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DRAFT
Program Environmental Impact Report
Fresno Southeast Development Area Specific Plan Project
City of Fresno, Fresno County, California

State Clearinghouse Number 2022020486

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius (Centigrade)
°F	degrees Fahrenheit
µg/m^3	micrograms per cubic meter
AAQS	Ambient Air Quality Standards
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ACHP	Advisory Council on Historic Preservation
ACLUP	Airport Comprehensive Land Use Plan
ACM	asbestos-containing material
ACP	Alternative Compliance Plan
ADA	Americans with Disabilities Act
ADL	aerially deposited lead
ADT	Average Daily Traffic
AEP	Association of Environmental Professionals
AF	acre-feet
AFY	acre-feet/year
AIA	Airport Influence Area
AIC	Archaeological Information Center
AICUZ	Air Installation Compatibility Use Zone
ALUC	Airport Land Use Commission
ALUCP	Airport Land Use Compatibility Plans
AMSL	above mean sea level
APCD	Air Pollution Control District
APE	Area of Potential Effect
APN	Assessor's Parcel Number
APS	Alternative Planning Strategy
AQI	Air Quality Index
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
AQP	Air Quality Plan
ARB	California Air Resources Board
ARFF	Airport Rescue Fire Fighting
AST	aboveground storage tank
ATCM	Airborne Toxic Control Measures
ATP	Active Transportation Plan

BAAQMD	Bay Area Air Quality Management District
BACT	Best Available Control Technology
BART	Bay Area Rapid Transit
BAU	Business as Usual
BCF	billion cubic feet
BCF/year	billion cubic feet per year
BGS	below ground surface
BMP	Best Management Practice
BPS	Best Performance Standards
BRT	Bus Rapid Transit
BTU	British Thermal Unit
BVOC	biogenic volatile organic compound
C^2ES	Center for Climate and Energy Solution
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAFE	Corporate Average Fuel Economy
CAGR	compound annual growth rate
CAL FIRE	California Department of Forestry and Fire Protection
Cal/EPA	California Environmental Protection Agency
Cal/OES	California Governor's Office of Emergency Services
Cal/OSHA	California Occupational Health and Safety Administration
CalEEMod	California Emissions Estimator Model
CALGreen	California Green Building Standards Code
CalRecycle	California Department of Resources Recycling and Recovery
Caltrans	California Department of Transportation
CAP	Climate Action Plan
CAPCOA	California Air Pollution Control Officers Association
CARTS	Cedar Avenue Recycling and Transfer Station
CBC	California Building Standards Code
CBCP	dibromochloropropane
CBCP	dibromo-chloropropane
CBSC	California Building Standards Commission
CCAA	California Clean Air Act
CCCC	California Climate Change Center
CCR	California Code of Regulations
CDF	California Department of Finance
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology

CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFC	chlorofluorocarbon
CFR	Code of Federal Regulations
CH_4	methane
CHL	California Historical Landmarks
CHRIS	California Historical Resources Information System
CMP	Congestion Management Plan
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CNPSEI	California Native Plant Society Electronic Inventory
CNRA	California Natural Resources Agency
CO	carbon monoxide
CO_2e	carbon dioxide equivalent
COG	Council of Governments
CPHI	California Points of Historical Interest
CPTED	Crime Prevention Through Environmental Design
CPUC	California Public Utilities Commission
CRA	Cultural Resources Assessment
CRHR	California Register of Historical Resources
CSA	Community Service Area
CTR	California Toxics Rule
CUPA	Certified Unified Program Agency
CVP	Central Valley Project
CWA	Clean Water Act
dB	decibel
dBA	A-weighted decibel
dBA/DD	A-weighted decibel per each doubling of the distance
DBCP	dibromochloropropane
DBH	diameter at breast height
DPM	diesel particulate matter
DSP	District Services Plan
DTSC	California Department of Toxic Substances Control
du	dwelling unit
du/acre	dwelling unit per acre

DWR	California Department of Water Resources
EDB	ethylene dibromide
EDD	California Employment Development Department
EFF	effective firefighting force
EIA	United States Energy Information Administration
EIR	Environmental Impact Report
EISA	Energy Independence and Security Act
EMFAC	Emission Factor
EOC	Emergency Operations Center
EPA	United States Environmental Protection Agency
EPO	Emergency Preparedness Officer
ESMP	Environmental Site Management Plan
ETWU	Estimated Total Water Usage
EV	electric vehicle
FAA	Federal Aviation Administration
FAR	floor area ratio
FAT	Fresno Yosemite International Airport
FAX	Fresno Area Express
FBO	Fixed Base Operator
FCEHD	Fresno County Environmental Health Division
FCMA	Fresno-Clovis Metropolitan Area
FCS	FirstCarbon Solutions
FEMA	Federal Emergency Management Agency
FFD	Fresno Fire Department
FGC	Fish and Game Code
FGFPD	Fig Garden Fire Protection District
FHSZ	Fire Hazard Severity Zone
FHWA	Federal Highway Administration
FID	Fresno Irrigation District
FIP	Flood Insurance Program
FIRM	Flood Insurance Rate Map
FMC	Fresno Municipal Code
FMFCD	Fresno Metropolitan Flood Control District
FMMP	Farmland Mapping and Monitoring Program
FPP	Farmland Preservation Program
FPPA	Farmland Protection and Policy Act
FresnoABM	Activity Based Travel Demand Model
ft-L	footlambert

GAMAQI	Guide for Assessing and Mitigating Air Quality Impacts
GHG	greenhouse gas
GIS	Geographic Information Systems
GPCD	gallons per capita per day
gpd/ad	gallons per day per acre
gpm	gallons per minute
GPS	Global Positioning System
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
GWh	gigawatt-hours
GWh/y	gigawatt-hours per year
GWP	global warming potential
HAP	Hazardous Air Pollutants
HCD	California Department of Housing and Community Development
HCM	Highway Capacity Manual
HCP	Habitat Conservation Plan
HEPA	high-efficiency particulate air
HFC	hydrofluorocarbon
HHW	household hazardous waste
HMRT	Hazardous Materials Response Team
HOV/HOT	High Occupancy Vehicle/High Occupancy Toll
HRA	Health Risk Assessment
HRI	California Historic Resources Inventory
HUD	Department of Housing and Urban Development
HVAC	heating, ventilation, and air conditioning
HWCL	Hazardous Waste Control Law
I/I	Infiltration and Inflow
IGSM	Integrated Groundwater and Surface Water Model
IIJA	Infrastructure Investment and Jobs Act
in/sec	inches per second
IOU	investor-owned utility
IPaC	Information for Planning and Consultation
IPCC	United Nations Intergovernmental Panel on Climate Change
ISO	Independent System Operator
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation System
kBTU	kilo-British Thermal Unit
kW	kilowatts

LAFCo	Local Agency Formation Commission
LBP	lead-based paint
LCFS	Low Carbon Fuel Standard
L_{dn}	day/night average sound level
LED	light-emitting diode
LEED™	Leadership in Energy and Environmental Design
L_{eq}	equivalent sound level
LEV	Low Emission Vehicle
L_{max}	maximum noise/sound level
LOS	Level of Service
LRA	Local Responsibility Area
LSE	load-serving entities
LUST	Leaking Underground Storage Tank
MBTA	Migratory Bird Treaty Act
Metro Plan	Metropolitan Water Resources Management Plan
MFCP	Model Farmland Conservation Program
mg/L	milligrams per liter
mgd	million gallons per day
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
MM	Mitigation Measure
MMRP	Mitigation Monitoring and Reporting Program
MOU	Memorandum of Understanding
mph	miles per hour
MPO	Metropolitan Planning Organization
MRF	Material Recovery Facilities
MRZ	Mineral Resources Zone
MS4	Municipal Separate Storm Sewer System
MT	metric tons
MTS	Metropolitan Transportation System
MTT	million metric tons
MW	megawatt
MWD	Metropolitan Water District of Southern California
MWELO	Model Water Efficient Landscape Ordinance
MXD	mixed-use development
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NAP-21	Moving Ahead for Progress in the 21st Century Act

NASA	National Aeronautics and Space Administration
NCCP	Natural Community Conservation Plan
NDC	nationally determined contributions
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NESWTF	Northeast Surface Water Treatment Facility
NEV	Neighborhood Electrical Vehicle
NFIP	National Flood Insurance Program
NFPA	National Fire Protection Association
NFWRF	North Fresno Wastewater Reclamation Facility
NHM	Natural History Museum of Los Angeles County
NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NIMS	National Incident Management System
NO_2	nitrogen dioxide
NOAA Fisheries	National Marine Fisheries Service
NOC	Notice of Completion
NOP	Notice of Preparation
NO_x	nitrogen oxides
NPDES	National Pollutant Discharge Elimination System
NPPA	Native Plant Protection Act
NRA	Natural Resources Agency
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
NSR	New Source Review
NTR	National Toxics Rule
NWIC	Northwest Information Center
O&M	Operations and Maintenance
O_3	ozone
OAL	Office of Administrative Law
OEHHA	California Office of Environmental Health Hazard Assessment
OHWM	ordinary high water mark
ONAC	Federal Office of Noise Abatement and Control
OPR	Governor's Office of Planning and Research
OS	Open Space
OSHA	Occupational Safety and Health Administration
PCB	polychlorinated biphenyl

PCE	tetrachloroethylene
pCi/L	picocuries per liter
PDWF	Peak Dry Weather Flow
PEIR	Program Environmental Impact Report
PFC	perfluorocarbon
PG&E	Pacific Gas and Electric Company
Phase I ESA	Phase I Environmental Site Assessment
PM_{10}	particulate matter, including dust, 10 micrometers or less in diameter
$PM_{2.5}$	particulate matter, including dust, 2.5 micrometers or less in diameter
ppb	parts per billion
ppm	parts per million
ppt	parts per trillion
PPV	peak particle velocity
PRC	Public Resources Code
PVC	polyvinyl chloride
PWWF	Peak Wet Weather Flow
RCRA	Resource Conservation and Recovery Act
REC	Recognized Environmental Condition
Recology	Integrated Resource Recovery Company
RecycleSmart	Central Contra Costa County Solid Waste Authority
REL	Reference Exposure Level
RHNA	Regional Housing Needs Allocation
RMP	Risk Management Plan
rms	root mean square
ROG	reactive organic gases
RPS	Renewables Portfolio Standard
RTM	Regional Transmission Main
RTP	Regional Transportation Plan
RWQCB	Regional Water Quality Control Board
RWRF	Regional Wastewater Reclamation Facility
SARA	Superfund Amendments and Reauthorization
SB	Senate Bill
SCH	State Clearinghouse
SCS	Sustainable Communities Strategy
SEDA	Southeast Development Area
SEGA	Southeast Growth Area
SEMS	Standardized Emergency Management System
SESWTF	Southeast Surface Water Treatment Facility

SF_6	sulfur hexafluoride
SFHA	Special Flood Hazard Area
SFPUC	San Francisco Public Utilities Commission
SGMA	Sustainable Groundwater Management Act
SIP	State Implementation Plan
SJVAB	San Joaquin Valley Air Basin
SMARA	California Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SOI	Sphere of Influence
South Coast AQMD	South Coast Air Quality Management District
SPCC	Spill Prevention, Control, and Countermeasure
SR	State Route
SRTP	Short Range Transit Plan
SSJVIC	Southern San Joaquin Valley Information Center
SSMP	Sewer System Management Plan
SSO	sanitary system overflow
State Water Board	California State Water Resources Control Board
SWIS	Solid Waste Information System
SWPPP	Storm Water Pollution Prevention Plan
SWTF	Surface Water Treatment Facility
TAC	toxic air contaminants
TAF	Transportation Analysis Framework
TAM	Transit Asset Management
T-BACT	Best Available Control Technology for Toxics
TCE	trichlorethylene
TCM	transportation control measures
TCP	trichloropropane
TDM	Transportation Demand Management
TDS	total dissolved solids
TDV	Time Dependent Valuation
TEA-21	Transportation Equity Act for the 21st Century
Tg	teragram
TGM	Transmission Grid Main
therms/y	therms per year
TIA	Traffic Impact Analysis
TIP	Transportation Improvement Program
TIS	Traffic Impact Study
TMA	Transportation Management Association

TMDL	Total Maximum Daily Load
TOD	Transit Oriented Development
TPM	Transportation Performance Management
TSCA	Toxic Substances Control Act
TSM	Transportation Systems Management
UBC	Uniform Building Code
UFC	Uniform Fire Code
UNFCCC	United Nations Framework Convention on Climate Change
USACE	United States Army Corps of Engineers
USAR	Urban Search and Rescue
USBR	United States Bureau of Reclamation
USC	United States Code
USDA	United States Department of Agriculture
USDOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	underground storage tank
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Plan Act
V/C	volume to capacity ratio
Valley Air District	San Joaquin Valley Air Pollution Control District
VCP	vitrified clay pipe
VdB	velocity in decibels
VDECS	Verified Diesel Emission Control Strategies
VMT	Vehicle Miles Traveled
VOC	volatile organic compounds
WATERS	Watershed Assessment, Tracking, and Environmental Results System
WDR	Waste Discharge Requirements
WQMP	Water Quality Management Plan
WRI	World Resources Institute
WSA	Water Supply Assessment
WWTP	Wastewater Treatment Plant
ZEV	Zero-Emission Vehicle

EXECUTIVE SUMMARY

Purpose

This Draft Program Environmental Impact Report (Draft PEIR) is prepared in accordance with the California Environmental Quality Act (CEQA) to evaluate the potential environmental impacts associated with the implementation of the proposed Fresno Southeast Development Area (SEDA) Specific Plan Project (State Clearinghouse No. 2022020486). This document is prepared in conformance with CEQA (Public Resources Code [PRC] § 21000, *et seq*.) and the CEQA Guidelines (California Code of Regulations [CCR], Title 14, § 15000, *et se*q.).

The purpose of this Draft PEIR is to inform decision-makers, representatives of affected and responsible agencies, the public, and other interested parties of the potential environmental effects that may result from implementation of the proposed project. This Draft PEIR describes potential impacts relating to a wide variety of environmental issues and methods by which these impacts can be mitigated or avoided.

Project Summary

Project Location

The City of Fresno (City) is located in the Fresno County, California, within the San Joaquin Valley. The City is located approximately 200 miles north of Los Angeles and 170 miles south of Sacramento. The City is located on the State Route (SR) 99 corridor and bounded by Madera County to the north, the City of Clovis to the northeast, and unincorporated land and communities to the east, south, and west. The City encompasses approximately 115.18 square miles and has a population of approximately 542,000 people.

The location of the nearly 9,000-acre Plan Area is in the southeast portion of the City, in Fresno County, California as shown in Exhibit 2-1. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the west by Locan, Temperance, and Minnewawa Avenues.

Project Description

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. The proposed project is framed with three interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. Additionally, the proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Project Objectives

The objectives of the proposed project are to:

Quantified Objectives:

- Accommodate between 40,000 and 45,000 dwelling units of varying types, sizes, densities, and affordability levels.
- Accommodate between 30,000 and 37,000 jobs.

Fiscal Responsibility:

- Provide self-financing for the development and ongoing maintenance of the SEDA that does not reduce City of Fresno resources dedicated to other areas of the City or burden Fresno residents outside of the SEDA.
- Holistically coordinate infrastructure to integrate efficiencies that piecemeal planning cannot.
- Invest in resource conserving techniques for stormwater systems, water supply, and trail and open space networks to save on infrastructure and mitigation costs.

Social Equity:

- Promote health by reducing harmful emissions from cars and industry.
- Foster healthy physical activity and community interaction by providing easy, safe walking and bicycle access to parks, schools, and retail centers.
- Sustain the diversity of Fresno's population by providing a wide variety of housing choices and business opportunities.
- Respect the major economic and cultural role of agriculture in the Central Valley by accommodating growth within the confines of a smaller urban footprint and directly integrating community-scale agriculture into the design of community centers, neighborhoods, and open spaces.

Environmental Sustainability:

- Emphasize the efficient use of energy, water, and other resources in SEDA design and policies. Strive to produce a self-mitigating plan that deeply reduces the environmental impacts of growth and can sustain and even serve to improve or repair natural systems.
- Reduce energy and water consumption through more efficient land use patterns, smarter building standards, and environmentally sensitive infrastructure to help Fresno meet standards for greenhouse gas emissions, and well as air pollution and water quality.

Housing Choice:

- Offer a variety of housing choices to a mix of incomes, age groups, and lifestyles.
- Ensure new housing units are affordable to households with varying levels of income through covenants and deed-restrictions or other affordability mechanisms.

High Quality Transit Service:

- Provide convenient and frequent transit service to connect SEDA's town centers to jobs and housing inside the Plan Area and across the region.

Walkable Neighborhoods:

- Provide for nearly all homes to be located within walking distance of a Neighborhood Town Center with an elementary school, recreation areas, community gardens, and small shops.

Parks, Open Space, and Trails:

- Create a variety of natural open spaces and parks for recreation in all areas of the SEDA.
- Create trail systems and bicycle paths that make traveling without a car safe and convenient.
- Ensure that schools and major town centers can be reached safely with or without a car.

Mixed Use Town Centers:

- Mix shopping, housing, and jobs in vibrant Regional Town Centers and Community Town Centers that are easily accessible to most residents via a short walk, bike ride, drive, or transit trip.

Innovative Employment Areas:

- Attract opportunities in green technology and energy systems, ag-related industries, modular housing, and other emerging fields to provide jobs for Fresno residents.

Community Farming and Agriculture:

- Integrate small farms, community gardens, and farmers' markets into neighborhoods, schools, and town centers.
- Create a buffer that includes rural homes, organic farming, and open spaces to serve as a transition between the SEDA and commercial agriculture to the east.

Implementation:

- Develop the SEDA in an organized and phased manner based on housing needs, infrastructure availability, and minimization of impacts.
- Ensure amenities and infrastructure provision for each new phase prior to commencement of construction.

Significant Unavoidable Adverse Impacts

The proposed project would result in the following significant unavoidable impacts:

- **Impact AES-3 (Project-level Visual Character):** The proposed project would, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site

and its surroundings. (Public views are those that are experienced from publicly accessible vantage point). Buildout of the SEDA Specific Plan would alter the existing visual character by increasing the intensity of development in many areas that are primarily agriculture. No feasible mitigation measures are available to mitigate the impact to a less than significant level.

- **Impact AES-4 (Project-level Light and Glare):** The proposed project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Intensified development in the Plan Area could increase the amount of light from streetlights, exterior lighting from buildings, and vehicle headlights. The increase in lighting within the Plan Area could result in light spillover onto adjacent areas and could substantially illuminate the sky during nighttime. This increase in illumination is considered a significant impact. Implementation of Mitigation Measures (MM) AES-4a through MM AES-4e would reduce potential glare impacts resulting from the proposed project by requiring shields, low-intensity fixtures, requirements for signs, and non-reflective materials. However, impacts would remain significant and unavoidable.
- **Cumulative Aesthetics, Lights, and Glare Impacts:** Implementation of the proposed project would increase intensify development of structures, which would create new sources of light and glare within the Plan Area and adjacent to the Plan Area. These new sources of glare could result from materials used on building façades, parking lots, signs, roadway surfaces, and motor vehicles. This increase in glare could result in cumulatively considerable significant glare impacts and illumination of the nighttime sky. Additionally, implementation of MM AES-4a through MM AES-4e would reduce potential glare impacts resulting from the proposed project. However, impacts would remain significant and unavoidable.
- **Impact AG-1 (Project-level Conversion of Farmland to Nonagricultural Uses):** There are approximately 2,475 acres of land designated as Prime Farmland, approximately 1,352 acres of Farmland of Statewide Importance, approximately 1,189 acres of land designated as Farmland of Local Importance, and approximately 1,725 acres of land designated as Unique Farmland scattered throughout the Plan Area. Through its open space framework and land use objectives and policies, the Specific Plan would allow flexibility in the location, form, and function of diverse agricultural types within communities and would establish a buffer between the urban area of the City of Fresno and the surrounding agricultural land. Consistent with Policy RC-9-c, incorporation of the General Plan MM AG-1.1, which requires future development to comply with the Farmland Preservation Program (FPP) once adopted for the SEDA would ensure that all future development would be required to mitigate the loss of farmland if Prime Farmland, Unique Farmland, or Farmland of Statewide Importance where such lands are proposed to be converted to urban uses within the Sphere of Influence (SOI) outside city limits. However, because the FPP has not yet been developed, the proposed project would implement project-specific MM AG-2, which requires all future development to mitigate the loss of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, on a project-by-project basis before the initiation of construction or ground-disturbing activities. However, while implementation of MM AG-2 would reduce some project specific impacts, loss of Prime Farmland would still occur with implementation of the proposed

project. Therefore, this impact would be significant and unavoidable even with implementation of available mitigation.

- **Impact AG-2 (Project-level Conflict with Existing Zoning or Williamson Act Contract)**: According to the General Plan, the City and its SOI includes lands under Williamson Act Contract for prime and non-prime agricultural land. According to the Williamson Act property map, the majority of Williamson Act properties within the City and SOI are located within the Plan Area. Therefore, the continued implementation of the approved General Plan and the proposed Specific Plan could conflict with existing Williamson Act Contracts because non-agricultural uses are allowed on the land under a Williamson Act Contract. As a result, the continued implementation of the General Plan and proposed Specific Plan could result in a significant impact on existing Williamson Act Contract land. While the policies included in the Specific Plan would directly limit farmland conversion and thereby help to preserve agriculture in the Plan Area and implementation of the FPP when established through General Plan MM AG-1.1 as a condition of approval, buildout of the proposed project would still result in the conversion of Williamson Act land to nonagricultural uses. Therefore, this impact would be significant and unavoidable without any available mitigation.
- **Cumulative Agricultural Resources and Forestry Resources Impacts:** Although the proposed project would promote small farms, community gardens, and farmer's markets, future development in areas outside of the Plan Area, in combination of the loss of prime farmland within the Plan Area, would result in the conversion of farmland to non-agriculture uses. Therefore, the implementation of the proposed project would result in a significant and unavoidable impact on agricultural zoning and Williamson Act Contracts. The proposed project includes land use changes that would result in the conversion of farmland to non-agriculture uses, and no feasible mitigation measures are available. Therefore, this impact would be significant and unavoidable.
- **Impact AIR-1 (Project-level Consistency with Air Quality Management Plan):** The proposed project has the potential to exceed the San Joaquin Valley Air Pollution Control District (Valley Air District) significance thresholds during construction and operation. Implementation of the proposed project would result in the generation of substantial long-term criteria air pollutant emissions that would exceed the Valley Air District regional significance thresholds and would therefore not be considered consistent with the existing Air Quality Plans (AQPs). No further measures are available beyond the applicable Valley Air District rules and regulations in addition to the proposed project's policies and design guidelines. The various goals and policies of the proposed project would contribute to reducing long-term criteria air pollutant emissions to the extent feasible. However, due to the magnitude and intensity of development accommodated by the proposed project, it would, it would have a significant and unavoidable impact.
- **Impact AIR-2 (Project-level Cumulative Criteria Pollutant Emissions):** While adherence to Rule 9510 would contribute to reducing exhaust nitrogen oxide (NO_x) emissions, it would not be applicable to reducing volatile organic compound (VOC) emissions generated by operation of equipment and from off-gassing from asphalt and paints. Additionally, there is potential for multiple projects to be constructed at one time in the Plan Area, resulting in the generation of

cumulatively significant amounts of NO_x emissions. Regional emissions generated by the proposed project would exceed applicable thresholds for cumulative criteria pollutant emissions after compliance with all rules, regulations, and mitigation measures during operation. While compliance with the Valley Air District rules and the policies of the proposed Specific Plan may contribute to reducing operation-related regional air quality impacts of individual projects envisioned under the proposed Specific Plan to less than significant levels, the projected cumulative emissions associated with future development projects would be in exceedance of the Valley Air District thresholds. Therefore, implementation of the proposed project would result in a significant impact because it would significantly contribute to the nonattainment designations of the San Joaquin Valley Air Basin (SJVAB). This impact would be significant and unavoidable**.**

- **AIR-3 (Project-level Sensitive Receptors Exposure to Pollutant Concentrations):** Compliance with existing regulatory programs, General Plan policies and mitigation measures, and MM AIR-1a through MM AIR-1f will serve to reduce the impacts of the proposed project to the extent feasible. However, the proposed project would result in the future development of numerous projects, each contributing incrementally to air emissions affecting sensitive receptors. Thus, it is possible that the proposed project would result in cumulatively significant impacts to sensitive receptors, even if individual projects were each less than significant. This is particularly likely since none of the measures herein would prevent multiple development projects from being constructed concurrently within close proximity to sensitive receptors in such a manner as to cause substantial concentrations within the area. Further, neither the amount of construction occurring nor the exact location within the Plan Area is foreseeable and, as such, it cannot be determined whether the resultant construction emissions could be adequately controlled or reduced to below regulatory thresholds. Without such information, it is not possible to conclude that air pollutant emissions resulting from construction activities would be adequately reduced to the point that sensitive receptors are not exposed to substantial concentrations of air pollutants, and thus a significant and unavoidable impact may result.
- **Cumulative Air Quality Impacts:** While implementation of MM AIR-1a though MM AIR-1f, as well as General Plan PEIR Mitigation Measures, would serve to reduce criteria air pollutant and toxic air contaminants (TAC) emissions generated by the proposed project, there is currently not enough information to quantify emissions of specific project development that may occur under the proposed project. Without quantification to guarantee a less than significant finding, future development projects may still exceed the Valley Air District regional significance thresholds. Additionally, due to the size of the proposed project, there is not sufficient mitigation available to reduce the potential criteria pollutant emissions associated with the proposed project to levels that would not exceed the Valley Air District thresholds of significance. Therefore, cumulative impacts to air quality would be considered to remain significant and unavoidable.
- **Impact GHG-1 (Project-level Greenhouse Gas Emissions):** Implementation of the proposed project would contribute to global climate change through direct emissions of greenhouse gases (GHG) from on-site area sources and vehicle trips generated by the proposed project, and indirectly through off-site energy production required for on-site activities, water use, and

waste disposal. The operation of the proposed project would generate an increase in population and employment, and would contribute to an increase in wastewater generation, water demand, and vehicle trips. New buildings would be more energy efficient, but there would be an overall increase in energy usage due to the magnitude of new building space that would be constructed. Per the GHG Plan Update guidance, the environmental impact of the proposed project related to GHG emissions is significant, because the Plan Area is currently outside of the City boundaries, and the emissions included in the planning area were not included or considered by the City in the preparation of the GHG Plan Update, which demonstrates that the city would be in compliance with State mandated GHG emission reduction goals. As a result, the proposed project is not consistent with the GHG Plan Update, and the proposed project's contribution to environmental impacts related to GHG emissions are significant. The guiding principles, design guidelines, and proposed land use designations for the Plan Area would contribute to minimizing emissions to the extent feasible, however there is no mitigation feasible to reduce the GHG emissions of the proposed project to less than significant levels. The GHG impacts of the proposed project are significant and unavoidable

- **Cumulative Greenhouse Gas Emissions Impacts:** The proposed project would result in an expansion of the City of Fresno boundaries and would contribute to population growth in the region that was not included in the GHG Plan Update emissions projections, which demonstrate conformity with State GHG reduction goals. The proposed project would generate a significant net increase in GHG emissions and would have a "significant" GHG impact per the City of Fresno GHG Reduction Plan Update. As the proposed project would have a significant impact per the guidance included in the GHG Plan Update, the project has a potentially significant level of cumulative significance. There are no feasible mitigation measures available. As such, cumulative impacts with regard to GHG emissions are significant and unavoidable.
- **Impact NOI-1 (Project-level Construction Noise):** Short-term construction noise impacts associated with the project are an increase in traffic flow on local streets associated with the transport of workers, equipment, and materials to and from the project site and noise generated during site–preparation, grading, and construction activities. With implementation of MM NOI–1a and MM NOI–1b, construction noise impacts due to construction activities would be reduced to the extent feasible. However, given that details of individual development projects in the vicinity of the Plan Area are currently unknown, it is not possible to quantify the construction noise impacts at specific off-site or on-site sensitive receptors. Because these construction activities may occur near noise-sensitive receptors and because noise disturbances may occur for prolonged periods of time, construction noise impacts would remain significant and unavoidable.
- **Cumulative Construction Noise:** Given that details of individual development projects adjacent to the Plan Area are currently unknown, it is not possible to quantify future cumulative construction noise impacts that could occur if multiple developments were to construct simultaneously, which could constitute a cumulative noise impact. Because construction activities associated with implementation of the Specific Plan could then also occur simultaneously and because noise disturbances could occur for prolonged periods of

time, there is the possibility for a cumulative construction noise impacts that would remain significant and unavoidable.

Areas of Controversy

Pursuant to CEQA Guidelines Section 15123(b), a summary section must address areas of controversy known to the Lead Agency, including issues raised by agencies and the public, and it must also address issues to be resolved, including the choice among alternatives and whether or how to mitigate the significant effects.

A Notice of Preparation (NOP) for the proposed project was issued on February 22, 2022. The NOP describing the original concept for the proposed project and issues to be addressed in the Draft PEIR was distributed to the State Clearinghouse, responsible agencies, and other interested parties for a 30-day public review period extending from February 22, 2022 through March 25, 2022. The NOP identified the potential for significant impacts on the environment related to the following topical areas:

- Aesthetics, Light, and Glare
- Agricultural Resources and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources and Tribal Cultural Resources
- Energy
- Geology, Soils, and Seismicity
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems
- Wildfire
- Mandatory Findings of Significance

Disagreement Among Experts

This Draft PEIR contains substantial evidence to support all the conclusions presented herein. It is possible that there will be disagreement among various parties regarding these conclusions, although the City of Fresno is not aware of any disputed conclusions at the time of this writing. Both the CEQA Guidelines and case law clearly provide the standards for treating disagreement among experts. Where evidence and opinions conflict on an issue concerning the environment, and the Lead Agency knows of these controversies in advance, the EIR must acknowledge the controversies, summarize the conflicting opinions of the experts, and include sufficient information to allow the public and decision-makers to make an informed judgment about the environmental consequences of the proposed project.

Potentially Controversial Issues

Below is a list of potentially controversial issues that may be raised during the public review and hearing process of this Draft PEIR:

- Section 3.2, Agricultural Resources and Forestry Resources
- Section 3.5, Cultural Resources and Tribal Cultural Resources
- Section 3.7, Geology, Soils, and Seismicity
- Section 3.9, Hazards and Hazardous Materials
- Section 3.10, Hydrology and Water Quality
- Section 3.15, Public Services
- Section 3.17, Transportation and Traffic
- Section 3.18, Utilities and Service Systems

It is also possible that evidence will be presented during the 45-day, statutory EIR public review period that may create disagreement. Decision-makers would consider this evidence during the public hearing process.

In rendering a decision on a project where there is disagreement among experts, the decision-makers are not obligated to select the most environmentally preferable viewpoint. Decision-makers are vested with the ability to choose whatever viewpoint is preferable and need not resolve a dispute among experts. In their proceedings, decision-makers must consider comments received concerning the adequacy of the Draft PEIR and address any objections raised in these comments. However, decision-makers are not obligated to follow any directives, recommendations, or suggestions presented in comments on the Draft PEIR, and can certify the Final EIR without needing to resolve disagreements among experts.

Public Review of the Draft Program EIR

Upon completion of the Draft PEIR, the City of Fresno filed a Notice of Completion (NOC) with the Governor's Office of Planning and Research (OPR) to begin the public review period (PRC § 21161). Concurrent with the NOC, this Draft PEIR has been distributed to responsible and trustee agencies, other affected agencies, surrounding cities, and interested parties, as well as all parties requesting a copy of the Draft PEIR in accordance with Public Resources Code 21092(b)(3). During the public review period, the Draft PEIR, including the technical appendices, is available for review at the City of Fresno Planning and Development Department. The address for each location is provided below:

City of Fresno
Attn: Jennifer Clark, Director
Planning and Development Department
2600 Fresno Street, Room 3065
Fresno, California 93721

Agencies, organizations, and interested parties have the opportunity to comment on the Draft PEIR during the 45-day public review period. Written comments on this Draft PEIR should be addressed to:

Jennifer Clark, Director, Planning and Development Department
c/o Sophia Pagoulatos, Planning Manager
2600 Fresno Street, Room 3065
Fresno, California 93721
Jennifer.Clark@fresno.gov
Sophia.Pagoulatos@fresno.gov

Submittal of electronic comments in Microsoft Word or Adobe PDF format is encouraged. Upon completion of the public review period, written responses to all significant environmental issues raised will be prepared and made available for review by the commenting agencies at least 10 days prior to the public hearing before the City of Fresno on the proposed project, at which the certification of the Final EIR will be considered. Comments received and the responses to comments will be included as part of the record for consideration by decision-makers for the proposed project.

Executive Summary Matrix

Table ES-1 below summarizes the impacts, mitigation measures, and resulting level of significance after mitigation for the relevant environmental issue areas evaluated for the proposed project. The table is intended to provide an overview; narrative discussions for the issue areas are included in the corresponding section of this Draft PEIR. Table ES-1 is included in the Draft PEIR as required by CEQA Guidelines Section 15123(b)(1).

Table ES-1: Executive Summary Matrix

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.1—Aesthetics, Light, and Glare		
Impact AES-1: The proposed project would not have a substantial adverse effect on a scenic vista.	None required.	N/A
Impact AES-2: The proposed project would not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within a State Scenic Highway.	None required.	N/A
Impact AES-3: The proposed project would in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings. (Public views are those that are experienced from publicly accessible vantage point).	None.	Significant and unavoidable impact.
Impact AES-4: The proposed project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.	**MM AES-1**: Lighting systems for street and parking areas shall include shields to direct light to the roadway surfaces and parking areas. Vertical shields on the light fixtures shall also be used to direct light away from adjacent light sensitive land uses such as residences.	Significant and unavoidable impact.
	MM AES-2: Lighting systems for public facilities such as active play areas shall provide adequate illumination for the activity; however, low-intensity light fixtures and shields shall be used to minimize spillover light onto adjacent properties.	
	MM AES-3: Lighting systems for nonresidential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low-intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur.	
	MM AES-4: Lighting systems for freestanding signs shall not exceed 100 footlambert (ft-L) when adjacent to streets which have an average light intensity of less than 2.0 horizontal footcandles and shall not exceed 500 ft-L when adjacent to streets that have an average light intensity of 2.0 horizontal foot-candles or greater.	
	MM AES-5: Materials used on building façades shall be non-reflective.	

Impacts	Mitigation Measures	Level of Significance After Mitigation
Cumulative Impact: The project would result in significant and unavoidable cumulative impacts to aesthetics, light, and glare.	Implement **MM AES-1 through MM AES-5.**	Significant and unavoidable impact.
Section 3.2—Agriculture Resources and Forest Resources		
Impact AG-1: The proposed project would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use.	**MM AG-1.1:** Consistent with Policy RC-9-c of the approved General Plan, the City, in coordination with regional partners or independently, shall establish a Farmland Preservation Program by 2025. The intent of the Farmland Preservation Program would be that, when Prime Farmland, Unique Farmland, or Farmland of Statewide Importance are proposed for development and converted to urban uses within the Sphere of Influence outside city limits, this program would require that the developer of such a project mitigate the loss of farmland consistent with the requirements of CEQA. The Farmland Preservation Program shall establish thresholds of significance and provide several mitigation options that may include, but are not limited to, the following: • Restrictive Covenants or Deeds • In Lieu Fees • Mitigation Banks • Fee Title Acquisition • Conservation Easements • Land Use Regulations The Farmland Preservation Program may be modeled after some or all of the programs described by the California Council of Land Trusts. Prior to the adoption of the Farmland Preservation Program, projects shall be required to comply with CEQA to address potential environmental impacts on an individual basis. **MM AG-2: Prime Farmland, Unique Farmland, and Farmland of Statewide Importance Impact Reduction Measure.** Until the City's Farmland Preservation Program is implemented consistent with the General Plan Program Environmental Impact Report Mitigation Measure (MM) AG-1.1 and the General Plan Policy RC-9-c, all development in the Fresno Southeast Development Area Specific Plan Area which would convert land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance	Significant and unavoidable impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
	to nonagricultural uses shall be analyzed on a project-by-project basis, consistent with the requirements of the California Environmental Quality Act (CEQA) at the time the project application is submitted. Where a specific development project site would include the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses, the project applicant shall identify feasible mitigation prior to project approval and implement such mitigation prior to any construction or ground-disturbing activities. Such mitigation may include but is not limited to siting project to avoid farmland; payment of in lieu fees; or, the acquisition and/or conservation of equivalent Prime Farmland, Unique Farmland, or Farmland at Statewide Importance at another location, where it is financially feasible to do so, in the form of agricultural conservation easements, or other feasible mitigation.	
Impact AG-2: The proposed project would not conflict with existing zoning for agricultural use, or a Williamson Act Contract.	None.	Significant and unavoidable impact.
Impact AG-3: The proposed project would not conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g)).	None required.	No impact.
Impact AG-4: The proposed project would not result in the loss of forest land or conversion of forest land to non-forest use.	None required.	No impact.
Impact AG-5: The proposed project would not involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or conversion of forest land to non-forest use.	Implement **MM AG-1.1** and **MM AG-2**.	No impact.
Cumulative Impact: The project would result in significant and unavoidable cumulative impacts to agricultural and forestry resources.	Implement **MM AG-1.1** and **MM AG-2**.	Significant and unavoidable impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.3—Air Quality		
Impact AIR-1: The proposed project would conflict with or obstruct implementation of the applicable air quality plan.	**MM AIR-1a:** As part of a standard grading permit submittal, the project applicant shall submit documentation to the City of Fresno that demonstrates that all off-road construction equipment in excess of 50 horsepower is equipped with engines meeting the United States Environmental Protection Agency (EPA) Tier IV Final off-road engine emission standards or cleaner. The construction contractor shall maintain records concerning its efforts to comply with this requirement during construction, including equipment lists. Off-road equipment descriptions and information may include but are not limited to equipment type, equipment manufacturer, equipment identification number, engine model year, engine certification (tier rating), horsepower, and engine serial number. The project applicant and/or construction contractor shall submit the construction operations plan and records of compliance to the City of Fresno. If engines that comply with Tier IV Final off-road emission standards are not commercially available, then the construction contractor shall use the next cleanest piece of off-road equipment (e.g., Tier IV Interim) available. For purposes of this mitigation measure, "commercially available" shall mean the availability of Tier IV Final engines taking into consideration factors such as (i) critical-path timing of construction; and (ii) geographic proximity to the project site of equipment. The contractor can maintain records for equipment that is not commercially available by providing letters from at least two rental companies for each piece of off-road equipment where the Tier IV Final engine is not available.	Significant and unavoidable impact.
	MM AIR-1b: Prior to the issuance of grading or building permits for each individual development proposal within the project site, the relevant applicant for each development shall provide the City with documentation demonstrating the use of "Super-Compliant" architectural coatings during construction of the proposed project. "Super-Compliant" architectural coatings, as defined by the South Coast AQMD, are paints which do not exceed 10 grams of reactive organic gas (ROG) per liter of paint. All architectural coatings shall be applied either by (1) using a high-volume, low-pressure spray method operated at an air pressure between 0.1 and 10	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	pounds per square inch gauge to achieve a 65 percent application efficiency; or (2) manual application using a paintbrush, hand-roller, trowel, spatula, dauber, rag, or sponge, to achieve a 100 percent application efficiency. The construction contractor shall also use precoated/natural colored building materials, where feasible.	
	MM AIR-1c: All nonresidential buildings shall be designed to provide infrastructure to support use of electric-powered forklifts and/or other interior vehicles. All nonresidential buildings shall be designed to provide electric infrastructure to support use of exterior yard trucks and on-site vehicles. The operation of yard trucks that are used to move trailers and on-site vehicles within the project site shall be powered by electricity unless the project applicant can reasonably demonstrate that specific equipment is not available for a task. Compliance with this mitigation measure shall be verified by the City of Fresno prior to the issuance of a building permit.	
	MM AIR-1d: Each implementing development project shall be required to implement, at a minimum, an increase in each building's energy efficiency 15 percent beyond Title 24, and reduce indoor water use by 25 percent. All requirements will be documented through a checklist to be submitted to the City of Fresno prior to issuance of building permits for the implementing development project with building plans and calculations.	
	MM AIR-1e: Prior to issuance of building permits for non-single-family residential and mixed-use residential development projects in the Plan Area, the project applicant shall indicate on the building plans that the following features have been incorporated into the design of the building(s). Proper installation of these features shall be verified by the City of Fresno prior to the issuance of a Certificate of Occupancy. • Electric vehicle (EV) charging shall be provided as specified in Section A4.106.8.2 (Residential Voluntary Measures) of the California Green Building Standards Code (CALGreen) Code. • Bicycle parking shall be provided as specified in Section A4.106.9 (Residential Voluntary Measures) of the CALGreen Code.	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	MM AIR-1f: Prior to the issuance of building permits for nonresidential development projects in the Plan Area, project applicants shall indicate on the building plans that the following features have been incorporated into the design of the building(s). Proper installation of these features shall be verified by the City of Fresno prior to the issuance of a Certificate of Occupancy. • For buildings with more than 10 tenant-occupants, changing/shower facilities shall be provided as specified in Section A5.106.4.3 (Nonresidential Voluntary Measures) of the California Green Building Standards Code (CALGreen) Code. • Preferential parking for low-emitting, fuel-efficient, and carpool/van vehicles shall be provided as specified in Section A5.106.5.1 (Nonresidential Voluntary Measures) of the CALGreen Code. • Facilities shall be installed to support future electric vehicle (EV) charging at each nonresidential building with 30 or more parking spaces. Installation shall be consistent with Section A5.106.5.3 (Nonresidential Voluntary Measures) of the CALGreen Code.	
Impact AIR-2: The proposed project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard.	Implement **MM AIR-1a through MM AIR-1f.**	Significant and unavoidable impact.
Impact AIR-3: The proposed project would expose sensitive receptors to substantial pollutant concentrations.	None.	Significant and unavoidable impact.
Impact AIR-4: The proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.	None.	N/A
Cumulative Impact: The project would have significant and unavoidable cumulative impacts to air quality.	Implement **MM AIR-1a through MM AIR-1f.**	Significant and unavoidable impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.4—Biological Resources		
Impact BIO-1: The proposed project would have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.	None.	N/A
Impact BIO-2: The proposed project would have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.	None.	N/A
Impact BIO-3: The proposed project would have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.	None.	N/A
Impact BIO-4: The proposed project would interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites.	None.	N/A
Impact BIO-5: The proposed project would conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.	None.	N/A
Impact BIO-6: The proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State habitat conservation plan.	None.	N/A

Impacts	Mitigation Measures	Level of Significance After Mitigation
Cumulative Impact: The project would have a less than cumulative impact on biological resources.	None.	N/A
Section 3.5—Cultural Resources and Tribal Cultural Resources		
Impact CUL-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5.	None.	N/A
Impact CUL-2: The proposed project would not cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.	None.	N/A
Impact CUL-3: The proposed project would not disturb human remains, including those interred outside of formal cemeteries.	None.	N/A
Impact CUL-4: The proposed project would not cause a substantial adverse change in the significance of a Tribal Cultural Resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).	None.	N/A
Impact CUL-5: The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to	None.	N/A

Impacts	Mitigation Measures	Level of Significance After Mitigation
be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1.		
Cumulative Impact: The project would have a less than significant cumulative impact on cultural and tribal cultural resources.	None.	N/A
Section 3.6—Energy		
Impact ENER-1: The proposed project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.	None.	N/A
Impact ENER-2: The proposed project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on energy.	None.	N/A
Section 3.7—Geology and Soils		
Impact GEO-1: The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving: i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42. ii) Strong seismic ground shaking. iii) Seismic-related ground failure, including liquefaction. iv) Landslides.	None.	N/A
Impact GEO-2: The proposed project would not result in substantial soil erosion or the loss of topsoil.	None.	N/A

Impacts	Mitigation Measures	Level of Significance After Mitigation
Impact GEO-3: The proposed project would not be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse.	None.	N/A
Impact GEO-4: The proposed project would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.	None required.	N/A
Impact GEO-5: The proposed project would not have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.	None.	N/A
Impact GEO-6: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.	**MM GEO-6.1:** Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for unique paleontological/geological resources shall be conducted. The following procedures shall be followed: • If unique paleontological/geological resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that unique paleontological/geological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified Paleontologist shall be consulted to determine whether the resource requires further study. The qualified Paleontologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to, excavation of the finds and evaluation of the finds. If the resources are determined to be significant, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading	Less than significant impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
	shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any paleontological/geological resources recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study. • If unique paleontological/geological resources are found during the field survey or literature review, the resources shall be inventoried and evaluated for significance. If the resources are found to be significant, mitigation measures shall be identified by the qualified Paleontologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include a paleontological monitor. The monitoring period shall be determined by the qualified Paleontologist. If additional paleontological/geological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed. **MM GEO-1:** Applicants, owners and/or sponsors of all future development or construction projects shall be required to perform or provide paleontological monitoring during ground-disturbing activities. Should significant paleontological resources (e.g., bones, teeth, well-preserved plant elements) be unearthed by the future project construction crew, the project activities shall be diverted at least 15 feet from the discovered paleontological resources until a professional Paleontologist has assessed such discovered resources and, if deemed significant, such resources shall be salvaged in a timely manner. The applicant/owner/sponsor of said project shall be responsible for diverting project work and providing the assessment including retaining a professional Paleontologist for such purpose. Collected fossils shall be deposited by the applicant/owner/sponsor in an appropriate repository (e.g., University of California Museum of Paleontology (UCMP), California Academy of Sciences) where the collection shall be properly curated and made available for future research.	

Impacts	Mitigation Measures	Level of Significance After Mitigation
Cumulative Impact: The project would have a less than significant cumulative impact with mitigation incorporated on geology and soils.	None.	Less than significant impact with mitigation incorporated.
Section 3.8—Greenhouse Gas Emissions		
Impact GHG-1: The proposed project would generate direct and indirect greenhouse gas emissions, and these emissions would result in a significant impact on the environment. **Impact GHG-2:** The proposed project would conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.	No feasible mitigation available.	Significant and unavoidable impact.
Cumulative Impact: The project would have a significant and unavoidable cumulative impact on greenhouse gas emissions.	None available.	Significant and unavoidable impact.
Section 3.9—Hazards and Hazardous Materials		
Impact HAZ-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.	None required.	N/A
Impact HAZ-2: The proposed project would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment.	**MM HAZ-2a:** Prior to the issuance of a grading permit, the property owners and/or developers of properties shall ensure that a Phase I Environmental Site Assessment (Phase I ESA) (performed in accordance with the current Airborne Toxic Control Measures [ATCM] Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process [E 1527]) shall be conducted for each individual property prior to development or redevelopment to ascertain the presence or absence of Recognized Environmental Conditions (RECs), Historical Recognized Environmental Conditions (HRECs), and Potential Environmental Concerns (PECs) relevant to the property under consideration. The findings and conclusions of the Phase I ESA shall become the basis for potential recommendations for follow-up investigation, if found to be warranted.	Less than significant impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
	MM HAZ-2b: In the event that the findings and conclusions of the Phase I Environmental Site Assessment (Phase I ESA) for a property result in evidence of Recognized Environmental Conditions (RECs), Historical Recognized Environmental Conditions (HRECs) and/or Potential Environmental Concerns (PECs) warranting further investigation, the property owners and/or developers of properties shall ensure that a Phase II ESA shall be conducted to determine the presence or absence of a significant impact to the subject site from hazardous materials. The Phase II ESA may include but may not be limited to the following: (1) Collection and laboratory analysis of soils and/or groundwater samples to ascertain the presence or absence of significant concentrations of constituents of concern; (2) Collection and laboratory analysis of soil vapors and/or indoor air to ascertain the presence or absence of significant concentrations of volatile constituents of concern; and/or (3) Geophysical surveys to ascertain the presence or absence of subsurface features of concern such as underground storage tanks (USTs), drywells, drains, plumbing, and septic systems. The findings and conclusions of the Phase II ESA shall become the basis for potential recommendations for follow-up investigation, site characterization, and/or remedial activities, if found to be warranted.	
	MM HAZ-2c: In the event the findings and conclusions of the Phase II Environmental Site Assessment (Phase II ESA) reveal the presence of significant concentrations of hazardous materials warranting further investigation, the property owners and/or developers of properties shall ensure that site characterization shall be conducted in the form of additional Phase II ESAs in order to characterize the source and maximum extent of impacts from constituents of concern. The findings and conclusions of the site characterization shall become the basis for formation of a remedial action plan and/or risk assessment.	
	MM HAZ-2d: If the findings and conclusions of the Phase II Environmental Site Assessment (Phase II ESA), site characterization and/or risk assessment demonstrate the presence of concentrations of hazardous materials exceeding regulatory threshold levels, prior to the issuance of a grading permit, property owners and/or developers of properties shall complete site remediation and potential risk assessment with oversight from the applicable regulatory agency including, but not limited to, the California	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) or Regional Water Quality Control Board (RWQCB), and Fresno County Environmental Health Division (FCEHD). Potential remediation could include the removal or treatment of water and/or soil. If removal occurs, hazardous materials shall be transported and disposed at a hazardous materials permitted facility.	
	MM HAZ-2e: Prior to the issuance of a building permit for an individual property within the Plan Area with residual environmental contamination, the agency with primary regulatory oversight of environmental conditions at such property ("Oversight Agency") shall have determined that the proposed land use for that property, including proposed development features and design, does not present an unacceptable risk to human health, if applicable, through the use of an Environmental Site Management Plan (ESMP) that could include institutional controls, site-specific mitigation measures, a risk management plan, and deed restrictions based upon applicable risk-based cleanup standards. Remedial action plans, risk management plans and health and safety plans shall be required as determined by the Oversight Agency for a given property under applicable environmental laws, if not already completed, to prevent an unacceptable risk to human health, including workers during and after construction, from exposure to residual contamination in soil and groundwater in connection with remediation and site development activities and the proposed land use.	
	MM HAZ-2f: For those sites with potential residual volatile organic compounds (VOCs) in soil, soil gas, or groundwater that are planned for redevelopment with an overlying occupied building, a vapor intrusion assessment shall be performed by a licensed environmental professional. If the results of the vapor intrusion assessment indicate the potential for significant vapor intrusion into the proposed building, the project design shall include vapor controls or source removal, as appropriate, in accordance with Regional Water Quality Control Board (RWQCB), the Department of Toxic Substances Control (DTSC) or the Fresno County Environmental Health Division (FCEHD) requirements. Soil vapor mitigations or controls could include passive venting and/or active venting. The vapor intrusion assessment as associated vapor controls or source removal can be	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	incorporated into the Environmental Site Management Plan (ESMP) (Mitigation Measure HAZ4-4e).	
	MM HAZ-2g: In the event of planned renovation or demolition of residential and/or commercial structures on the subject site, prior to the issuance of demolition permits, asbestos and lead-based paint (LBP) surveys shall be conducted in order to determine the presence or absence of asbestos-containing materials (ACM) and/or LBP. Removal of friable ACM, and non-friable ACMs that have the potential to become friable, during demolition and/or renovation shall conform to the standards set forth by the National Emissions Standards for Hazardous Air Pollutants (NESHAPs). The San Joaquin Valley Air Pollution Control District (Valley Air District) is the responsible agency on the local level to enforce the NESHAPs and shall be notified by the property owners and/or developers of properties (or their designee(s)) prior to any demolition and/or renovation activities. If asbestos-containing materials are left in place, an Operations and Maintenance Program (O&M Program) shall be developed for the management of asbestos-containing materials (ACM).	
	MM HAZ-2h: Prior to the import of a soil to a particular property within the Plan Area as part of that property's site development, such soils shall be sampled for toxic or hazardous materials to determine whether concentrations exceed applicable Environmental Screening Levels for the proposed land use at such a property, in accordance with Regional Water Quality Control Board (RWQCB), the Department of Toxic Substances Control (DTSC) or the Fresno County Environmental Health Division (FCEHD)requirements, prior to importing to such a property.	
Impact HAZ-3: The proposed project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.	Implement **MM HAZ-2a through MM HAZ-2h.**	Less than significant impact.
Impact HAZ-4: The proposed project could be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section	Implement **MM HAZ-2a through MM HAZ-2h.**	Less than significant impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
65962.5 and, as a result, could create a significant hazard to the public or the environment.		
Impact HAZ-5: For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, the proposed project would not result in a safety hazard or excessive noise for people residing or working the project area.	None required.	N/A
Impact HAZ-6: The proposed project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	None required.	N/A
Impact HAZ-7: The proposed project would not expose people or structures, either directly or indirectly to a significant risk of loss, injury or death involving wildland fires.	None required.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on hazards and hazardous materials.	None required.	N/A
Section 3.10—Hydrology and Water Quality		
Impact HYD-1: The proposed project could violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or ground water quality.	None.	N/A
Impact HYD-2: The proposed project could substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.	**MM HYD-2a:** The City shall continue to be an active participant in the North Kings Groundwater Sustainability Agency (North Kings GSA) and the implementation of the North Kings Groundwater Sustainability Plan (North Kings GSP) in order to ensure that the Kings Subbasin has balanced levels of pumping and recharge. The City shall confirm that each project for future development in the Plan Area has incorporated any resulting standards prior to issuing approval for any development applications that require discretionary approval.	Less than significant with mitigation incorporated.

Impacts	Mitigation Measures	Level of Significance After Mitigation
	MM HYD-2b: Prior to exceeding existing water supply capacity, the City shall evaluate the water supply system and shall not approve development per the Specific Plan for the Plan Area until additional capacity is provided through water system improvements for the Specific Plan Area in accordance with the City Metropolitan Water Resources Management Plan (Metro Plan).	
	MM HYD-2c: Prior to exceeding existing water demands, the City shall pursue the provision of adequate water supplies by securing additional water sources and shall not approve development per the Specific Plan for the Plan Area until additional water supply is provided.	
	MM HYD-2d: The City shall develop new and expand existing groundwater recharge facilities to balance increased water demands resulting from the Project Area. New and expanded groundwater recharge facilities shall be in accordance with the City of Fresno General Plan and City Metro Plan,. The City shall complete these measures prior to approving any new project applications for future development in the Project Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.	
Impact HYD-3: The proposed project could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would: i) Result in substantial erosion or siltation on- or off-site; ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site; iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or **iv)** Impede or redirect flood flows?	**MM HYD-3a:** The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in updating the Storm Drainage and Flood Control Master Plan for the Plan Area to include the proposed basins and the analysis necessary to provide adequate capacity for future stormwater runoff resulting from future development of the Southeast Development Area (SEDA) Specific Plan. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.	Less than significant with mitigation incorporated.
	MM HYD-3b: The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in implementing the Storm Drainage and Flood Control Master Plan improvements for the proposed drainage areas within the Plan Area. Any new proposed development in the Southeast Development Area (SEDA) shall be reviewed by the City and FMFCD to confirm that design and construction documents have incorporated the updated Storm Drainage	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	and Flood Control Master Plan improvements, prior to approving any such development.	
	MM HYD-3c: The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in reevaluating proposed Basins DW and DX for available capacities, and shall expand these basins or construct additional basins to accommodate the future stormwater capacities from development in the Southeast Development Area (SEDA) in accordance with the SEDA Specific Plan. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.	
Impact HYD-4: The proposed project would not be located in a flood hazard zone, tsunami, or seiche zone, or risk release of pollutants due to project inundation**.**	None.	N/A
Impact HYD-5: The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact with mitigation incorporated on hydrology and water quality.	Implement **MM HYD-2a, MM HYD-2b, MM HYD-2c, MM HYD-2d, MM HYD-3a, MM HYD-3b,** and **MM HYD-3c.**	Less than significant with mitigation incorporated.
Section 3.11—Land Use and Planning		
Impact LAND-1: The proposed project would not physically divide an established community.	None.	N/A
Impact LAND-2: The proposed project would not cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on land use and planning.	None.	N/A

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.12—Mineral Resources		
Impact MIN-1: The proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State.	None.	N/A
Impact MIN-2: The proposed project would not result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on mineral resources.	None.	N/A
Section 3.13—Noise		
Impact NOI-1: The proposed project could generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.	**MM NOI-1a: Construction Activity Hours Restriction** Construction activity which requires a permit issued by the City of Fresno shall be limited to the hours between 7:00 a.m. and 10:00 p.m. on weekdays and Saturdays. Any construction activity outside of these hours must comply with the City's noise performance standards of Section 15.2506 of the Municipal Code.	Significant and unavoidable impact.
	MM NOI–1b: **Construction Noise Mitigation Plan** Prior to the issuance of demolition, grading, and/or construction permits, applicants for individual development projects within 500 feet of noise–sensitive receptors (e.g., residences, hospitals, schools) shall conduct a project–level construction noise analysis to evaluate potential impacts on sensitive receptors. The analysis shall be conducted once the final construction equipment list that will be used for demolition and grading activities is determined. The project–level noise analysis shall be prepared, reviewed, and approved by the City of Fresno Planning Director. If the analysis determines that demolition and construction activities would result in an impact to identified noise-sensitive receptors, then specific measures to attenuate the noise impact shall be outlined in the analysis and reviewed and approved by the City of Fresno Planning Director. Specific measures may include but are not limited to the following Best Management Practices (BMPs):	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	• Post a construction site notice near the construction site access point or in an area that is clearly visible to the public. The notice shall include the following: job site address; permit number, name, and phone number of the contractor and owner; dates and duration of construction activities; construction hours allowed; and the City of Fresno Planning Director and construction contractor phone numbers where noise complaints can be reported and logged. • Consider the installation of temporary sound barriers for construction activities immediately adjacent to occupied noise-sensitive structures. • Restrict haul routes and construction–related traffic to the least noise-sensitive times of the day. • Reduce non-essential idling of construction equipment to no more than 5 minutes. • Ensure that all construction equipment is monitored and properly maintained in accordance with the manufacturer's recommendations to minimize noise. • Fit all construction equipment with properly-operating mufflers, air intake silencers, and engine shrouds, no less effective than as originally equipped by the manufacturer, to minimize noise emissions. • If construction equipment is equipped with back-up alarm shut offs, switch off back-up alarms and replace with human spotters, as feasible. • Stationary equipment (such as generators and air compressors) and equipment maintenance and staging areas shall be located as far from existing noise-sensitive land uses, as feasible. • To the extent feasible, use acoustic enclosures, shields, or shrouds for stationary equipment such as compressors and pumps. • Shut off generators when generators are not needed. • Coordinate deliveries to reduce the potential of trucks waiting to unload and idling for long periods of time. • Grade surface irregularities on construction sites to prevent potholes from causing vehicular noise. • Minimize the use of impact devices such as jackhammers, pavement breakers, and hoe rams. Where possible, use concrete crushers or pavement saws rather than hoe rams for tasks such as concrete or asphalt demolition and removal.	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	• The final noise-reduction measures to be implemented and their associated details shall be determined by the construction-level noise analysis. The final noise-reduction measures shall be included on all construction and building documents and/or construction management plans and submitted for verification to the City; implemented by the construction contractor through the duration of the construction phase; and discussed at the pre-demolition, -grade, and/or -construction meetings.	
	MM NOI–2: Traffic Noise Reduction Plan Prior to issuance of building permits, the property owner/developer shall be responsible to implement the following measures to limit potential traffic noise source impacts: • Any proposed development project that would include noise sensitive land use development along noise impacted roadway segments identified in Table 3.13-8 shall demonstrate compliance with Municipal Code Section 15-2506 by submitting a final acoustical report. This report shall demonstrate that the proposed project incorporates sufficient noise attenuation features, if needed, to meet the City's exterior/interior noise performance standards. The individual project owner/developer shall submit the acoustic study to the Planning Director for review and approval. Upon approval by the City of Fresno, the proposed acoustical design features shall be incorporated into the proposed development. Noise reduction design features may include, but are not limited to, locating noise sensitive development on the site to be shielded by structures (buildings, enclosures, or sound walls) or by using upgraded wall and window assemblies to ensure that acceptable interior noise levels are maintained.	
	MM NOI–3: Stationary Source Noise Reduction Plan Prior to issuance of building permits, the property owner/developer shall be responsible to implement the following measures to limit operational stationary noise source impacts: • Any proposed development projects that include unshielded parking areas within 175 feet, or unshielded truck loading docks within 300 feet, or unshielded mechanical ventilation equipment systems within 35 feet of a noise sensitive receptor, shall demonstrate compliance with Municipal	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	Code Section 15-2506 by submitting a site specific acoustic study. These reports shall demonstrate that the proposed project incorporates sufficient noise attenuation features, if needed, to meet the City of Fresno's exterior/interior noise performance standards. The individual project owner/developer shall submit the acoustic study to the Planning Director for review and approval. Upon approval by the City, the proposed acoustical design features shall be incorporated into the proposed development. Noise reduction design features may include, but are not limited to, locating stationary noise sources on the site to be shielded by structures (buildings, enclosures, or sound walls) or by using equipment that has a quieter rating.	
Impact NOI-2: The proposed project could result in generation of excessive groundborne vibration or groundborne noise levels**.**	**MM NOI-4: Construction Vibration Reduction Plan** Prior to issuance of grading and/or building permits, a note shall be provided on grading and building plans indicating that during grading and construction the property owner/developer shall be responsible for requiring contractors to implement the following measures to limit construction-related vibration impacts: • For any future development projects that would necessitate the use of pile driving within 200 feet of an off-site structure shall submit a Construction Vibration Reduction Plan that identifies specific techniques, such as the depth and location of temporary trenching, that would reduce potential vibration impacts to less than significant for the impacted structure. • For any future development projects that would necessitate the use of large vibratory rollers within 30 feet of an off-site structure, or the use of other heavy construction equipment within 15 feet of an off-site structure, shall submit a Construction Vibration Reduction Plan that identifies specific techniques, such as the depth and location of temporary trenching, that would reduce potential vibration impacts to less than significant for the impacted structure. • The individual project owner/developer shall submit the Construction Vibration Reduction Plan to the Planning Director for review and approval prior to issuance of building permits. Upon approval by the City, the construction vibration reduction measures shall be incorporated into the construction documents.	Less than significant impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
Impact NOI-3: The proposed project would not expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport.	None.	N/A
Cumulative Impact: The project would have a significant and unavoidable impact regarding construction noise. The project would have a less than significant impact with regard to all other noise and vibration impacts.	No mitigation is available that would reduce cumulative construction noise impacts to less than significant.	Significant and unavoidable impact.
Section 3.14—Population and Housing		
Impact POP-1: The proposed project would not induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).	None.	N/A
Impact POP-2: The proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on population and housing.	None.	N/A
Section 3.15—Public Services		
Impact PUB-1: The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection.	None.	N/A

Impacts	Mitigation Measures	Level of Significance After Mitigation
Impact PUB-2: The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection.	None.	N/A
Impact PUB-3: The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools.	None.	N/A
Impact PUB-4: The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks.	None.	N/A
Impact PUB-5: The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on public services.	None.	N/A

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.16—Recreation		
Impact REC-1: The proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.	None.	N/A
Impact REC-2: The proposed project could include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.	**MM REC-1:** As new development occurs in the Plan Area, the City shall periodically (every 5 years) monitor residential population growth compared to development of new parklands for the purpose of evaluating the strength of this Plan to meet the ratio of 3 acres of parkland per 1,000 population. If the ratio is not met, the City shall explore additional ways to increase the amount of dedicated parkland in the Plan Area, including but not limited to designating additional lands for parkland development.	Less than significant with mitigation incorporated.
Cumulative Impact: The project would have a less than significant cumulative impact with mitigation incorporated on recreation.	Implement **MM REC-1.**	Less than significant with mitigation incorporated.
Section 3.17—Transportation and Traffic		
Impact TRANS-1: The proposed project would not conflict with a program plan, ordinance or policy of the circulation system, including transit, roadway, bicycle and pedestrian facilities.	**MM TRANS-1a:** Provide more options for shorter trips by encouraging vertical mixed uses and locating residential uses in walking distance (0.5 mile) to retail and employment uses.	Less than significant impact with mitigation incorporated.
	MM TRANS-1b: Provide pedestrian and bicycle network improvements within the development connecting complementary uses (i.e., residential, employment, retail, and transit stops) internally and to existing off-site facilities.	
	MM TRANS-1c: Ensure that design of key intersections and roadways encourage the use of walking, biking, and transit.	
	MM TRANS-1d: Collaborate with Fresno Transit (FAX) to provide new transit services to the proposed project and within the proposed project area.	
	MM TRANS-1e: In addition, the following Transportation Demand Management (TDM) strategies may be applicable at the implementing project level:	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	• Reduce Parking Supply for Retail Uses (maximum reduction: 12.5 percent) • Add Transit Rerouting and Transit Stops (maximum reduction: 5 percent) • Implementation of Local Shuttle Service (grouped strategy with transit system improvements) • Mandatory Travel Behavior Change Program, Promotions and Marketing (maximum reduction: 1 percent) • Promotions and Marketing (maximum reduction: 1 percent) • Emergency Ride Home (ERH) Program (maximum reduction: 3 percent) • School Carpool Program (maximum reduction: 15 percent) • Bike Share (maximum reduction: 0.25 percent) • Implement/Improve On-street Bicycle Facility (maximum reduction: 0.625 percent) • Traffic Calming Improvements (maximum reduction: 1 percent) • Pedestrian Network Improvements (maximum reduction: 2 percent)	
Impact TRANS-2: The proposed project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).	None.	N/A
Impact TRANS-3: The proposed project would not substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).	None.	N/A
Impact TRANS-4: The proposed project would not result in inadequate emergency access.	**MM TRANS-4:** At the time of planning application submittal, the project applicant shall prepare a Construction Management Plan that shall specify traffic controls required to maintain adequate circulation and access throughout the Southeast Development (SEDA) Specific Plan Area. At least one lane shall remain open in each direction during construction and access to all existing businesses shall be maintained. This plan shall be subject to approval by the jurisdictional police and fire departments prior to commencement of construction.	Less than significant impact with mitigation incorporated.
Cumulative Impact: The project would have a less than significant cumulative impact on transportation.	Implement **MM TRANS-1a, MM TRANS-1b, MM TRANS-1c, MM TRANS-1d, MM TRANS-1e,** and **MM TRANS-4.**	Less than significant impact.

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.18—Utilities and Service Systems		
Impact UTIL-1: The proposed project could require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.	Implementation of all other mitigation measures in this Draft PEIR would be required for all construction activities. Therefore, construction of new utilities would cause less than significant impacts with mitigation incorporated, with regard to the other potential environmental impacts discussed in this Draft PEIR. See the Executive Summary for a summary of all mitigation measures. Mitigation measures for all resource topics in this Draft PEIR would be applicable to construction of new or expanded utility infrastructure.	Less than significant impact with mitigation incorporated.
	MM UTIL-1a: The City shall evaluate the water conveyance system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would demand additional water and exceed the capacity of a facility until additional capacity is provided. The City shall evaluate proposed water capacity and conveyance improvements provided in the City Metro Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.	
	MM UTIL-1b: The City shall evaluate the water supply system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would demand additional water until additional sources are secured and provided for future development. The City shall evaluate proposed water supply improvements for potential environmental impacts, and shall construct such improvements prior to exceedance of demand to accommodate full buildout of the Specific Plan.	
	MM UTIL-1c: The City shall evaluate the wastewater system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would contribute wastewater to the wastewater treatment system that would exceed capacity until additional capacity is provided. The City shall evaluate proposed wastewater treatment improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	MM UTIL-1d: Consistent with the Sewer System Management Plan, the City shall evaluate the wastewater collection system at the time that discretionary projects are submitted for approval by the City, the City shall not approve development that would generate additional wastewater and exceed the capacity of a facility until additional capacity is provided. The City shall evaluate proposed wastewater collection improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.	
	MM UTIL-1e: The City shall support the Fresno Metropolitan Flood Control District FMFCD in evaluating the storm water collection system and implementing the District Services Plan and Storm Drainage and Flood Control Master Plan, and in constructing such improvements to the storm drain system prior to exceedance of capacity to accommodate full buildout of the Specific Plan. The City shall complete these evaluations prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.	
	MM UTIL-1f: At the time discretionary projects are submitted, the City shall require project-specific environmental evaluations for the expansion or relocation of electric, natural gas, or telecommunication facilities be completed prior to project approval.	
Impact UTIL-2: The proposed project would have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.	Implement **MM HYD-2b**, **MM HYD-2c**, **MM UTIL-1a**, **MM UTIL-1b,** and the following:	Less than significant impact with mitigation incorporated.
	MM UTIL-2a: The City shall develop and implement water conservation measures to reduce the per capita water use, and continue to refine and implement water saving and conservation standards for new developments approved under the Specific Plan. The City shall complete these measures and standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated the refined measures and standards prior to issuing approval	

Impacts	Mitigation Measures	Level of Significance After Mitigation
	MM UTIL-2b: The City shall continue to implement the City of Fresno Water Conservation Program, as may be updated, and periodically update restrictions on water uses, and evaluate the feasibility of the conservation target identified as part of the Fresno General Plan PEIR. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.	
	MM UTIL-2c: The City shall refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance (MWELO) and other state regulations. The City shall complete these standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.	
Impact UTIL-3: The proposed project would not result in a determination by the wastewater treatment provider which serves or may serve the proposed project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.	Implement **MM UTIL-1c** and **MM UTIL-1d**.	Less than significant with mitigation incorporated.
Impact UTIL-4: The proposed project would not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.	None required.	N/A
Impact UTIL-5: The proposed project would comply with federal, State, and local statutes and regulations related to solid waste.	None required.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact with mitigation incorporated on utilities and service systems.	**MM UTIL-4.1:** The City shall evaluate additional landfill locations at the time discretionary projects are submitted, and shall not approve development that could contribute solid waste to a landfill that is at capacity until additional capacity is provided	Less than significant impact with mitigation incorporated.

Impacts	Mitigation Measures	Level of Significance After Mitigation
Section 3.19—Wildfire		
Impact WILD-1: The proposed project would not substantially impair an adopted emergency response plan or emergency evacuation plan.	None.	N/A
Impact WILD-2: The proposed project would not due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.	None.	N/A
Impact WILD-3: The proposed project would not require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.	None.	N/A
Impact WILD-4: The proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.	None.	N/A
Cumulative Impact: The project would have a less than significant cumulative impact on wildfires.	None required.	N/A

CHAPTER 1: INTRODUCTION

1.1 - Overview of the CEQA Process

This Draft Program Environmental Impact Report (Draft PEIR) is prepared in accordance with the California Environmental Quality Act (CEQA) to evaluate the potential environmental impacts associated with the implementation of the proposed Fresno Southeast Development Area (SEDA) Specific Plan Project (proposed project) (State Clearinghouse No. 2022020486). This document is prepared in conformance with CEQA (California Public Resources Code [PRC], § 21000, *et seq*.) and the CEQA Guidelines (California Code of Regulations [CCR], Title 14, § 15000, *et seq*.). This Draft PEIR is intended to serve as an informational document for the public agency decision makers and the public regarding the proposed project.

1.1.1 - Overview

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the approximately 9,000-acre Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the Plan Area by the year 2050. The proposed project is framed with three interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. Additionally, the proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure. Exhibit 1-1 shows the proposed general land use designations of the Specific Plan.

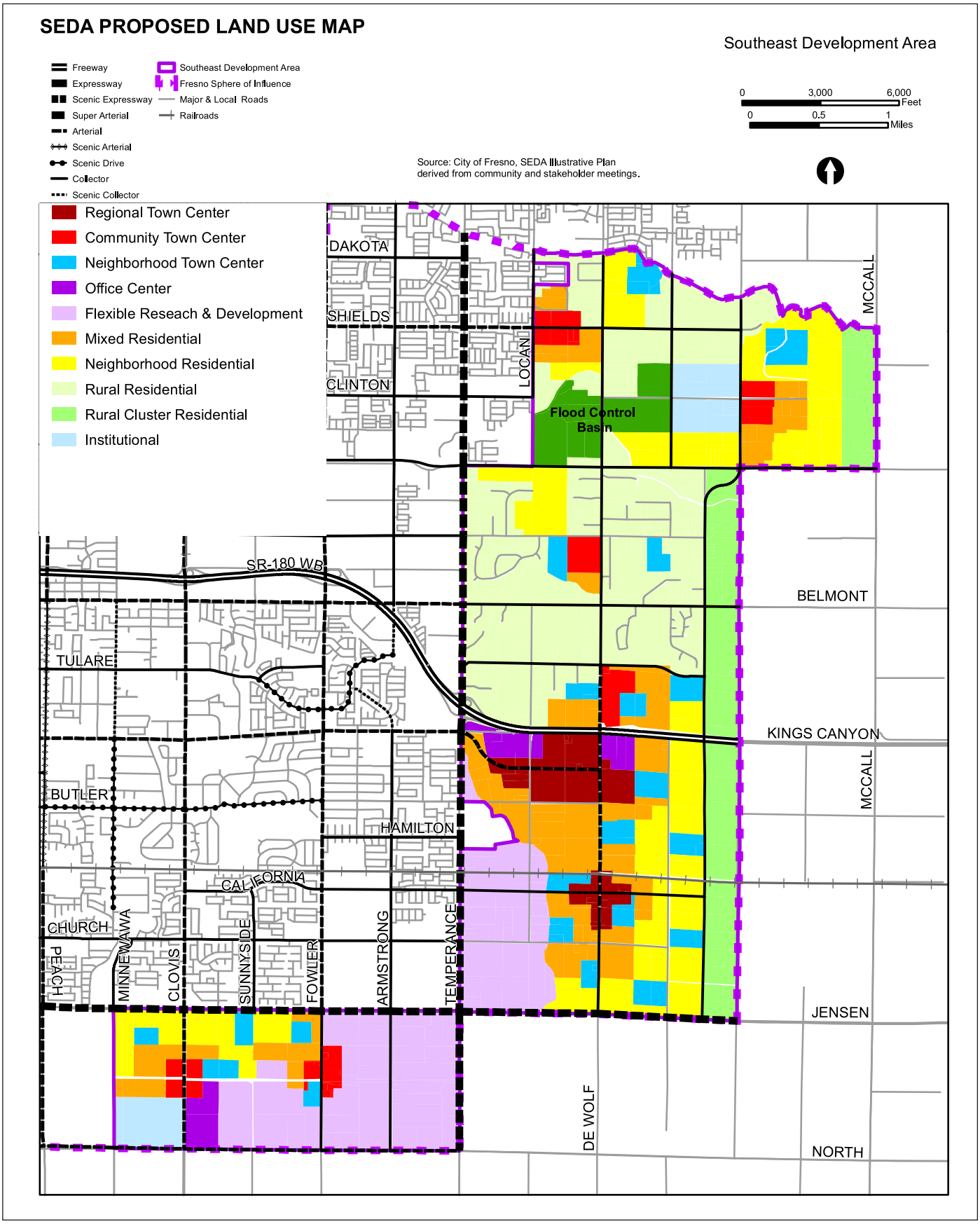
1.1.2 - Purpose and Authority

This Draft PEIR provides a project-level analysis of the environmental effects of the proposed project. The environmental impacts of the proposed project are analyzed in the Draft PEIR to the degree of specificity appropriate, in accordance with CEQA Guidelines Section 15146. This document addresses the potentially significant adverse environmental impacts that may be associated with the planning, construction, or operation of the project. It also identifies appropriate and feasible mitigation measures and alternatives that may be adopted to significantly reduce or avoid these impacts.

CEQA requires that an EIR contains, at a minimum, certain specific elements. These elements are contained in this Draft PEIR and include:

- Table of Contents
- Introduction
- Executive Summary
- Project Description
- Environmental Setting, Significant Environmental Impacts, and Mitigation Measures

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Source: City of Fresno, SEDA Regulating Districts, 07/2023.

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Exhibit 1-1
Specific Plan Map

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- Cumulative Impacts
- Significant Unavoidable Adverse Impacts
- Alternatives to the Proposed Project
- Growth-Inducing Impacts
- Areas of Known Controversy

1.1.3 - Lead Agency Determination

The City of Fresno is designated as the lead agency for the project. CEQA Guidelines Section 15367 defines the lead agency as ". . . the public agency, which has the principal responsibility for carrying out or approving a project." Other public agencies may use this Draft PEIR in the decision-making or permit process and consider the information in this Draft PEIR along with other information that may be presented during the CEQA process.

This Draft PEIR was prepared by FirstCarbon Solutions (FCS), an environmental consultant. Prior to public review, it was extensively reviewed and evaluated by the City of Fresno. This Draft PEIR reflects the independent judgment and analysis of the City of Fresno as required by CEQA. Lists of organizations and persons consulted and the report preparation personnel are provided in Chapter 6 of this Draft PEIR.

1.2 - Scope of the Draft Program EIR

This Draft PEIR addresses the potential environmental effects of the proposed project. The City of Fresno issued a Notice of Preparation (NOP) for the proposed project on February 22, 2022, which circulated between February 22, 2022, to March 25, 2022, for the statutory 30-day public review period. The scope of this Draft PEIR includes the potential environmental impacts identified in the NOP and issues raised by agencies and the public in response to the NOP. The NOP is contained in Appendix A of this Draft PEIR.

Fourteen comment letters were received in response to the NOP. They are listed in Table 1-1 and provided in Appendix A of this Draft PEIR.

Table 1-1: NOP Comment Letters

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
Public Agencies				
California Department of Conservation	Monique Wilber, Conservation Program Support Supervisor	March 14, 2022	• Recommendation to consider agricultural conservation easements as mitigation. • Request for the Draft PEIR to discuss the type, amount, and location of farmland conversion resulting from the	• Section 3.2, Agricultural Resources and Forestry Resources • Section 3.2, Agricultural Resources and Forestry Resources

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			proposed project.	
			• Request for the Draft PEIR to evaluate impacts on any current or future agriculture operations in the vicinity.	• Section 3.2, Agricultural Resources and Forestry Resources
			• Request for the Draft PEIR to evaluate incremental impacts leading to cumulative impacts on agricultural land.	• Section 3.2, Agricultural Resources and Forestry Resources
			• Request for the Draft PEIR to include mitigation measures for impacts to agricultural land.	• Section 3.2, Agricultural Resources and Forestry Resources
			• Request for the Draft PEIR to evaluate the project's compatibility with any agricultural land enrolled in a Williams Act contract and notify the Department of Conservation of non-renewal and/or cancellation of a Williams Act contract.	• Section 3.2, Agricultural Resources and Forestry Resources
California Department of Fish and Wildlife	Julie A. Vance, Regional Manager	March 25, 2022	• Acknowledgment that the California Department of Fish and Game (CDFW) is a trustee and responsible agency for the proposed project.	• N/A
			• Requests that the Draft PEIR analyze potential impacts on the special-status species identified in the comment letter and provides necessary mitigation measures to reduce impacts to a less than significant level.	• Section 3.4, Biological Resources
California Department of Toxic Substances Control	Gavin McCreary, Project Manager, Site Evaluation and Remediation Unit	March 15, 2022	• Requests that the Draft PEIR acknowledge the potential for historic or future activities to result in the release of hazardous waste/substances.	• Section 3.9, Hazards and Hazardous Materials
			• Recommends that all future development under the	• Section 3.9, Hazards and Hazardous

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			proposed project collect soil samples for lead analysis prior to performing any intrusive activities.	Materials; and Section 3.7, Geology, Soils, and Seismicity
			• Recommends that all future development under the proposed project conduct surveys for the presence of lead-based paints, mercury, asbestos containing materials, and polychlorinated biphenyl caulk before demolishing any buildings.	• Section 3.9, Hazards and Hazardous Materials
			• Requests that Draft PEIR require any future development under the proposed project that requires the importation of soil to backfill any excavated areas to conduct the proper sampling to ensure that the imported soil is free of contamination.	• Section 3.9, Hazards and Hazardous Materials; and Section 3.7, Geology, Soils, and Seismicity
			• Requests that the Draft PEIR requires any future development under the proposed project that is developed on land containing agricultural uses, weed abatement activities, or related activities to conduct a proper investigation for organochlorinated pesticides.	• Section 3.9, Hazards and Hazardous Materials
			• Recommends that the current and former agricultural lands in the Plan Area be evaluated in accordance with the California Department of Toxic Substances Control (DTSC) 2008 Interim Guidance for Sampling Agricultural Properties (Third Addition).	• Section 3.9, Hazards and Hazardous Materials; and Section 3.2, Agricultural Resources and Forestry Resources

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
California Department of Transportation	David Padilla, Branch Chief, Transportation Planning-North	March 18, 2022	• Recommends that a peak-hour ramp queue analysis is completed at each of the following State Route (SR) 180 interchanges to determine potential impacts: Clovis Avenue, Fowler Avenue, and Temperance Avenue.	• Section 3.17, Transportation and Traffic
			• Recommends that a peak-hour ramp queue analysis is completed at each of the following SR-180 intersections to determine potential impacts: De Wolf Avenue, Highland Avenue, and McCall Avenue.	• Section 3.17, Transportation and Traffic
			• Requests all future development proposals to evaluate traffic safety impacts on the State Highway Systems due to new pedestrian and bicyclist needs due to the proposed project, specifically SR-180 interchanges at Fowler Avenue and Temperance Avenue and intersections at De Wolf Avenue, Highland Avenue, and McCall Avenue.	• Section 3.17, Transportation and Traffic
			• Requests that all future development under the proposed project should conduct a Vehicles Miles Traveled (VMT) analysis and determine whether development under the proposed project would be required to pay a VMT Mitigation Impact Fee.	• Section 3.17, Transportation and Traffic
			• Requests that project proponents consider allocating a portion of future residential development as affordable housing units.	• Section 3.17, Transportation and Traffic

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			• Recommends that the City establish policies for the installation of Level 2 Electric Vehicle (EV) charging for single-and multi-family residential units as well as DC Fast Charging EV charging stations for retail, commercial, park and public facilities.	• Section 3.17, Transportation and Traffic
			• Recommends that the Draft PEIR include implementation guidelines for multimodal strategies, such as those that originate from Transit Oriented Development (TOD), in an effort to further reduce future projects' traffic related impacts.	• Section 3.17, Transportation and Traffic
			• Support of active transportation plans and smart growth efforts that support the State's 2050 Climate goals.	• Section 3.17, Transportation and Traffic
			• Requests early engagement on all future development under the proposed project that could affect the state right-of-way.	• Section 3.17, Transportation and Traffic
Fresno County Department of Public Works and Planning, Development Service and Capital Projects Division	David Randall, Senior Planner	March 24, 2022	• Identifies locations within the Plan Area that are within Special Flood Hazard Areas, which would be subject to Fresno County Ordinance Code Title 15, Chapter 15.48 as well as Federal Emergency Management Agency (FEMA) flood elevation requirements as applicable.	• Section 3.7, Geology, Soils, and Seismicity; Section 3.10, Hydrology and Water Quality; and Section 3.19, Wildfire
			• States that any construction within or near a stream will require a clearance from CDFW and Streambed Alternation Agreement if buildout would result in	• Section 3.4, Biological Resources; and Section 3.10, Hydrology and Water Quality

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			alteration or degradation.	
			• Recommends that any improvements constructed within or near a canal should be coordinated with the owners of the canal/appropriate agency.	• Section 3.10, Hydrology and Water Quality
			• Recommends that the Fresno Metropolitan Flood Control District be consulted regarding future development near flood drainage basins.	• Section 3.10, Hydrology and Water Quality
			• Recommends that any construction and/or development within an Agricultural Preserve consult with/obtain approval from the County Policy and Planning Department.	• Section 3.2, Agricultural Resources and Forestry Resources
			• Identifies that any future development under the Specific Plan that would be greater than 1 acre would be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit and produce a Storm Water Pollution Prevention Plan (SWPPP).	• Section 3.10, Hydrology and Water Quality
			• Recommends that a Traffic Impact Study be prepared.	• Section 3.17, Transportation and Traffic
			• States that any work done within the County-road right-of-way to construct a new driveway or improve an existing driveway will require an Encroachment Permit from the Road Maintenance and Operations Division.	• Section 3.17, Transportation and Traffic
			• States that any encroachment or access over the Southern Pacific Railroad right-of-way	• N/A

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			would require approval from the owner.	
			• States that any grading will require either an engineered grading and drainage plan, road improvement plan, permit or voucher and must comply with the City standards/requirements.	• Section 3.7, Geology, Soils, and Seismicity; Section 3.10, Hydrology and Water Quality; and Section 3.17, Transportation and Traffic
			• Requests that all engineered grading and drainage plans, road improvement plans, permits, and vouchers also be forwarded to the City of Fresno.	• N/A
			• States that any future development under the SEDA Specific Plan that would use or handle hazardous materials would be required to meet the requirements set forth in the California Health and Safety Code (HSC), Division 20, Chapter 6.95, and the California Code of Regulations Title 22, Division 4.5. Any businesses handling hazardous waste must submit a Hazardous Materials Business Plan pursuant to HSC, Division 20, Chapter 6.95, Section 25507.	• Section 3.9, Hazards and Hazardous Materials
			• States that an Underground Storage Tank (UST) Removal Permit from the Fresno County Department of Public Health, Environmental Health Division must be obtained if any petroleum USTs are discovered during construction.	• Section 3.9, Hazards and Hazardous Materials
			• States that all water wells and septic systems identified at a future development site that	• Section 3.9, Hazards and Hazardous Materials

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			are not intended to be used would be properly removed by a licensed contractor.	
			• Requested that all appropriate measures be incorporated during the construction phase of any future development to minimize potentially significant short-term noise impacts to noise-sensitive receivers.	• Section 3.13, Noise
			• Requests that all future projects must conform with applicable standards of the Noise Element of the City of Fresno General Plan.	• Section 3.13, Noise
			• States that the County has a water-providing Community Service Area (CSA) (CSA 14) which is interested in connecting to the City's water system and that the County has several road CSAs within the Plan Area.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requests that the Design Division be forwarded any transportation studies associated with SEDA.	• N/A
Fresno County Historical Landmarks and Records Advisory Commission	Bill Secrest, Librarian, Heritage Center, Fresno County Public Library	February 24, 2022	• Request to be notified of all future development under the proposed project that may have impacts on cultural and tribal cultural resources.	• Section 3.5, Cultural Resources and Tribal Cultural Resources
			• Expressed concern that the Plan Area may contain houses and structures of historical interest (in excess of 100 years of age) with an outside possibility of Yokuts artifacts present.	• Section 3.5, Cultural Resources and Tribal Cultural Resources

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
Fresno Irrigation District	Laurence Kimura, PE, Chief Engineer	March 25, 2022	• Identifies the Flood Irrigation District (FID) canals in the Plan Area.	• Section 3.10, Hydrology and Water Quality
			• States that many of the existing facilities will need to be upgraded to meet the current urban standards or relocated by the developer to accommodate new urban developments which will require new pipelines and new exclusive easements.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requires that all open channels and existing pipelines impacted by the project area development to be upgraded to meet FID's current standards for urban, rural, and industrial areas.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requires that development impacts to large canal crossings to be designed to protect the canal's integrity for an urban setting including the need for access and full right-of-way widths for FID's operations and maintenance needs.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Identifies that the FID facilities within the Plan Area carry irrigation water for FID users, recharge water for the City, and flood waters during winter months.	• Section 3.10, Hydrology and Water Quality
			• Provides provisions for public roads used to access canals.	• N/A
			• Provides provisions for construction on canal banks.	• N/A
			• Provides provisions for trails that are master planned as part of SEDA that occur along canals.	• N/A

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			• Requires that development within the Plan Area will not result in an increase in the City's surface water allocation from FID.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requests that the Draft PEIR evaluate whether the City's Water Master Plan needs to be updated and how the Cooperative Agreement between the City and FID may impact development within the Plan Area.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requests that the Draft PEIR evaluate whether previous projects proposed under the City's Water Master Plan resulted in the benefits anticipated.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requests that the Draft PEIR require that any future development minimize water demand and/or reduce impacts to groundwater.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Requires that any future development under SEDA that uses treated surface water during a period where the City has a deficit water supply or groundwater levels continue to drop then the City must acquire additional water from a water purveyor as to not impact water supplies or exacerbate the deficit.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
			• Identifies that groundwater overdraft is an issue in the City and requires that the Draft PEIR evaluates the Specific Plan's impact on groundwater resources.	• Section 3.10, Hydrology and Water Quality; and Section 3.18, Utilities and Service Systems
Fresno Metropolitan	Denise Wade, Master Plan	March 25, 2022	• States that FMFCD intends to work with the City to provide	• N/A

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
Flood Control District (FMFCD)	Special Projects Manager		Master Planned drainage area systems to serve the Plan Area.	
			• States that approximately 4,200 acres of the Plan Area is outside the current FMFCD boundary and thus the FMFCD's sphere of influence will be adjusted to include the Plan Area.	• Section 3.10, Hydrology and Water Quality
			• Requires that all impacts to stormwater runoff created by increasing densities in developed area that effect the capacity of the existing Master Planned storm drainage system must be fully mitigated.	• Section 3.10, Hydrology and Water Quality
			• States that FMFCD has studied the areas not currently located within a Master Planned area and has located the tentative basin facilities in an attached Exhibit that must be incorporated in the SEDA Proposed Land Use plan.	• Section 3.10, Hydrology and Water Quality
			• States that the City, FMFCD, and the County are all currently covered as Co-Permittees for the Municipal Separate Storm Sewer System (MS4) discharges through NPDES and discusses procedure for future projects under SEDA for permitting.	• Section 3.10, Hydrology and Water Quality
			• Requests that all future CEQA review within the City, including the SEDA area, utilize the *Guidance for Addressing Stormwater Quality for CEQA Review* documents.	• Section 3.10, Hydrology and Water Quality

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			• States that existing FMFCD policy requires post-development requirements for areas not served by stormwater basins or areas that discharge to sensitive waterbodies. Should future development under SEDA include sustainable infrastructure, coordination between the City and FMFCD must take place to ensure plans are suited to meet stormwater quality regulatory objectives and compatible with drainage standards in the Fresno area.	• Section 3.10, Hydrology and Water Quality
			• Recommends that the Draft EIR evaluate impacts related to the construction of master planned storm drainage facilities to the extent feasible to prevent duplicate CEQA processing.	• Section 3.10, Hydrology and Water Quality
			• Future development under SEDA would be subject to drainage fees pursuant to the Drainage Fee Ordinance prior to approval of any final maps and/or issuance of building permits at the rates in effect at the time of such approval.	• Section 3.10, Hydrology and Water Quality
			• Requires that the grading of proposed development within the Plan Area shall be designed such that there are not adverse impacts to the passage of major storm flow through that development.	• Section 3.10, Hydrology and Water Quality
			• Requires that future development provide any surface flowage easements or covenants for any portions of the developing area that cannot convey stormwater to	• Section 3.10, Hydrology and Water Quality

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			public right-of-way without crossing private property.	
			• Requires that FMFCD review and approve the final improvement plans for all development (i.e., grading, street improvement and storm drain facilities) within the boundaries of the proposed project to insure consistency with the future Storm Drainage Master Plan.	• Section 3.10, Hydrology and Water Quality
			• Requires that a storm drain easement is obtained whenever storm drain facilities are located on private property. No encroachments into the easement will be permitted including, but not limited to, foundations, roof overhangs, swimming pools, and trees.	• Section 3.10, Hydrology and Water Quality
			• Requires that all future development verify that permanent drainage service is available with FMFCD to ensure that runoff can be safely conveyed to existing Master Plan facilities.	• Section 3.10, Hydrology and Water Quality
			• Encourages but does not require that roof drains from nonresidential development be constructed such that they are directed onto and through a landscaped grassy swale area to filter out pollutants from roof runoff.	• Section 3.10, Hydrology and Water Quality
			• Requires that runoff from areas where industrial activities, product, or merchandise come into contact with and thus contaminate stormwater must be directed through	• Section 3.10, Hydrology and Water Quality

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			landscaped areas or otherwise treated before discharging it off-site or into a storm drain.	
Native American Heritage Commission	Cameron Vela, Cultural Resources Analyst	February 23, 2022	• Requires that the preparation of the Draft PEIR and Specific Plan adhere to Assembly Bill (AB) 52 and Senate Bill (SB) 18.	• Section 3.5, Cultural Resources and Tribal Cultural Resources
San Joaquin Valley Air Pollution Control District (SJVAPCD)	Brian Clements, Director of Permit Services	March 24, 2022	• Recommends that the Draft PEIR demonstrates the project's compliance with all applicable goals, policies, and objectives outlined in CARB's Air Quality and Land Use Handbook: A Community Health Perspective and CARB's Freight Handbook Concept Paper.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Recommends that the Draft PEIR include modeling to assess, characterize, and mitigate project-level construction and operational emissions and air quality impacts.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• States that a health risk assessment (HRA) should be performed for future projects within the SEDA.	• Section 3.3, Air Quality
			• Offers availability to review Health Risk Assessment (HRA) protocols and analyses and requires the following components for analysis: HRA AERMOD model files, HARP2 files, and a summary of emission source location, emission rates, and emission factor calculations and methodology.	• Section 3.3 Air Quality
			• Suggests that development projects resulting in toxic air contaminant (TAC) emissions	• Section 3.3, Air Quality; and Section

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			should be located an adequate distance from residential areas and sensitive receptors.	3.8, Greenhouse Gas Emissions
			• Recommends that the Draft PEIR require an Ambient Air Quality Analysis (AAQA) to be performed for any future development project with emissions that exceed 100 pounds per day of any pollutant.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Recommends the Draft PEIR discuss the feasibility of implementing a Voluntary Emission Reduction Agreement (VERA) for this project.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Recommends the Draft PEIR analyze methods to reduce VMT, GHG emissions, and air quality impacts by reviewing heavy-duty truck routing patterns, reducing idling of heavy-duty trucks, and using the cleanest available heavy heavy-duty (HHD) trucks and vehicles.	• Section 3.3, Air Quality; Section 3.8, Greenhouse Gas Emissions; and Section 3.17, Transportation and Traffic
			• Recommends use of zero-emission technologies for all on-site service equipment and on-road equipment, as feasible.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Recommends that the Draft PEIR include a measure requiring the assessment and potential installation, as technologically feasible, of particulate matter emission control systems for new large restaurants operating under-fired charbroilers.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			• Describes incentive funding for Valley businesses that covers the cost of purchasing, installing, and maintaining the particulate matter emission control system for up to two years.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Recommends the Draft PEIR consider incorporating vegetative barriers and urban greening as a measure to further reduce air pollution exposure of sensitive receptors.	• Section 3.3, Air Quality; and Section 3.4, Biological Resources
			• Suggests that the Draft PEIR consider the feasibility of incorporating solar power systems as an emission reduction strategy for future projects within the SEDA.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Explains that the District offers incentives to public agencies, businesses, and property owners of multi-unit dwellings to install electric charging infrastructure.	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions
			• Suggests that the City and project proponents install electric vehicle chargers at project sites and at strategic locations throughout the SEDA.	• Section 3.3, Air Quality; Section 3.6, Energy; and Section 3.8, Greenhouse Gas Emissions
			• Recommends that any project proponent whose project is determined to have a potentially significant odor impact should be required to draft and maintain an Odor Management Plan.	• Section 3.3, Air Quality
			• Requests that the Draft PEIR analyzes the proposed project's compliance with	• Section 3.3, Air Quality; and Section 3.8, Greenhouse Gas Emissions

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			applicable SJVAPCD rules and regulations.	
Sanger Unified School District	Ryan Kilby, Chief Operations Officer	March 25, 2022	• Request that the Draft PEIR analyze whether the number of schools shown is appropriate to adequately serve the SEDA buildout population.	• Section 3.15, Public Services
			• States that a new high school (Sanger West) and middle schools serving 7-8 grades will serve SEDA population.	• Section 3.15, Public Services
			• Recommends that at least one additional high school and one additional middle school will be needed to serve the buildout of SEDA.	• Section 3.15, Public Services
			• States that any future school site locations designated as part of the Specific Plan. should be considered conceptual rather than locked into parcel location.	• Section 3.15, Public Services
			• States that, in order to obtain a California Department of Education site approval for a school site, the District has to go through a site-specific CEQA process, a rigorous hazardous materials testing process under the oversight of DTSC as well as other safety studies.	• Comment noted; topics fall outside the scope of the EIR. However, comment letter will be included in Appendix A, NOP comments.
Organizations				
Carpenters Local 701, United Brotherhood of Carpenters and Joiners of America	Travis Alexander	March 25, 2022	• Requests that the Specific Plan include mandatory policies within the economic development and environmental justice element that promotes apprenticeships for construction under the proposed project.	• N/A

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			• Requests that the Specific Plan include a Local Hire Policy, which requires each construction contractor to hire a minimum of 25 percent of staff for each apprenticeable craft job classification with more than four employees whose primary residence is within the Counties of Fresno, Kings, Madera, or Tuolumne for at least 180 days after the project's Notice to Proceed.	• N/A
			• Support of the benefits to the community that would be included as part of the apprenticeship and local hire policies.	• N/A
Dunlap Band of Mono Indians	Dirk Charlie, Dunlap Mono Tribal Liaison	N/A	• Suggest that the City contact the following tribes to inquire if they are aware of any historical and/or cultural resources in the Plan Area: Table Mountain Ranch, Big Sandy, and Traditional Transundi Tribe.	• Section 3.5, Cultural Resources and Tribal Cultural Resources
Leadership Counsel of Justice and Accountability (LCJA), Fresno Building Healthy Communities (FBHC), Central California Environmental Justice Network (CCEJN), and Fresno Barrios Unidos (FBU)	Karla Martinez, LCJA; Kimberly McCoy, FBHC; Nayamin Martinez, CCEJN; and Ruben Espinoza, FBU	March 25, 2022	• Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area.	• All topical sections contained within the Draft PEIR
			• Requests that the Draft PEIR identifies plan alternatives, which would mitigate negative impacts of the plans.	• Chapter 5, Alternatives
			• Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.	• All topical sections contained within the Draft PEIR

Agency/ Organization	Author	Date	Comments/Topics Discussed in Letter	Corresponding Draft PEIR Section where Comments are Addressed
			• Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including state and federal fair housing, civil rights, and climate laws such as SB 743.	• All topical sections contained within the Draft PEIR
			• Requests that the City meaningfully engage with the public through a robust, accessible, and responsive process.	• Chapter 1, Introduction; and Chapter 2, Project Description
Source: Compiled by FirstCarbon Solutions (FCS) 2022.				

1.2.1 - Potentially Significant Environmental Issues

The NOP found that the following topical areas may contain potentially significant environmental issues that require further analysis in the Draft PEIR. These sections are as follows:

- Aesthetics, Light, and Glare
- Agriculture Resources and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources and Tribal Cultural Resources
- Energy
- Geology, Soils, and Seismicity
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems
- Wildfire

As identified in the NOP, there are no topical areas that were initially determined not to be significant, and thus, this Draft PEIR does not include a section for Effects Found not to be Significant.

1.3 - Organization of the Draft Program EIR

This Draft PEIR is organized into the following main sections:

- **Chapter ES: Executive Summary.** This Chapter includes a summary of the proposed project and alternatives to be addressed in the Draft PEIR. A brief description of the areas of controversy and issues to be resolved, and overview of the Mitigation Monitoring and Reporting Program (MMRP), in addition to a table that summarizes the impacts, mitigation measures, and level of significance after mitigation, are also included in this section.

- **Chapter 1: Introduction.** This Chapter provides an introduction and overview describing the purpose of this Draft PEIR, its scope and components, and its review and certification process.
- **Chapter 2: Project Description.** This Chapter includes a detailed description of the proposed project, including its location, site, and project characteristics. A discussion of the project objectives, intended uses of the Draft PEIR, responsible agencies, and approvals that are needed for the proposed project are also provided.
- **Chapter 3: Environmental Impact Analysis.** This chapter analyzes the environmental impacts of the proposed project. Impacts are organized into major topic areas. Each topic area includes a description of the environmental setting, methodology, significance criteria, impacts, mitigation measures, and significance after mitigation. The specific environmental topics that are addressed within Chapter 3 are as follows:
  - **Section 3.1—Aesthetics, Light, and Glare:** Addresses the potential visual impacts of development intensification and the overall increase in illumination produced by the proposed project.
  - **Section 3.2—Agricultural Resources and Forestry Resources:** Addresses the potential for conversion of Important Farmland to nonagricultural use and forest land to non-forest use.
  - **Section 3.3—Air Quality:** Addresses potential air quality impacts associated with project implementation and emissions of criteria pollutants. In addition, the section also evaluates project emissions of toxic air contaminants.
  - **Section 3.4—Biological Resources:** Addresses potential impacts on habitat, vegetation, and wildlife; the potential degradation or elimination of important habitat; and impacts on listed, proposed, and candidate threatened and endangered species.
  - **Section 3.5—Cultural Resources and Tribal Cultural Resources:** Addresses potential impacts on historical resources, archaeological resources, paleontological resources, and burial sites, and additionally addresses potential project impacts related to tribal cultural resources.
  - **Section 3.6—Energy:** Addresses potential project impacts related to energy usage.
  - **Section 3.7—Geology, Soils, and Seismicity:** Addresses the potential impacts the project may have on soils and assesses the effects of project development in relation to geologic and seismic conditions.
  - **Section 3.8—Greenhouse Gas Emissions:** Addresses potential project emissions of greenhouse gases.
  - **Section 3.9—Hazards and Hazardous Materials:** Addresses potential for presence of hazardous materials or conditions on the project site and in the project area that may have the potential to impact human health.
  - **Section 3.10—Hydrology and Water Quality:** Addresses the potential impacts of the project on local hydrological conditions, including drainage areas, and changes in the flow rates.
  - **Section 3.11—Land Use and Planning:** Addresses the potential land use impacts associated with division of an established community and consistency with the Specific Plan and Fresno General Plan.
  - **Section 3.12—Mineral Resources:** Address potential impacts to mineral resources.
  - **Section 3.13—Noise:** Addresses potential noise impacts during construction and at project buildout from mobile and stationary sources. The section also addresses the impact of noise generation on neighboring uses.

- **Section 3.14—Population and Housing:** Addresses the potential of the proposed project to induce direct or indirect population growth.
- **Section 3.15—Public Services:** Addresses potential impacts upon public services, including fire protection, law enforcement, schools, parks, and recreational facilities.
- **Section 3.16—Recreation:** Addresses potential impacts related to parks and park usage.
- **Section 3.17—Transportation and Traffic:** Addresses potential impacts related to the local and regional roadway system and public transportation, bicycle, and pedestrian access.
- **Section 3.18—Utilities and Services Systems:** Addresses potential impacts related to service providers, including fire protection, law enforcement, water supply, wastewater, solid waste, and energy providers.
- **Section 3-19—Wildfire:** Addresses potential impacts related to wildfire including lands within State Responsibility Areas and lands classified as very high fire hazard severity zones.

- **Chapter 4: Other CEQA Considerations.** This chapter provides a summary of significant environmental impacts, including unavoidable and growth-inducing impacts. This chapter discusses the cumulative impacts associated with the proposed project, including the impacts of past, present, and probable future projects. In addition, the proposed project's energy demand is discussed.
- **Chapter 5: Alternatives to the Proposed Project.** This chapter compares the impacts of the proposed project with three land-use project alternatives: the No Project Alternative, the Consolidated Business Park Alternative, and the Farmland Conservation Alternative. An environmentally superior alternative is identified. In addition, alternatives initially considered but rejected from further consideration are discussed.
- **Chapter 6: Persons and Organizations Consulted/List of Preparers.** This chapter contains a full list of persons and organizations that were consulted during the preparation of this Draft PEIR. This Chapter also contains a full list of the authors who assisted in the preparation of the Draft PEIR, by name and affiliation.
- **Appendices.** The Draft PEIR appendices includes all notices and other procedural documents pertinent to the Draft PEIR, as well as all technical material prepared to support the analysis.

1.4 - Documents Incorporated by Reference

As permitted by CEQA Guidelines Section 15150, this Draft PEIR has referenced several technical studies, analyses, and previously certified environmental documentation. Information from the documents, which have been incorporated by reference, has been briefly summarized in the appropriate section(s). The relationship between the incorporated part of the referenced document and the Draft PEIR has also been described. The documents and other sources that have been used in the preparation of this Draft PEIR include but are not limited to:

- Southeast Development Area Specific Plan (Specific Plan) (2023)
- Fresno General Plan 2014
- Fresno General Plan Final Program Environmental Impact Report (2021) (State Clearinghouse Number 2019050005, certified July 2021)

- Fresno Urban Water Management Plan (2021)
- Fresno Vehicle Miles Traveled Guidelines (2020)
- City of Fresno Active Transportation Plan (2016)

In accordance with CEQA Guidelines Section 15150(b), the Specific Plan, General Plan, and the above referenced documents and other sources used in the preparation of the Draft PEIR are available for review at the City of Fresno Planning and Development Department at the address shown in Section 1.6 below, during regular business hours.

1.5 - Documents Prepared for the Proposed Project

The following technical studies and analyses were prepared for the proposed project:

- Air Quality, Greenhouse Gas Emissions, and Energy Analyses
- Biological Resources Assessment
- Cultural, Tribal Cultural, and Paleontological Resources Analyses
- Noise Analysis
- Traffic Impact Analysis
- Water Technical Report
- Recycled Water Technical Report
- Wastewater Technical Report
- Storm Drainage Technical Report

1.6 - Review of the Draft Program EIR

Upon completion of the Draft PEIR, the City of Fresno filed a Notice of Completion (NOC) with the State Office of Planning and Research to begin the public review period (PRC § 21161). Concurrent with the NOC, this Draft PEIR has been distributed to responsible and trustee agencies, other affected agencies, surrounding cities, and interested parties, as well as all parties requesting a copy of the Draft PEIR in accordance with Public Resources Code 21092(b)(3). During the public review period, the Draft PEIR, including the technical appendices, is available for review at the City of Fresno Planning and Development. The address is provided below:

City of Fresno
Attn: Jennifer Clark, Director
Planning and Development Department
2600 Fresno Street, Room 3065
Fresno, CA 93721

The Draft PEIR is also available for review at the following website: www.fresno.gov/SEDA

Agencies, organizations, and interested parties have the opportunity to comment on the Draft PEIR during the 45-day public review period. Written comments on this Draft PEIR should be addressed to:

Jennifer Clark, Director
Planning and Development Department
c/o Sophia Pagoulatos, Planning Manager
Planning and Development Department
2600 Fresno Street, Room 3065
Fresno, CA 93721
Jennifer.Clark@fresno.gov
sophia.pagoulatos@fresno.gov

Submittal of electronic comments in Microsoft Word or Adobe PDF format is encouraged. Upon completion of the public review period, the lead agency will evaluate all comments received on the Draft PEIR and prepare written responses. Written responses to comments made by public agencies during the public review period will be prepared and made available for review by the commenting public agencies at least 10 days prior to the public hearing before the Fresno City Council on the project, at which time the certification of the Final EIR will be considered. Comments received and the responses to comments will be included as part of the record for consideration by decision makers for the project.

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CHAPTER 2: PROJECT DESCRIPTION

This Draft Program Environmental Impact Report (Draft PEIR) analyzes the potential environmental effects of the proposed Fresno Southeast Development Area (SEDA) Specific Plan Project (proposed project) in the City of Fresno (City). This section of the Draft PEIR describes the key characteristics of the proposed project, including a general overview of the Specific Plan approval process; project location and planning area; and the characteristics of the proposed project, including required discretionary approvals. The following project description serves as the basis for the environmental analysis contained in this Draft PEIR. The City is the California Environmental Quality Act (CEQA) Lead Agency and has final authority to approve the proposed project and certify the Draft PEIR.

2.1 - Specific Plan Approval Process

The SEDA, previously known as the Southeast Growth Area (SEGA), was approved for incorporation into the City in 2006 by the Local Agency Formation Commission (LAFCo) with several provisions. The provisions included preparation of a Specific Plan and associated environmental assessment before any annexations of land to the City could be approved. The City initiated the process of preparing a Specific Plan for SEGA but put it aside amid the uncertainty of the recession in 2008. Concepts from the SEGA planning process were rolled into the current Fresno General Plan (General Plan) that was adopted in 2014. The General Plan includes the SEDA Plan Area (Plan Area) as one of several growth areas.

Located in Growth Area II, SEDA was intended to be developed once other infill initiatives were given time to gain momentum. For example, only about one-third of SEDA's residential capacity (approximately 15,000 dwelling units out of a total 45,000 dwelling unit capacity) is included in the General Plan's buildout numbers, which accommodates the City's anticipated 2035 population. It is assumed that the remaining residential capacity of 30,000 dwelling units will not be developed until after 2035. While there is still ample residential capacity within the current city limits and in Growth Area I (which includes the Southwest Fresno and the West Area Neighborhoods Specific Plan areas), there is a sense of urgency about the current housing crisis and the City's ability to provide housing for the existing population and its natural growth as well as the unanticipated in-migration occurring at this time.

2.1.1 - Notice of Preparation and Public Scoping Meeting

The Notice of Preparation (NOP) of the Draft PEIR for the proposed project was circulated from February 22, 2022, to March 25, 2022, to trustee and responsible agencies, the State Clearinghouse (SCH), and the public to share information about the proposed project and receive input on the scope of the environmental issues to be addressed in the Draft PEIR. A Scoping Meeting was held virtually, due to the COVID-19 restrictions, on March 3, 2022. Input obtained through the scoping process was incorporated into the environmental analysis and planning process.

2.1.2 - Public Outreach

In an effort to offer multiple opportunities for engagement with the public and stakeholders, the City hosted three in-person workshops on May 3, 17, and 31, 2022, to further facilitate discussion on the proposed project. City staff were also available to attend pop-up events, neighborhood meetings, religious gatherings, etc. Additionally, the City has maintained a web page devoted to informing the public about, and encouraging participation in, the Specific Plan process. The website includes public notices, meeting materials, presentations resources and reports, contact information, and other background materials. The web page is located at: www.fresno.gov/SEDA.

2.1.3 - Contents of the Specific Plan

The Specific Plan is organized into the following four sections and seven elements. A set of objectives and implementing policies are provided in each relevant section. The Specific Plan's sections and elements are as follows:

1. **Introduction.** This section provides an overview of the vision, opportunities, and challenges for development of the Plan Area, the existing conditions and growth expected in the Plan Area, and the implementation of the proposed project.
2. **Document Elements.** This section contains the following seven elements for SEDA:
   - **Urban Form Element.** This element contains a series of exhibits that showcase the Land Use vision, a description of the Land Use Districts that make up the map, and the associated standards for each Land Use District. The section also contains specific objectives and policies related to urban form.
   - **Housing Element.** This element discusses the availability of housing in the City and the challenges associated with providing housing affordability. This element includes SEDA's household demographics and discusses the diverse range of housing types to be developed as a result of the Specific Plan, from medium- and higher-density multi-family types to small- and medium-lot single-family options. This section also includes objectives and policies that reflect the priorities and vision for housing within the Plan Area.
   - **Open Space Element.** This element outlines the proposed project's plan to provide a high-quality, accessible open space system; provides standards for the location, accessibility, and design of key public facilities; and details design guidelines and standards for park development. This element also includes objectives and policies that define the variety of open spaces and public spaces envisioned for the Plan Area.
   - **Community Farming and Agricultural Element.** This element provides the proposed project's policy framework to balance the needs of urban development with the need to conserve the economic, cultural, and historic value of agricultural land in the City's metropolitan area. In addition to including the policies and objectives for agricultural uses in the Plan Area, this element also provides descriptions of the different types of community farming and agriculture uses.
   - **Conservation Element.** This element describes the objectives and policies that are aimed at reducing greenhouse gases (GHGs), conserving water and energy, and diverting waste, which together reduce GHG emissions and conserve resources.

- **Economic Development Element.** This element describes the City's commitment to environmentally responsible economic development that creates shared prosperity. This element includes the goals of the proposed project to build on the City's current strengths and to create more opportunity for current and future residents and businesses. The objectives and policies of this element serve to identify economic opportunities presented by the design and policies of the Plan Area.
- **Cultural and Historical Resource Element.** This element discusses the policies that support preservation of the historically significant buildings, districts, sites, landscapes, and other features that reveal the unique identity of the City and contribute to its sense of place.

3. **Implementation.** This section outlines the actions, studies, plans, and procedures that will assist in implementing the Specific Plan.

2.1.4 - Additional Project Components

The proposed project sets a vision for how the Plan Area would develop over time and is supported by several other documents and plans in addition to the Specific Plan. The following components are part of the planning process and will be necessary prior to construction of any subsequent development under the Specific Plan:

Phasing Plan

The Phasing Plan defines the required sequence of development for various areas within SEDA.

Infrastructure Financing Plan

The proposed project would include a Public Facilities Financing Plan to fund backbone infrastructure and public facilities, including roads, sewer, water, storm drainage, parks, and other public facilities. Backbone infrastructure and public facilities required for development would be funded through a combination of public and private funding. Costs associated with in-tract infrastructure costs such as interior roads and utility lines would be funded by private developer funding and will be excluded from the Financing Plan. The project Financing Plan would be developed through a review of the SEDA Specific Plan, infrastructure studies, and coordination with the City.

Annexation

The proposed project requires annexation of Fresno County (County) lands into the City. LAFCo is a Responsible Agency under CEQA for the proposed project. LAFCo will consider the analysis contained in this EIR when considering the annexation of the project site into the City. Annexation will be strategic and proactive to facilitate infrastructure development by the City.

General Plan Amendment and Development Code Change

The proposed project would also amend the General Plan and Development Code to implement the land use and zoning described in the proposed project.

2.2 - Existing

2.2.1 - Regional Location

The City is located in Fresno County, California, within the San Joaquin Valley. The City is located approximately 200 miles north of Los Angeles and 170 miles south of Sacramento. The City is located on the State Route (SR) 99 corridor and bounded by Madera County to the north, the City of Clovis to the northeast, and unincorporated land and communities to the east, south, and west. The City encompasses approximately 115.18 square miles[1][2] and has a population of approximately 542,000 people.[3]

2.2.2 - Plan Area Location

The location of the nearly 9,000-acre Plan Area is in the southeast portion of the City, in Fresno County, California as shown in Exhibit 2-1. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the west by Locan, Temperance, and Minnewawa Avenues.

2.2.3 - Existing Uses

Agricultural Uses

The predominant existing use in the Plan Area (approximately 5,000 acres) is agriculture, primarily vineyards, orchards, and vegetable farms. The average parcel size is approximately 25 acres and is typically used for growing a range of crops. The Plan Area also contains agriculture-related and commercial operations, such as plant nurseries, wineries, and other various agricultural businesses.

Rural Residential Uses

The second most predominant existing use is rural residential development, which is primarily concentrated in the area between SR-180 and McKinley Avenue but also scattered throughout the Plan Area. Currently, there are 700 residential parcels (approximately 2.6 acres on average) within the Plan Area, which accommodate 713 single-family homes and 13 mobile homes.

Institutional and Public Facilities Uses

A school, churches, and other public uses also occupy the Plan Area. The Plan Area includes land that falls within both the Sanger and Clovis Unified School Districts (Sanger Unified and Clovis Unified), with Fowler and Fresno Unified School Districts bordering the Plan Area. Presently, the Lone Star Elementary School, located in the southern portion of the Plan Area, is the only school in the Plan Area. However, Clovis Unified is constructing an educational center for middle and high school students in the northern portion of the Plan Area on a site along the Clinton Avenue alignment between Leonard and Highland Avenues, with phased opening expected in 2025.

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1 City of Fresno. 2020. Fresno General Plan Program Environmental Impact Report. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/03/Fresno-GP-Public-Review-Draft-Program-EIR.pdf. Accessed March 17, 2022.

2 United States Census Bureau. 2020. Fresno City, California QuickFacts. Website: https://www.census.gov/quickfacts/fresnocitycalifornia. Accessed December 9, 2022.

3 United States Census Bureau. 2020. Fresno City, California QuickFacts. Website: https://www.census.gov/quickfacts/fresnocitycalifornia. Accessed March 17, 2022.

Natural Features

The Plan Area is traversed by several constructed drainage features and natural waterways: Gould Canal, Redbank Slough, Dry Creek Canal, Mill Ditch, Fancher Creek Canal, and Briggs Canal. Typically, canals in the Plan Area are mostly unvegetated and the banks are reinforced with rock or broken asphalt and concrete, with some portions fully concrete-lined. In addition, there are several small ponds and numerous lateral irrigation ditches that deliver water from the canals to agricultural fields.

2.2.4 - Existing General Plan Designations

According to the City's General Plan, the existing Plan Area contains the following General Plan designations:

- Residential–Low Density (1-3.5 DU/acre)
- Residential–Medium Density (5.0–12 DU/acre)
- Residential–Urban Neighborhood (16–30 DU/acre)
- Employment–Mixed Use
- Employment–Office
- Public Facilities
- Open Space
- Buffer

2.2.5 - Circulation and Access

The current roadway network is mainly comprised of two-lane county roads at 0.5-mile intervals, interspersed with local streets. Major roadway access corridors include Temperance, Clovis, and Jensen Avenues. Each of these major roadway access corridors accommodates four lanes of traffic with a central turning lane. SR-180 has been extended eastward along the old Kings Canyon alignment from Temperance Avenue to Academy Avenue in Sanger. This route extension provides an east–west connection to SR-99, serving commuters and the movement of agricultural goods from eastern portion of the County. Temperance Avenue has been expanded to four lanes where needed to serve new development.

2.3 - Project Characteristics

2.3.1 - Proposed Project

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. The proposed project is framed with three interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. Additionally, the proposed project

would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

2.3.2 - Proposed Specific Plan Buildout

The Land Use Map defines the physical extent of Land Use Districts, as well as major roadway alignments which constitute the buildout of the proposed project as shown in Exhibit 2-2. It also identifies potential locations for certain open space and institutional features. These locations, as well as certain roadway configurations and specific transit alignments, are more closely specified in the Infrastructure Plan. The implementation of the Land Use Map is administered through the application of Land Use District Standards and Street and Circulation Standards. The proposed project land use categories by district are shown in Table 2-1 along with the total proposed acreage. Descriptions of each of the associated land use categories are further discussed below.

Table 2-1: Proposed Specific Plan Acreages

Land Use	Proposed Plan Acres	Percentages
Mixed-Use Land Uses		
Regional Town Center	310	3.5%
Community Town Center	290	3.3%
Neighborhood Town Center	520	5.9%
Mixed-Use Land Uses Total	***1,120***	***12.7%***
Residential Land Uses		
Mixed Residential	1,090	12.4%
Neighborhood Residential	1,520	17.3%
Rural Residential	2,160	24.5%
Rural Cluster Residential	810	9.2%
Residential Land Uses Total	***5,580***	***63.4%***
Employment Land Uses		
Office Center	160	1.8%
Flexible Research and Development	1,380	15.7%
Institutional	280	3.2%
Employment Land Uses Total	***1,820***	***20.7%***
Other Land Uses		
Flood Control Basin	280	3.2%
Total	***8,800***	***100%***
Source: City of Fresno 2022.		

Mixed-Use Land Uses

The proposed project is based upon a hierarchy of walkable, mixed-use Town Centers supported by a multimodal transportation network. Town Centers, which would serve as commercial and civic focal points for the Plan Area, are designed to include a rich mixture of uses with varying intensities. Town Centers are human-scaled and defined by quality design features. They incorporate living and working opportunities with entertainment, cultural activities, and shops serving the daily needs of residents and employees. There are three types of Town Centers, including Regional Town Centers, Community Town Centers, and Neighborhood Town Centers.

Regional Town Centers

The Regional Town Center is at the top of the mixed-use center hierarchy in the Plan Area. The commercial uses in Regional Town Centers would serve approximately 40,000 to 60,000 households across the Plan Area and within the surrounding communities outside of the Plan Area. The Regional Town Center features region-serving retail and office activity, as well as medium- and higher-density housing. The Regional Town Center will be located south of SR-180 along the realigned Kings Canyon Boulevard. The center will be focused around one or more major transit stations linked to the regional rapid transit network. The Regional Town Center will be given priority as the primary mixed-use employment center, retail destination, and host to major cultural attractions.

Community Town Centers

Seven Community Town Centers would be dispersed across the Plan Area and would provide commercial, civic, and other services to meet the needs of Community Town Center residents and employees, as well as those of surrounding neighborhoods. Community Town Center services, including grocery stores, support between 5,000 and 10,000 households both in the Plan Area and the surrounding communities outside of the Plan Area. Community Town Centers feature a variety of medium-density housing options. Some Community Town Centers are focused on major rapid transit stations.

Neighborhood Town Centers

Neighborhood Town Centers would be dispersed throughout the Plan Area and would serve as focal points of adjacent residential areas. Neighborhood Centers include employment and residential uses and would provide access to civic services and amenities, including elementary schools, local parks, community gardens, and other services. Each Neighborhood Town Center would serve approximately 1,500 to 2,000 households in the Plan Area and surrounding communities outside of the Plan Area and include a range of housing options.

Residential Land Uses

The Plan Area includes a rich and complete fabric of residential communities that support mixed-use centers and include a variety of housing types and affordability levels. The proposed project would distribute a variety of housing types across the Plan Area to accommodate current and future housing needs. The range of housing types and densities throughout the communities would provide flexibility to meet the evolving needs of households in the region. There are four types of residential

land uses, including Mixed Residential, Neighborhood Residential, Rural Residential, and Rural Cluster Residential.

Mixed Residential

Mixed Residential districts support the Regional and Community Town Centers with a variety of medium- and higher-density housing, including a diverse mix of attached and detached single-family and multi-family homes. The average gross density within the Mixed Residential district will be approximately 20–30 units per acre. Residential buildings range in net density from 8–60 units per acre.

Neighborhood Residential

Neighborhood Residential districts surround Neighborhood Town Centers and support the retail, employment, and other services provided throughout the Plan Area. Neighborhood Residential areas include a variety of detached and attached single-family housing types, as well as multi-family housing options. The average gross density within the Mixed Residential district will be approximately 7–15 units per acre. Residential buildings range in net density from 6–30 units per acre.

Rural Residential

There are approximately 1,536 acres in the Plan Area currently developed as very-low-density rural residential homes and ranchettes. The proposed project designates these homes as Rural Residential. Upon annexation into the City, the existing land use on these parcels will remain protected under the Annexation Overlay Ordinance as approved by the City Council in Bill 2008-10 on March 4, 2008. Changes in land use would be subject to the process and regulations set forth in the SEDA Development Code Update.

Rural Cluster Residential

Rural Cluster districts, located along the eastern edge of the Plan Area, would concentrate residential lots within a small, clustered area of a larger parcel or groups of parcels. This clustering of homes preserves the continuity and viability surrounding land for agricultural uses and open space conservation. Rural Cluster districts serve as a transitional buffer between more intense urban uses within the Plan Area and the commercial agricultural operations outside of the Plan Area. The average gross density of Rural Cluster districts is 0.1–0.5 units per acre. A district may include 20–80 acres, with single-family homes clustered on lots 1 acre or smaller in a designated cluster.

Employment Land Uses

The proposed project would provide opportunities to attract diverse, high-quality employers and job opportunities while meeting the environmental challenges associated with growth in the City and the Central Valley. Many jobs would be located within a short distance to amenities in Regional and Community Town Centers, Office Centers, and in Flexible Research and Development districts. In these locations, employment opportunities can be closely linked to regional transit service and trail systems. The proposed project would put a significant portion of Plan Area residents within walking distance of major employment areas and high-capacity transit services that link to regional employment centers, including Downtown Fresno. Reducing reliance on automobiles for work trips

would significantly reduce GHG emissions, playing a significant role in meeting the proposed project's sustainability goals.

Office Center

Office Center districts are located adjacent to Regional and Community Centers or along regionally significant transportation corridors (e.g., SR-180, Kings Canyon Boulevard, Clovis Avenue). Office Centers accommodate professional offices and compatible commercial uses such as restaurants, coffee shops, cafés, banks, and book shops. Some residential uses could be conditionally permitted in Office Centers.

Flexible Research and Development

Flexible Research and Development districts would be primarily located west of the Briggs Canal and/or south of Jensen Avenue and are intended for uses such as research and development, light manufacturing, product testing centers, and office development. The area may also include compatible commercial uses such as restaurants, coffee shops, cafés, printing and publishing, dry cleaners, and other supporting businesses. Access to regional transportation corridors (both road and rail) is critical. Residential uses are not allowed in Flexible Research and Development areas.

Institutional Uses

Institutional Land Use Districts would include the planned Clovis Unified School District Education Center and the existing Sanger Unified School District Education Center. The Institutional Land Use Districts would not include new SEDA high schools, middle schools, or elementary schools and other civic uses in the SEDA Plan. These uses are integrated into Neighborhood Town Centers and other districts.

2.3.3 - Circulation and Access

The proposed project's multimodal circulation network would include a hierarchy of transportation options, ensuring that residents would have realistic choices for their daily travel needs. The proposed project would be served by high-capacity public transit and safe bicycle and pedestrian routes. Arterials, collectors, and local streets would provide safe, convenient access for local trips. Exhibit 2-3 shows the proposed major street circulation network. Non-auto options are integrated throughout the plan, with dedicated bicycle/pedestrian trails and a network of bicycle-priority "Bicycle Boulevards."

Transit Service

Transit Corridors and Arterials with high-capacity public transit would serve major town centers, while collectors and local streets would provide safe, convenient options for local trips. Transit service will be provided to and within the Plan Area via regional transit connections along Kings Canyon Boulevard. The Kings Canyon high frequency Q Bus Route would extend into the Regional Town Center and eventually terminate service in the Community Town Center located on South DeWolf Avenue. Local service would be provided along primary internal circulation corridors.

Bicycle and Pedestrian Trails

A network of pedestrian and bicycle routes, including dedicated trails and multi-purpose paths, would serve work, school, and recreational trips. This extensive non-auto travel network would be coordinated with existing and proposed regional trails. Trail systems would connect regional and sub-regional destinations for bicyclists, pedestrians, and equestrians (where appropriate). Multiuse trails would be parallel to canals and other east–west open space networks within the Plan Area. There would also be a network of bicycle lanes reflective of the Fresno Active Transportation Plan (ATP). This would consist of at least Class II Bike Lanes and other bicycle facilities as described in the California Department of Transportation (Caltrans) Bikeway Classification Guide.

Complete Streets

The Plan Area would be served by a network of Complete Streets as defined by the City's Complete Streets Policy adopted in 2019. A Complete Street is defined in the policy as a transportation facility that is planned, designed, operated, and maintained to provide safe mobility for all users—including bicyclists, pedestrians, transit vehicles, trucks, and motorists—appropriate to the function and context of the facility while connecting to a larger transportation network.

2.3.4 - Open Spaces, Agriculture, and Green Infrastructure

Parks and Open Spaces

The proposed project's open space system would provide places for active and passive recreation and includes corridors for trails and paths that would connect many areas of the Plan Area.

Sustainable Infrastructure

Sustainable infrastructure components capture and retain runoff, then treat the runoff by allowing it to move slowly through natural systems, such as constructed wetlands and rock filters. Stormwater management systems help reduce impacts on the environment. Regional infrastructure systems can also be designed as visual and active amenities for residents in the Plan Area.

Community Farming and Agriculture

The proposed project would integrate community-scale farming and agriculture into the urban fabric. Agricultural activities would range from neighborhood gardens to agricultural education and from small farming operations in green belts to those on the Rural Cluster edge.

2.4 - Project Objectives

The objectives of the proposed project are to:

Quantified Objectives:

- Accommodate between 40,000 and 45,000 dwelling units of varying types, sizes, densities, and affordability levels.
- Accommodate between 30,000 and 37,000 jobs.

Fiscal Responsibility:

- Provide self-financing for the development and ongoing maintenance of the SEDA that does not reduce City of Fresno resources dedicated to other areas of the City or burden Fresno residents outside of the SEDA.
- Holistically coordinate infrastructure to integrate efficiencies that piecemeal planning cannot.
- Invest in resource conserving techniques for stormwater systems, water supply, and trail and open space networks to save on infrastructure and mitigation costs.

Social Equity:

- Promote health by reducing harmful emissions from cars and industry.
- Foster healthy physical activity and community interaction by providing easy, safe walking and bicycle access to parks, schools, and retail centers.
- Sustain the diversity of Fresno's population by providing a wide variety of housing choices and business opportunities.
- Respect the major economic and cultural role of agriculture in the Central Valley by accommodating growth within the confines of a smaller urban footprint and directly integrating community-scale agriculture into the design of community centers, neighborhoods, and open spaces.

Environmental Sustainability:

- Emphasize the efficient use of energy, water, and other resources in SEDA design and policies. Strive to produce a self-mitigating plan that deeply reduces the environmental impacts of growth and can sustain and even serve to improve or repair natural systems.
- Reduce energy and water consumption through more efficient land use patterns, smarter building standards, and environmentally sensitive infrastructure to help Fresno meet standards for greenhouse gas emissions, and well as air pollution and water quality.

Housing Choice:

- Offer a variety of housing choices to a mix of incomes, age groups, and lifestyles.
- Ensure new housing units are affordable to households with varying levels of income through covenants and deed-restrictions or other affordability mechanisms.

High Quality Transit Service:

- Provide convenient and frequent transit service to connect SEDA's town centers to jobs and housing inside the Plan Area and across the region.

Walkable Neighborhoods:

- Provide for nearly all homes to be located within walking distance of a Neighborhood Town Center with an elementary school, recreation areas, community gardens, and small shops.

Parks, Open Space, and Trails:

- Create a variety of natural open spaces and parks for recreation in all areas of the SEDA.
- Create trail systems and bicycle paths that make traveling without a car safe and convenient.
- Ensure that schools and major town centers can be reached safely with or without a car.

Mixed Use Town Centers:

- Mix shopping, housing, and jobs in vibrant Regional Town Centers and Community Town Centers that are easily accessible to most residents via a short walk, bike ride, drive, or transit trip.

Innovative Employment Areas:

- Attract opportunities in green technology and energy systems, ag-related industries, modular housing, and other emerging fields to provide jobs for Fresno residents.

Community Farming and Agriculture:

- Integrate small farms, community gardens, and farmers' markets into neighborhoods, schools, and town centers.
- Create a buffer that includes rural homes, organic farming, and open spaces to serve as a transition between the SEDA and commercial agriculture to the east.

Implementation:

- Develop the SEDA in an organized and phased manner based on housing needs, infrastructure availability, and minimization of impacts.
- Ensure amenities and infrastructure provision for each new phase prior to commencement of construction.

2.5 - Intended Uses of this Draft Program EIR

This Draft PEIR has been prepared by the City to assess the potential environmental impacts that may arise in connection with actions related to implementation of the proposed project. Pursuant to CEQA Guidelines Section 15367, the City is the Lead Agency for the proposed project and has discretionary authority over the proposed project and project approvals. The Draft PEIR is intended to address all public infrastructure improvements and all future developments that are within the parameters of the proposed project. This Draft PEIR is intended to evaluate the environmental impacts of the Fresno SEDA Specific Plan to the greatest extent possible and is used as the primary environmental document to evaluate subsequent planning and permitting actions associated with projects in the planning area. Once certified, the City intends for this analysis to be used consistent with all available streamlining provisions in CEQA, including, but not limited to, Guidelines Section 15162-15168, 15182 and 15183.

2.5.1 - Discretionary and Ministerial Actions

The proposed project is a policy-level document and does not include any specific development proposals and may not fully evaluate the impacts of other future specific, individual development that may be approved under implementation of the proposed project. The Planning Commission and other decision-making bodies would review the proposed project and make recommendations to City Council, who has approval authority for adoption of the SEDA Plan and related actions. Future projects may be tiered off this Draft PEIR, or be found consistent with this Draft PEIR pursuant to one or more of CEQA's streamlining processes and may require additional, project-specific environmental analysis to secure the necessary discretionary development permits. Subsequent projects will be reviewed by the City for consistency with the General Plan, Specific Plan, Zoning Ordinance, and this Draft PEIR, and subsequent project-level environmental review will be conducted if required by CEQA.

Adoption of the proposed project would be enacted by a resolution of the City Council for the following discretionary actions:

- Adoption of the Fresno Southeast Development Area Specific Plan.
- Amendment of the Fresno General Plan, including amendments to the Land Use Map and text.
- Approval of Annexation (this would probably occur after initial adoption of the Specific Plan and would probably occur in phases—unlikely that it will be part of the plan adoption actions.)

Adoption of the proposed project would be enacted by a City ordinance for the following discretionary actions:

- Rezoning of property for consistency with the General Plan Amendment and SEDA Specific Plan.
- Text Amendment of the Development Code to incorporate new zone districts and other provisions called for in the SEDA Plan.

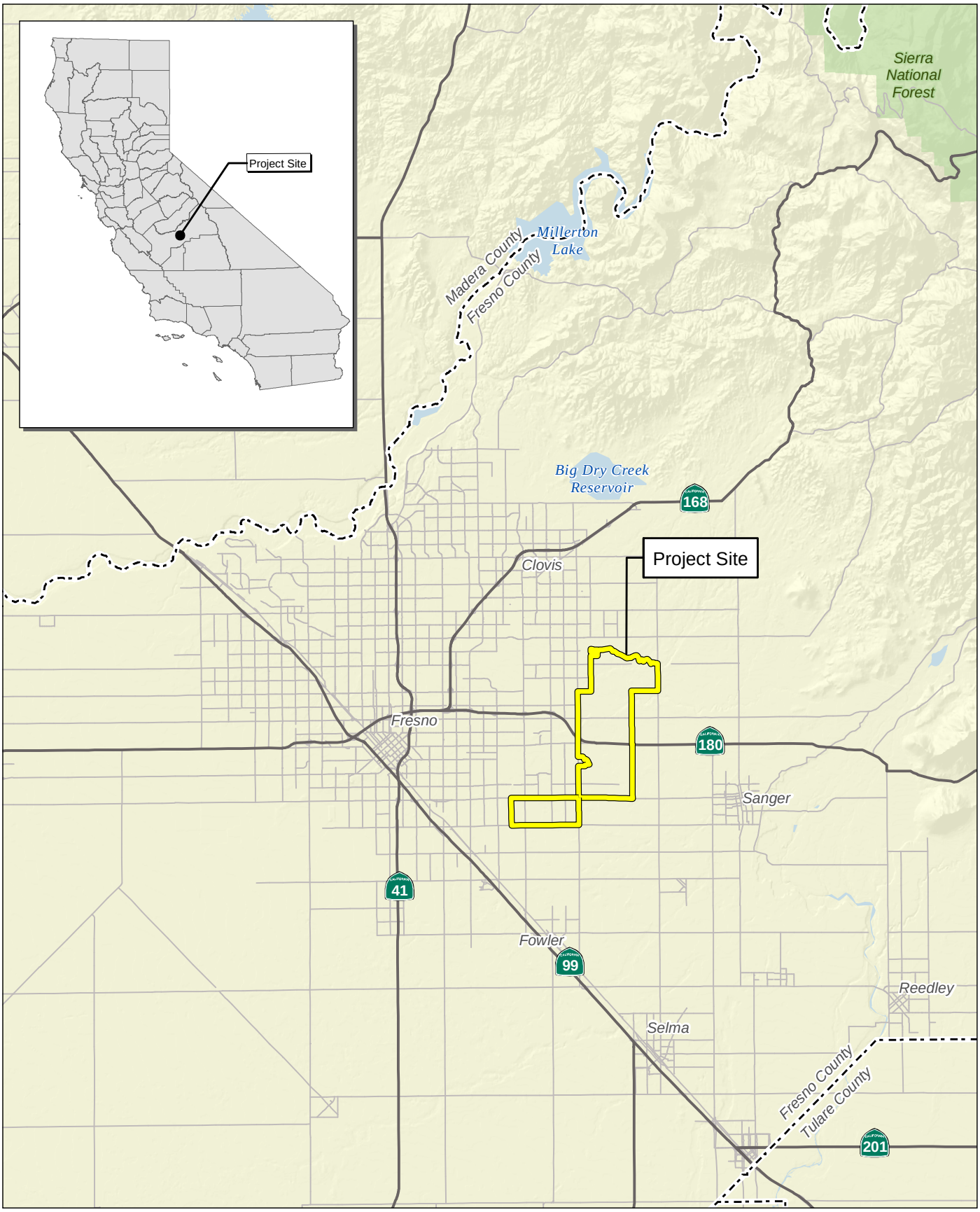
As discussed further under Section 2.4.2, Responsible and Trustee Agencies, other agencies may be consulted during the adoption process, however, their approval is not required for adoption of the proposed project. Any subsequent development under the proposed project may require approval of State, federal and Responsible Trustee Agencies that may rely on the program-level analysis in this Draft PEIR.

2.5.2 - Responsible and Trustee Agencies

A number of other agencies in addition to the City will serve as Responsible and Trustee Agencies, pursuant to CEQA Guidelines Section 15381 and Section 15386, respectively. For the purposes of CEQA, the term "Responsible Agency" includes all public agencies other than the Lead Agency that have discretionary approval power over the proposed project. Discretionary approval may include such actions as issuance of a permit, authorization, or easement needed to complete some aspect of

the proposed project. This Draft PEIR will provide environmental information to these agencies and other public agencies, which may be coordinated with other agencies, as part of project implementation. These agencies may include, but are not limited to, the following:

- California Department of Transportation
- California State Water Resources Control Board (State Water Board)
- California Department of Fish and Wildlife (CDFW)
- Central Valley Regional Water Quality Control Board (Central Valley RWQCB)
- Fresno Local Agency Formation Commission
- San Joaquin Valley Air Pollution Control District (Valley Air District)
- Fresno Municipal Flood Control District
- Fresno Irrigation District



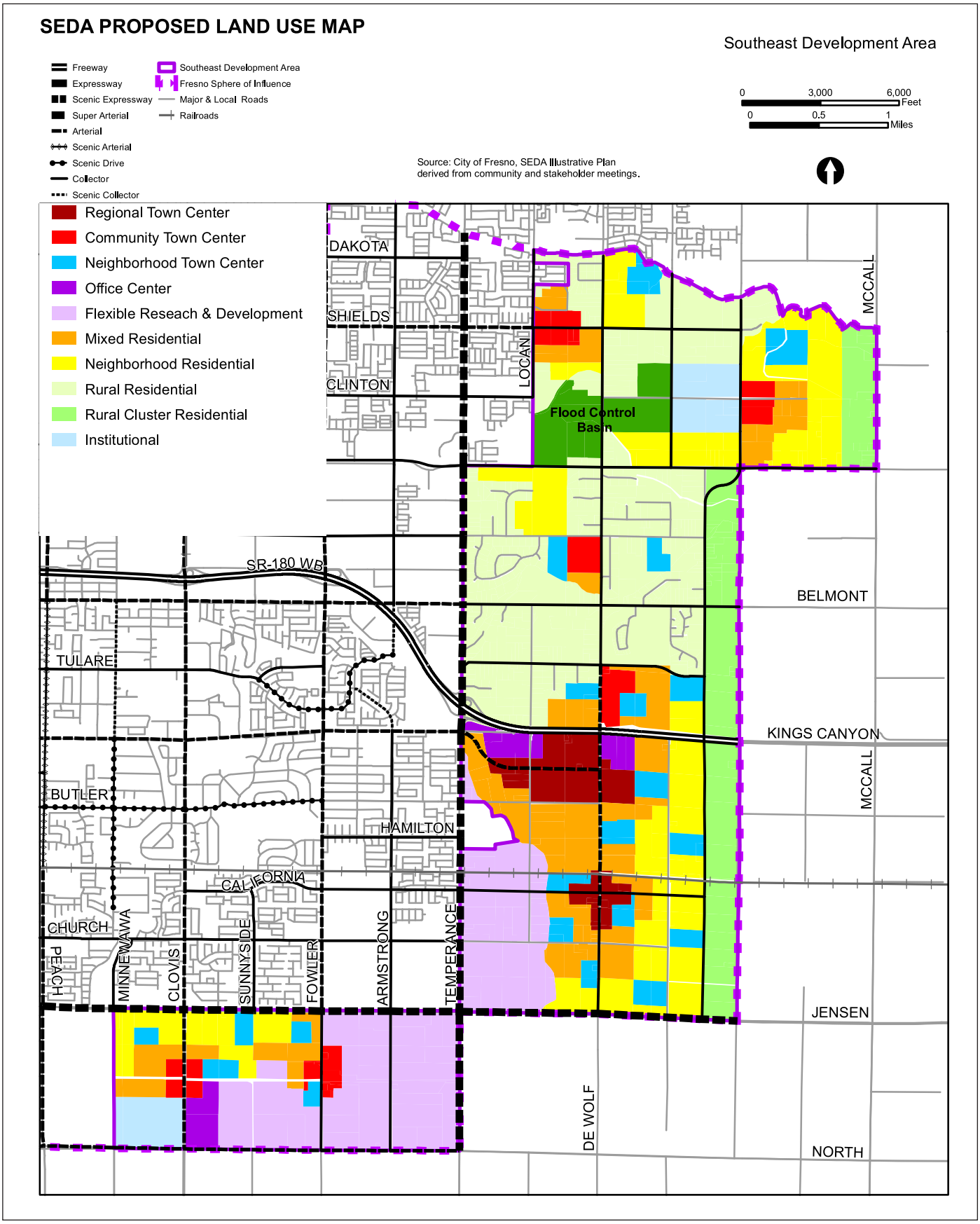
Source: Census 2000 Data, The California Spatial Information Library (CaSIL).

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Miles

Exhibit 2-1
Regional Location Map

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Source: City of Fresno, SEDA Regulating Districts, 07/2023.

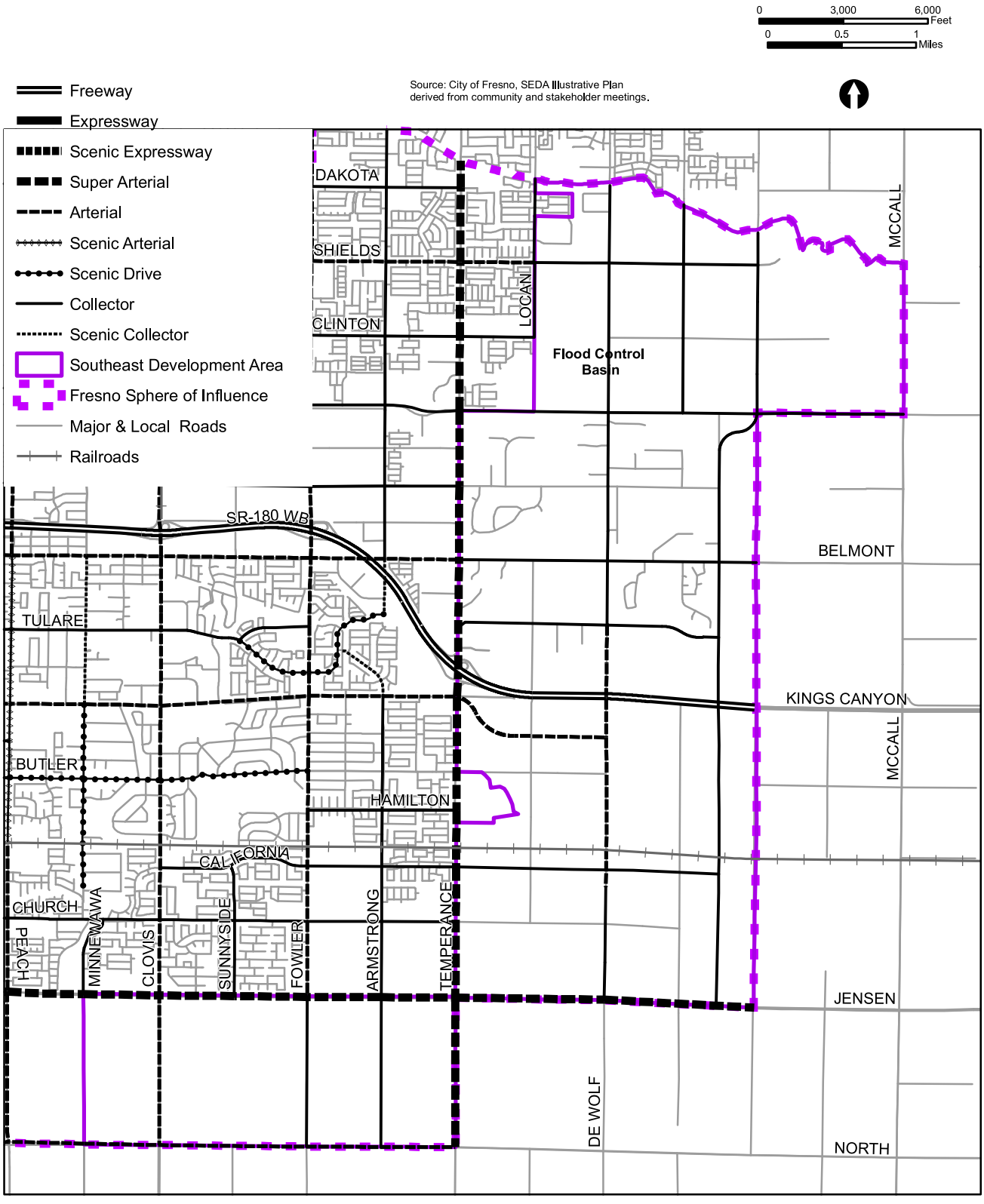
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Exhibit 2-2
Specific Plan Map

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PROPOSED MAJOR STREET CIRCULATION

Southeast Development Area



Source: City of Fresno

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Exhibit 2-3
Proposed Major Street Circulation Network

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CHAPTER 3: ENVIRONMENTAL IMPACT ANALYSIS

Organization of Issue Areas

This Draft Program Environmental Impact Report (Draft PEIR) provides analysis of impacts for those environmental topics where it was determined in the Notice of Preparation (NOP), or through subsequent analysis, that the proposed project would result in "potentially significant impacts." Sections 3.1 through 3.19 discuss the environmental impacts that may result with approval and implementation of the proposed project.

Issues Addressed in this Draft Program EIR

The following environmental issues are addressed in Chapter 3:

- Aesthetics, Light, and Glare
- Agricultural Resources and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources and Tribal Cultural Resources
- Energy
- Geology, Soils, and Seismicity
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems
- Wildfire

Level of Significance

Determining the severity of potential project impacts is fundamental to achieving the objectives of the California Environmental Quality Act (CEQA). CEQA Guidelines Section 15091 requires that decision-makers mitigate, as completely as is feasible, the significant impacts identified in the Draft PEIR. If the Draft PEIR identifies any significant unmitigated impacts, CEQA Guidelines Section 15093 requires decision-makers, in approving a proposed project, to adopt a statement of overriding considerations that explains why the benefits of the proposed project outweigh the adverse environmental consequences identified in the Draft PEIR.

The level of significance for each impact examined in this Draft PEIR was determined by considering the predicted magnitude of the impact against the applicable threshold. Thresholds were developed using criteria from the CEQA Guidelines and checklist; State, federal, and local regulatory schemes; local/regional plans and ordinances; accepted practice; consultation with recognized experts; and other professional opinions. The level of significance for each impact can be determined as "No impact," "Less than significant impact," "Less than significant with mitigation incorporated," or "Significant and unavoidable impact." A "No impact" determination means the proposed project would not affect this impact area at all. A "Less than significant impact" determination means that the proposed project may have a minor effect on this impact area, but it would not exceed a

threshold requiring mitigation. A "Less than significant with mitigation incorporated" determination means that the proposed project could potentially have a significant impact, but there are measures that can be put in place to reduce the impact to a level that is not considered significant. A "Significant and unavoidable impact" determination means that the proposed project exceeds thresholds requiring mitigation, but there is no feasible mitigation available that would reduce the impact to a level that is less than significant.

Impact Analysis and Mitigation Measure Format

The format adopted in this Draft PEIR to present the evaluation of impacts is described and illustrated below.

Summary Heading of Impact

Impact AES-1:	**An impact summary heading appears immediately preceding the impact description (Summary Heading of Impact in this example). The impact number identifies the section of the report (AES for Aesthetics, Light, and Glare in this example) and the sequential order of the impact (1 in this example) within that section. To the right of the impact number is the impact statement, which identifies the potential impact.**

Impact Analysis

A narrative analysis follows the impact statement.

Level of Significance Before Mitigation

This section identifies the level of significance of the impact before any mitigation is proposed.

General Plan PEIR Mitigation Measures

The City's General Plan establishes a blueprint for future land development in the City. To evaluate impacts on the environment, the General Plan was approved in conjunction with a certified PEIR in December 2014. The SEDA Specific Plan is subject to the General Plan. Accordingly, mitigation measures that were included in the General Plan PEIR apply to the proposed project and mitigation applicable to the proposed project is listed in each topical section throughout this EIR.

Mitigation Measures

In some cases, following the impact discussion, reference is made to State and federal regulations and agency policies that would fully or partially mitigate the impact. In addition, policies and programs from applicable local land use plans that partially or fully mitigate the impact may be cited.

Project-specific mitigation measures, beyond those contained in other documents, are set off with a summary heading and described using the format presented below:

MM AES-1 Project-specific mitigation is identified that would reduce the impact to the lowest degree feasible. The mitigation number links the particular mitigation to the impact it is associated with (**AES-1** in this example); mitigation measures are numbered sequentially.

Level of Significance After Mitigation

This section identifies the resulting level of significance of the impact following mitigation.

Abbreviations used in the mitigation measure numbering are:

Code	Environmental Issue
AES	Aesthetics, Light, and Glare
AG	Agricultural Resources and Forest Resources
AIR	Air Quality
BIO	Biological Resources
CUL	Cultural Resources and Tribal Cultural Resources
ENER	Energy
GEO	Geology, Soils, and Seismicity
GHG	Greenhouse Gas Emissions
HAZ	Hazards and Hazardous Materials
HYD	Hydrology and Water Quality
LAND	Land Use and Planning
MIN	Mineral Resources
NOI	Noise
POP	Population and Housing
PUB	Public Services
REC	Recreation
TRANS	Transportation and Traffic
UTIL	Utilities and Service Systems
WILD	Wildfire

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3.1 - Aesthetics, Light, and Glare

3.1.1 - Introduction

This section describes the existing aesthetics, light, and glare conditions in the Plan Area, as well as the relevant regulatory framework. This section also evaluates the possible impacts related to aesthetics that could result from implementation of the proposed project. Descriptions and analysis in this section are based, in part, on the Fresno General Plan (General Plan), Fresno Southeast Development Area (SEDA) Specific Plan (Specific Plan), aerial photos, and the California Department of Transportation (Caltrans) List of Eligible and Officially Designated State Scenic Highways. As further discussed in Chapter 1, Introduction, three public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to aesthetics:

- Requests the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Planning Area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.1.2 - Environmental Setting

Visual Character

City of Fresno

The visual quality and character of the City of Fresno (City) is characterized by various aesthetic attributes, generally located within the Downtown area, suburban and rural residential areas, industrial areas, agricultural areas, and along corridors of major thoroughfares. The Downtown area is the urban center of the City, comprised of high-rise buildings and a variety of land uses. Downtown buildings include mixed-use buildings, theaters, civic/institutional buildings, and industrial warehouses, many of which have historic design elements. The suburbs are characterized by low-rise neighborhood buildings that are primarily dominated by single-family residential uses. The primary industrial areas within the City include the areas south of Downtown, along State Route (SR) 99, and adjacent to the Fresno-Yosemite International Airport, which are characterized by low-rise buildings with manufacturing, processing, and warehouse uses.

Plan Area

The Plan Area is located in the southeastern portion of the City, which is primarily surrounded by agricultural land and single-family residential units. The primary crops in the Plan Area are vineyards, orchards, and vegetables. The Plan Area also contains agriculture-related and commercial operations such as plant nurseries, wineries, and other various agricultural businesses. The second most predominant existing use is rural residential development. There are several constructed drainage features and natural waterways throughout the Plan Area, including Gould Canal, Redbank Slough,

Dry Creek Canal, Mill Ditch, Fancher Creek Canal, and Briggs Canal. Some canals in the Plan Area are mostly unvegetated and the banks are enforced with rock or broken asphalt and concrete, with some portions fully concrete-lined.

Scenic Resources and Corridors

Scenic resources are defined as natural or man-made elements that contribute to an area's scenic value and are visually pleasing. Scenic resources include landforms, vegetation, water, or adjacent scenery.

Scenic corridors are channels that facilitate movement (primarily by automobile, transit, bicycle, or foot) from one location to another with expansive views of natural landscapes and visually attractive man-made development. Scenic corridors analyzed under the California Environmental Quality Act (CEQA) typically include State-designated Scenic Highways.

City of Fresno

Scenic resources within the City include landscaped open space areas such as parks and golf courses; areas along the San Joaquin River due to varying topography; and the river bluffs, which provide a unique geological feature in the San Joaquin Valley. Man-made scenic resources include historic buildings in Downtown Fresno, which provide a unique skyline. Corridors are developed with low-rise commercial, residential, and industrial uses that are located along major thoroughfares such as Herndon Avenue, Shaw Avenue, Ventura Avenue/Kings Canyon Road, Blackstone Avenue, and Clovis Avenue. Additionally, General Plan Policy MT-3-a: Scenic Corridors designates several scenic corridors within the City.

According to the Caltrans State Scenic Highway Mapping System, there are no eligible or officially designated State Scenic Highways within the City.[1] However, the County has three eligible State Scenic Highways; the nearest eligible highways include a portion of SR-180 and a portion of SR-168. These portions of eligible highway constitute the closest scenic corridors to the City.

Plan Area

The General Plan does not designate any scenic corridors within the Plan Area. Gateway route designation was contemplated in the General Plan for SR-180, Clinton Way, and Tulare Avenue, all of which run through the Plan Area.

Views

A scenic vista is viewpoint that provides expansive views of a highly valued landscape for the public's benefit. It is usually viewed from some distance away. Aesthetic components of a scenic vista include (1) scenic quality; (2) sensitivity level; and (3) view access. A scenic vista can be impacted in two ways: a development project can have visual impacts by either directly diminishing the scenic quality of the vista or by blocking the view corridors or "vista" of the scenic resource. Important factors in determining whether a proposed project would block scenic vistas include the project's proposed

[1] California Department of Transportation (Caltrans). 2018. California State Scenic Highway System Map. Website: https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed June 22, 2022.

height, mass, and location relative to surrounding land uses and travel corridors. Typical scenic vistas are locations where views of rivers, hillsides, and open space areas are accessible from public vantage points.

City of Fresno

The approved General Plan does not identify or designate scenic vistas within the Planning Area. Although no scenic vista has been designated, the City's General Plan identifies six locations along the San Joaquin River bluffs as designated vista points from which views should be maintained. Scenic vistas within the City could provide distant views of features such as the San Joaquin River to the north and the foothills of the Sierra Nevada mountains to the east. Distant views of the San Joaquin River and areas north of the river can be seen from the river bluffs. However, the majority of these views are from private property. Partially obstructed views of the San Joaquin River can be seen from Weber Avenue, Milburn Avenue, McCampbell Drive, Valentine Avenue, Palm Avenue, SR-41, Friant Road, and Woodward Park. Additionally, there are several locations throughout the eastern portion of the City that provide distant views of the Sierra Nevada foothills. It should be noted that these distant views of the Sierra Nevada foothills are impeded many days during the year by the poor air quality in the San Joaquin Valley Air Basin.

Plan Area

Several areas within the Plan Area, along Kings Canyon Road, for example, provide distant views of the Sierra Nevada foothills. Furthermore, the Plan Area is traversed by several constructed drainage features and natural waterways: Gould Canal, Redbank Slough, Dry Creek Canal, Mill Ditch, Fancher Creek Canal, and Briggs Canal.

Light and Glare

City of Fresno

The majority of the City is urbanized. Significant sources of light and glare, including streetlights, lighting within parking lots, interior lights from Downtown buildings, lighting associated with recreational facilities, and light emitted from residential and non-residential buildings characterize the City. Conversely, rural residential and agricultural areas that are located within the southeastern and western portions of the City are not characterized by significant sources of light and glare.

Project Site

The Plan Area consists primarily of agricultural land, residential uses, which do not create significant sources of light and glare. Existing sources of light and glare include street and traffic lighting as well as car and truck headlights from vehicles traveling along major roads such as Kings Canyon Road. Some light sources are emitted from residential buildings and public facilities throughout the Plan Area. These lighting sources as well as any buildings and structures made with glass, metal, and polished exterior or roofing materials that exist throughout the Plan Area could result in localized glare.

3.1.3 - Regulatory Framework

State

California Scenic Highway Program

The State Legislature created the California Scenic Highway Program, maintained by Caltrans, in 1963. The purpose of the State Scenic Highway Program is to protect and enhance the natural scenic beauty of California highways and adjacent corridors, through special conservation treatment. The State laws governing the Scenic Highway Program are found in the Streets and Highways Code, Sections 260 through 263. A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The State Scenic Highway System includes a list of highways that are either eligible for designation as scenic highways or have been officially designated. The status of a proposed State Scenic Highway changes from eligible to officially designated when the local governing body applies to Caltrans for scenic highway approval, adopts a Corridor Protection Program, and receives notification that the highway has been officially designated a State Scenic Highway.

Local

Fresno General Plan

The General Plan outlines a long-range vision for the physical development of the City that reflects the community's vision to preserve the desirable qualities of the existing community while encouraging the aspirations of the community. The following policies relate to aesthetics, light, and glare:

Urban Form, Land Use and Design Element

Policy UF-1-c **Identifiable City Structure.** Focus integrated and ongoing planning efforts to achieve an identifiable City structure, comprised of a concentration of buildings, people, and pedestrian-oriented activity in Downtown; along a small number of prominent east-west and north-south transit-oriented, mixed-use corridors with distinctive and strategically located Activity Centers; and in existing and new neighborhoods augmented with parks and connected by multi-purpose trails and tree lined bike lanes and streets.

Policy UF-1-e **Unique Neighborhoods.** Promote and protect unique neighborhoods and mixed-use areas throughout Fresno that respect and support various ethnic, cultural and historic enclaves; provide a range of housing options, including furthering affordable housing opportunities; and convey a unique character and lifestyle attractive to Fresnans. Support unique areas through more specific planning processes that directly engage community members in creative and innovative design efforts.

Policy UF-12-g Impacts on Surrounding Uses. Establish design standards and buffering requirements for high-intensity Activity Centers to protect surrounding residential uses from increased impacts from traffic noise and vehicle emissions, visual

intrusion, interruption of view and air movement, and encroachment upon solar access.

Policy UF-13-a **Future Planning to Require Design Principles.** Require future planning, such as Specific Plans, neighborhood plans or Concept Plans, for Development Areas designated by the General Plan to include urban design principles and standards consistent with the Urban Form, Land Use, and Design Element.

Policy UF-1-f **Complete Neighborhoods, Densities, and Development Standards.** Use Complete Neighborhood design concepts, development standards, and project reviews outside the Downtown Planning Area to achieve the development of Complete Neighborhoods and the residential density targets of the General Plan.

Objective UF-14 Create an urban form that facilitates multi-modal connectivity.

Policy UF-14-a **Design Guidelines for Walkability.** Develop and use design guidelines and standards for a walkable and pedestrian-scaled environment with a network of streets and connections for pedestrians and bicyclists, as well as transit and autos.

Objective LU-1 Establish a comprehensive citywide land use planning strategy to meet economic development objectives, achieve efficient and equitable use of resources and infrastructure, and create an attractive living environment.

Policy LU-2-e **Neighborhood Preservation.** Incorporate standards in the Citywide Development Code to preserve the existing small-scale residential quality of older neighborhoods.

Policy LU-3-b **Mixed-Use Urban Corridors that Connect the Downtown Planning Area.** Support the development of mixed-use urban corridors that connect the Downtown Planning Area with the greater Fresno-Clovis Metropolitan Area with functional, enduring, and desirable urban qualities along the Blackstone Avenue, Shaw Avenue, California Avenue, and Ventura Avenue/Kings Canyon Road corridors.

Policy LU-4-a **Neighborhood Nuisance Abatement.** Continue proactive and responsive code enforcement and nuisance abatement programs to improve the attractiveness of residential neighborhoods.

Policy LU-5-g **Scale and Character of New Development.** Allow new development in or adjacent to established neighborhoods that is compatible in scale and character with the surrounding area by promoting a transition in scale and architectural character between new buildings and established neighborhoods, as well as integrating pedestrian circulation and vehicular routes.

Policy LU-6-a **Design of Commercial Development.** Foster high quality design, diversity, and a mix of amenities in new development with uses through the consideration of guidelines, regulations and design review procedures.

Policy LU-6-b **Commercial Development Guidelines**. Consider adopting commercial development guidelines to assure high quality design and site planning for large commercial developments, consistent with the Urban Form policies of the General Plan.

Policy LU-6-d **Neighborhood and Community Commercial Center Design.** Plan for neighborhood mixed use and community commercial uses to implement the Urban Form concepts of the General Plan, promote the stability and identity of neighborhood and community shopping areas, and allow efficient access without compromising the operational effectiveness of the street system.

- Neighborhoods will be anchored by community commercial centers with a mix of uses that meet the area's needs and create a sense of place.

Policy LU-6-e Regional Center Planning and Design. Promote economic growth with regional commercial centers.

- Regional shopping centers will have internally-unified building design, landscaping, and signage standards.

Policy LU-6-f **Auto-Oriented Commercial Uses.** Direct highway-oriented and auto-serving commercial uses to locations that are compatible with the Urban Form policies of the General Plan. Ensure adequate buffering measures for adjacent residential uses noise, glare, odors, and dust.

Policy LU-9-e **Downtown Sightline.** Require new development to preserve existing sightlines to Downtown to the extent feasible.

Policy LU-9-f **View Corridors.** Promote new view corridors that highlight the Downtown skyline.

Objective D-1 Provide and maintain an urban image that creates a "sense of place" throughout Fresno.

Policy D-1-d **Public Art.** Continue to promote a citywide public art program that contributes to an awareness of the City's history and culture.

Policy D-1-e **Graphic Identity.** Continue the preservation, promotion, procurement and strategic location of landmarks, monuments and artwork that provide orientation and represent Fresno's cultural heritage and artistic values.

Objective D-2 Enhance the visual image of all "gateway" routes entering the Fresno Planning Area.

Policy D-2-a **Design Requirements for Gateways.** Consider unified design requirements for gateways to welcome travelers to the City's Activity Centers.

Policy D-2-c **Highway Beautification.** Work with Caltrans, the Fresno Council of Governments, Tree Fresno, neighboring jurisdictions, and other organizations to obtain funding for highway beautification programs.

Objective D-3 Create unified plans for Green Streets, using distinctive features reflecting Fresno's landscape heritage.

Policy D-3-a **Green Street Tree Planting.** Create a Green Street Tree Planting Program, with a well-balanced variety and spacing of trees to establish continuous shading and visual continuity for each streetscape. Strive to achieve coherent linkages between public and private spaces, prioritizing tree planting along tree-deficient Arterial and Collector Roadways in neighborhoods characterized by lower per capita rates of vehicle ownership.

Policy D-3-b **Funding for Green Street Tree Planting Program.** Pursue funding for the Green Street Tree Planting Program, including landscaping of median islands.

Policy D-3-c **Local Streets as Urban Parkways.** Develop local streets as "urban parkways," where appropriate, with landscaping and pedestrian spaces.

Policy D-3-d **Undergrounding Utilities.** Partner with utility companies to continue to pursue the undergrounding of overhead utilities as feasible.

Objective D-4 Preserve and strengthen Fresno's overall image through design review and create a safe, walkable and attractive urban environment for the current and future generations of residents.

Policy D-4-f **Design Compatibility with Residential Uses.** Strive to ensure that all new non-residential land uses are developed and maintained in a manner complementary to and compatible with adjacent residential land uses, to minimize interface problems with the surrounding environment and to be compatible with public facilities and services.

Objective D-5 Maintain and improve community appearance through programs that prevent and abate blighting influences.

Policy D-5-a **Code Enforcement**. Continue enforcement of the Fresno Municipal Code to remove or abate public nuisances in a timely manner.

Policy D-5-b **Clean Streets.** Promote community partnerships and continued City efforts toward litter clean-up and abatement of trash stockpiles on public and private streets.

Policy D-5-c **Facade Improvements.** Pursue funding for, and support of, building facade improvement programs.

Policy D-5-d **Graffiti Prevention and Abatement.** Seek ways to end graffiti, continue and expand the City's effective Graffiti Abatement Program.

Policy D-6-b Consider adopting and implementing incentives for, and support efforts by, private development to incorporate culturally-specific architectural elements in areas with a predominant ethnic population.

Mobility and Transportation Element

Objective MT-3 Identify, promote and preserve scenic or aesthetically unique corridors by application of appropriate policies and regulations.

Policy MT-3-a **Scenic Corridors.** Implement measures to preserve and enhance scenic qualities along scenic corridors or boulevards, including:

- Van Ness Boulevard–Weldon to Shaw Avenues
- Van Ness Extension–Shaw Avenue to the San Joaquin River Bluff–Kearney Boulevard–Fresno Street to Polk Avenue
- Van Ness-Fulton couplet–Weldon Avenue to Divisadero–Butler Avenue–Peach to Fowler Avenues
- Minnewawa Avenue–Belmont Avenue to Central Canal–Huntington Boulevard–First Street to Cedar Avenue
- Shepherd Avenue–Friant Road to Willow Avenue–Audubon Drive–Blackstone to Herndon Avenues
- Friant Road–Audubon to Millerton Roads
- Tulare Avenue–Sunnyside to Armstrong Avenues
- Ashlan Avenue–Palm to Maroa Avenues

Policy MT-3-b Preserve street trees lining designated scenic corridors or boulevards. Replace trees of the predominant type and in a comparable pattern to existing plantings if there is no detriment to public safety.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to aesthetics, light, and glare:

Urban Form Element

Objective UF-2 Provide a mix of Regional, Community, and Neighborhood Town Centers where individuals can live, work and play.

Policy UF-2.2 **Development Code Update.** The size, density, composition, and building character of Mixed-Use Districts will be consistent with the zone district standards set forth in the SEDA Development Code Update. In addition, the Plan will call upon the City of

Fresno's Department of Public Works Standards, the Active Transportation Plan and the Fresno Area Express (FAX) transit plans to implement streetscape design and non-auto circulation elements.

Policy UF-2.3 **Design and Development Principles**. The following principles are provided to guide the creation of public and private spaces within the Plan Area. More specific guidelines and regulations regarding many of these elements are found in the SEDA Development Code update section of this Chapter.

- **Pattern of streets, blocks, and buildings**: The centers will be designed with pedestrian oriented streets, blocks, buildings, and public spaces based on the block connectivity and size standards specified in the SEDA Development Code update, including a transportation network which will be based on a high-density grid system. Public spaces and civic buildings shall be arranged along streets in order to create a network of civic spaces of varying size and function.
- **Building character and orientation**: The character, massing, and orientation of buildings will contribute to a cohesive urban fabric that reinforces public spaces, creates a sense of intimacy, and visually distinguishes the center from surrounding districts.

  As shown in Figure 2.1 regarding building orientation, the front edges of buildings shall meet or approach front and side property lines according to the requirements of the SEDA Development Code update. Visual diversity will be created through variations in setback, massing, and architectural details. In addition, solar exposure and orientation shall be considered in the layout and design of all streets, blocks, and buildings to maximize energy and resource efficiency.
- **Center core**: Each town center will feature a core that provides a common gathering place for Southeast Fresno residents not only within the center, but surrounding districts as well. The core will accommodate the highest capacity for retail, employment, civic, and pedestrian activity of each center, and will design streets and buildings with pedestrian comfort and visual interest at the forefront.
- **Location and orientation of commercial activity**: Commercial activity is permitted throughout Regional and Community Town Centers, but the highest-intensity commercial uses (and/or ground floor commercial) will be located along all Arterials and Collector Streets and in the core area of the town center. Small convenience retail establishments, such as corner stores, can also occupy a portion of the ground floors of residential and office buildings outside of the core of centers. Ideally, office uses should be clustered around public transit stations and squares.
- **Location and orientation of large-format retail activity**: Large-format retail establishments (i.e., "big box" retail) may be located in the Regional Town Center but are discouraged in Community or Neighborhood Town Centers in order to

preserve the local neighborhood character of those areas. The urban design and parking standards of large-format retail stores will be consistent with the standards and policies of these districts. Large-format retail establishments served by surface parking will be located at the edges of the Regional Town Center, preferably adjacent to major regional roadways or highways.

- **Character, location, and orientation of public spaces**: Public gathering places that provide visual relief and passive recreation should be located in the Mixed-Use Districts and should be surrounded by civic buildings and any commercial or mixed-use buildings located in the town center.
- **Location and orientation of civic buildings**: Major civic buildings (e.g., libraries, schools, and government offices) will serve as focal points of public spaces within centers. Providing attention to distinctive building details, entry features and varying setbacks will allow civic buildings to stand out from other structures in the center. Wherever possible, civic buildings will be located in proximity to and open onto public spaces.

Objective UF-3 Foster a community of tight-knit residential districts.

Policy UF-3.2 **Development Code Update.** The size, density, composition, and building character of Residential Districts will be consistent with the SEDA zone district standards implemented through a Development Code update. Streets and non-auto circulation elements will be implemented according to the standards set in the Development Code.

Objective UF-4 Attract high-profile businesses to create bustling and desirable Employment Districts.

Policy UF-4.2 **Development Code Update**. The size, density, composition, and building character of Employment Districts will be consistent with the proposed SEDA zone district standards set forth in the SEDA Development Code update. In addition, the Plan will draw upon the City of Fresno's Department of Public Works Standards, the Active Transportation Plan, and the Fresno Area Express (FAX) transit plans to implement streetscape design and non-auto circulation elements.

Objective UF-7 Create a parking strategy to address current and future needs.

Policy UF-7.3 **Parking Design.** Support vibrant, walkable, and accessible communities by successfully integrating and managing parking facilities within the urban fabric.

- **Surface lot Standards:** Integrate a site design that is pleasant, convenient, and unobtrusive to the streetscape.
  - Connecting walkways shall be provided to afford convenient pedestrian access from the interior of parking areas to nearby buildings or open spaces.

- Landscaped setbacks with a minimum width of 10 feet shall be provided wherever a surface parking lot abuts a street; this may include the use of landscape material, land forms, rockeries, trellises, colonnades, and other elements.
- Landscaped islands shall be installed at the ends of all on-grade parking bays and shall contain one tree per adjacent stall.
- Landscaped medians shall have a minimum width of 8 feet from back of curb to back of curb.
- Paving and planting materials shall be approved by the Planning and Development and Public Works Directors.

- **Structured Lot Standards:** Enable structure design similar to the surface lot standards that is pleasant, convenient, and unobtrusive to the streetscape.
  - Residential parking structures should be shielded from the street on all sides by other uses.
    - Public parking structures within one block of the Super Arterials and Arterials of the Regional or Community Town Centers shall provide ground floor retail, commercial, office, or other pedestrian-compatible use for at least 70% of their street frontage (except to the extent that frontage minimums interfere with minimum access requirements).
    - Minimize heat island effect and urban stormwater runoff
    - Install planting, shading and paving techniques to minimize environmental impacts of parking facilities.
    - For vegetative shading, please refer to City of Fresno Performance Standards for Parking Lot Shading 9Fresno Development Code Section 15-2421).
  - Soil and planting materials on surface lots shall serve to:
    - Suppress sediment movement
    - Trap sediment-attached substances
    - Encourage infiltration
    - Encourage nutrient-fixing and absorption of flushed surface contaminants during detention and infiltration
  - Paving in high0density and commercial areas should consist of pervious pavement systems or equivalent technology, achieving a reduction of not less than 50% net impervious cover, for at least 50% of total pavement areas as compared to a typical concrete or asphalt paving system.
  - Materials with a minimum solar reflectance index (SRI) of 29 should be used on at least 50% of all impervious parking surfaces (including roofing over covered parking stalls).

- **Accessible Parking:** The Plan Area will provide for accessible parking in accordance with the ADA standards and Title 24 California Building Code and on-street in accordance with the best practices of the Pedestrian Rights of Way Accessibility Guidelines (PROWAG).

- **Preferential Parking:** Provide preferential parking to encourage more sustainable travel behavior.

- Develop pro-rata requirements for the provision of preferential non-residential parking for, but not limited to, all of the following modes of transportation in order of importance (high to low):
  - Bicycles
  - Motorcycles
  - Carshare Vehicles
  - Electric Vehicles
  - Carpools/vanpools

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.2 **Passive Open Space**. Support natural landscapes and wildlife habitat corridors by maintaining passive open spaces.

- Work with local land trusts to establish conservation easements that preserve land as part of the SEDA open space network.

Policy OS-4.1 **Multi-Use Trails.** Establish a planned network of multi-use greenway trails. These trails will serve bicyclists, pedestrians, and, where appropriate, equestrians. Cross sections and width requirements will be provided for specific conditions—including canal side, open space, streetside, and farm side trails.

Policy OS-4.3 **Trail Standards**. Trails shall be designed with features that encourage use, provide safety, and are resource-efficient. Trail standards shall address shading, low-water landscaping, fencing, paving and surface materials, lighting, seating and furniture, ADA access requirements, signage, and intersection treatments.

Community Farming and Agricultural Element

Objective CF-2 Create a long-term transition zone between urban uses in the City of Fresno and agricultural land in Fresno County. Buffering urban and adjoining agricultural land uses reduce conflicts that can arise due to noise, pollution, or traffic.

Policy CF-2.2 **Passive Recreation.** Encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians.

- **What is the role of rural cluster development?**
  - A transitional buffer. Urban areas and large agricultural operations cannot always sit side-by-side. Noise, dust, and pesticides from farms can pose health concerns for residents, while farmers need space to move machinery and goods. Rural clusters along the eastern edge of SEDA form a transition between the urban area and the agricultural lands beyond.

- An attractive residential option. Rural clusters offer a rural lifestyle within an environmentally responsible land use framework that promotes active farming and open space preservation.
- A means to preserve land. Rural cluster lands can be used for organic small-scale farming, equestrian activities, or other uses compatible with the nearby homes. The vast majority of the land is preserved as viable agricultural land or open space.

Objective CF-3 Promote community farming to provide opportunities for entrepreneurs and families to grow food for commercial and household production. Community farming is intended, in part, to diversify agriculture and make residents of the Southeast Development Area stakeholders in the success of Fresno County agriculture.

Policy CF-3.3 **Community Farming**. Create and expand a viable community farming program that promotes an appreciation of food and local ecology, instills a sense of stewardship and community, and provides a recreational activity.

- **Community/Neighborhood Gardens.** Create and support neighborhood gardens within local communities. Neighborhood gardens, such as Yo'Ville Community Garden in Southwest Fresno, are woven into the fabric of centers and residential areas, providing households with opportunities to grow some of their own produce and meet with other members of the community.
  - **Location.** Neighborhood gardens shall be integrated into Neighborhood Centers, open spaces, and other locations that place them within walking distance of most residents' homes.
  - **Access.** Access to community spaces can vary. Gardens can be open to the public, or only to designated users.
  - **Management.** Management structures of community spaces shall be determined as appropriate. Neighborhood gardens can be owned by a city or county agency or by a private landowner, and operated by a neighborhood collective, community garden association, non-profit, or city/county parks and recreation department that leases small plots of the garden to community members. Some neighborhood gardens are independent entities, while some jurisdictions have neighborhood garden programs that oversee all the gardens in a jurisdiction.
  - **Funding and staff assistance.** The City of Fresno shall encourage neighborhood organizations to seek funding for the neighborhood garden program and/ or facilitate assistance through the Fresno Parks, After School, Recreation, and Community Services Department or other agency/organization.
- **School Gardens.** Support and foster the integration of school gardens within neighborhood schools, such as the school garden located at Kepler Neighborhood School in Downtown Fresno. School gardens can serve as outdoor

classrooms where students learn about soil, botany, natural cycles, nutrition, and basic gardening principles in a hands-on setting.

- **Location.** School gardens should be located on school grounds, or within a very short walk of a school. When possible, school gardens should be planned upon new school construction in order to maximize joint-use opportunities with the City of Fresno Parks, After School, Recreation, and Community Services Department.
- **Access.** Access should be controlled based on school district policies.
- **Management.** Management structures shall be determined as appropriate. School gardens are typically managed by at least one garden coordinator who works closely with school administration or one or more dedicated teachers.
- **School gardens working group.** Create a working group of teachers, students, and residents to explore the development of school garden programs in the Clovis and Sanger Unified School Districts.

- **Community Orchards.** Support and preserve community orchards for both new and existing orchards within the SEDA. Community orchards can be integrated into the community's open space network, serving as park-like features and enhancing connections to agriculture.
  - **Location.** Community orchards can be integrated into public open spaces or associated with private development.
  - **Access.** Community orchards should be unfenced, with high levels of public access.
  - **Management.** Management structures shall be determined as appropriate. In a typical model, residents help to care for the orchards and pay fees to fund professional gardeners.

Conservation Element

Objective RC-1 Meet statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.7 **Urban Forestry Program**. Encouraging the integration and protection of new and existing mature trees within our communities can lead to significant reductions in the urban heat island effect and energy required for cooling. As another significant benefit, trees also store harmful carbon as they grow, in a process known as sequestration. As these trees continue to grow, mature and sequester carbon, it is also important for urban forestry projects to consider potential tree emissions that result from the maintenance and ultimate disposition of trees to ensure a net decrease in greenhouse gas emissions occurs.

Maintaining trees, vegetation and plants throughout City parks is important to the success and longevity of these publicly owned spaces. In addition, these areas provide opportunities for new tree planting and replacement of tree species that possess a low potential to store carbon, with tree species that possess higher carbon storage potential. To better understand how to achieve these

opportunities, there are many tools that communities can utilize. The Climate Action Reserve, Urban Forest Project Reporting Protocol (CAR 2019) provides criteria for generating greenhouse gas emission offsets with tree planting along with procedures for project monitoring.

Development of the SEDA will present many opportunities for the strategic planting of trees with high carbon storage potential, as noted below:

- Develop a tree palette for the SEDA that reinforces its sense of place, reflects native species, and includes tree species with high carbon storage potential.
- Meet parks shading targets noted in the Parks Master Plan.
- Plant shade trees to delineate corridors and the boundaries of urban areas, and to provide tree canopy for bike lanes, sidewalks, parking lots, trails and transit stops.

Cultural and Historic Resource Policies Element

Objective CR-3 Identify and protect significant structures, sites and landscapes within the Southeast Development Area.

Policy CR-3.6 **Resource Protection**. Incorporate historic sites, infrastructure and landscape features into new developments in order to conserve resources and preserve the area's vernacular landscape and "sense of place."

Fresno Municipal Code

Chapter 13 Article 3 of the Municipal Code outlines the Public Tree Policy, Tree Beautification policies, and Tree Preservation policies.[2]

Fresno Citywide Development Code

Chapter 15 of the Municipal Code outlines the Citywide Development Code, which implements the General Plan by providing a precise guide for the physical development of the City, to promote high quality architecture and sustainable design, to promote a safe and efficient traffic circulation system, including bicycle facilities and pedestrian amenities, and to support a multimodal transportation system, to facilitate the appropriate location of community facilities, institutions, parks, and recreational areas, and to safeguard and enhance the appearance of the City. The regulations in the Development Code vary for various zoning districts but include metrics such as density and massing, site design, façade design, and use regulations.[3]

Article 23 of the Development Code outlines landscaping design regulations.[4]

[2] City of Fresno. Fresno Municipal Code Chapter 13 – Sidewalks, Streets, Parkways, and Underground Utility Districts. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH13SISTPAUNUTDI_ART3STTRPA. Accessed June 22, 2022.

[3] City of Fresno. Fresno Municipal Code Chapter 15 – Citywide Development Code, Including Revisions. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE. Accessed March 22, 2023.

[4] City of Fresno. Fresno Municipal Code Chapter 15 – Citywide Development Code, Including Revisions. Article 23 – Landscape. Website:

Article 24 of the Development Code outlines parking area development standards.[5] Article 26 of the Development Code outlines regulations for signage.[6]

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan Program Environmental Impact Report (General Plan PEIR) contains the following mitigation measures that are applicable to the proposed project.

MM AES-4.1 Lighting for Street and Parking Areas

Lighting systems for street and parking areas shall include shields to direct light to the roadway surfaces and parking areas. Vertical shields on the light fixtures shall also be used to direct light away from adjacent light sensitive land uses such as residences.

MM AES-4.2 Lighting for Public Facilities

Lighting systems for public facilities such as active play areas shall provide adequate illumination for the activity; however, low intensity light fixtures and shields shall be used to minimize spillover light onto adjacent properties.

MM AES-4.3 Lighting for Nonresidential Uses

Lighting systems for nonresidential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur.

MM AES-4.4 Signage Lighting

Lighting systems for freestanding signs shall not exceed 100 footlambert (ft-L) when adjacent to streets which have an average light intensity of less than 2.0 horizontal foot-candles and shall not exceed 500 ft-L when adjacent to streets which have an average light intensity of 2.0 horizontal foot-candles or greater.

MM AES-4.5 Use of Non-Reflective Materials

Materials used on building facades shall be non-reflective.

https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIIIREAPSOALDI_ART23LA. Accessed March 22, 2023.

[5] City of Fresno. Fresno Municipal Code Chapter 15 – Citywide Development Code, Including Revisions. Article 24 – Parking and Loading. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIIIREAPSOALDI_ART24PALO. Accessed March 22, 2023.

[6] City of Fresno. Fresno Municipal Code Chapter 15 – Citywide Development Code, Including Revisions. Article 26 – Signs. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIIIREAPSOALDI_ART26SI. Accessed March 22, 2023.

3.1.4 - Methodology

Impacts related to aesthetics resulting from implementation of the proposed project are discussed below. The impact analysis is based on the existing visual character of the Plan Area, including scenic vistas, highways, roadways, and existing sources of light and glare. Changes to aesthetic resources that may occur from implementation of the proposed project are identified and qualitatively evaluated based on potential modifications to the existing aesthetic setting.

3.1.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts to aesthetics are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part on the questions posed in Appendix G. These significance criteria are as follows:

Would the project:

> Except as provided in Public Resources Code Section 21099, the project would have a significant impact on the environment if it would:
>
> a) Have a substantial adverse effect on a scenic vista.
>
> b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within a State Scenic Highway.
>
> c) In non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings? (Public views are those that are experienced from publicly accessible vantage point). If the project is in an urbanized area, would the project conflict with applicable zoning and other regulations governing scenic quality.
>
> d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.

3.1.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Scenic Vistas

Impact AES-1:	**The proposed project would not have a substantial adverse effect on a scenic vista.**

Impact Analysis

Future development under the proposed project would have significant impacts to scenic vistas and/or scenic corridors if new development blocks views from scenic vistas and/or scenic corridors. Potential impacts could include obstructed views of a scenic vista or scenic corridor from public viewpoints or modification of the scenic vista or scenic corridor.

The General Plan does not identify any scenic vistas from within the City. Although the General Plan identifies six locations as publicly valued scenic features along the San Joaquin River bluffs, the river bluffs are not visible from the Plan Area due to the flat topography of the City. General Plan Policy MT-3 identifies scenic corridors in the City, none of which are located within the Plan Area. However, the General Plan contemplated gateway route designation for SR-180, Clinton Way, and Tulare Avenue, all of which run through the Plan Area. The existing General Plan policies and proposed Specific Plan policies identified below would guide the development of these gateways such that their aesthetic quality would be promoted and preserved.

The General Plan includes policies intended to protect scenic vistas and scenic corridors in the City. Policy D-1-e requires the continued preservation, promotion, procurement, and strategic location of landmarks, monuments and artwork that provide orientation and represent Fresno's cultural heritage and artistic values. Policy D-2-a considers unified design requirements for gateways to welcome travelers to the City's Activity Centers. Policy D-2-c seeks out funding for highway beautification. Policy D-3-a requires the creation of a Green Street Tree Planting Program. Policy D-5-b promotes City efforts toward litter clean up and abatement. Policy MT-3-b requires that the preservation of street trees lining designated corridors or boulevards.

The Specific Plan also includes proposed policies intended to protect scenic vistas and scenic corridors in the City. Policy RC-1.7 encourages integration, protection, and maintenance of new and existing mature trees in the community as well as vegetation and plants throughout City parks.

Any future individual development projects would be reviewed by the City for compliance with the Development Code, which provides a precise guide for the physical development of the City, promotes high quality architecture and sustainable design, and aims to safeguard and enhance the appearance of the City. In addition, all future development would be required to comply with the objectives and policies of the General Plan and Specific Plan designed to protect scenic resources and natural features. At the programmatic level, aesthetic impacts to views would be reduced to a less than significant level. Consistent with the existing General Plan and proposed Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts and would ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Scenic Highways

Impact AES-2:	**The proposed project would not substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic building within a State Scenic Highway.**

Impact Analysis

Scenic highways are California highways designated by a local governing body and protected by the State Scenic Highway Program for the purpose of protecting and enhancing the natural scenic beauty of California highways and adjacent corridors through special conservation treatment. There are no officially designated State Scenic Highways in the City and thus no view corridors in the Plan Area.[7] As a result, the proposed project would result in no impact to scenic highways.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Visual Character

Impact AES-3:	**The proposed project would in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings. (Public views are those that are experienced from publicly accessible vantage point).**

Impact Analysis

Future development allowed by the Specific Plan could degrade the visual character of the Plan Area if the form and appearance of new development deteriorate the quality of the existing setting. As described above, the Plan Area exhibits a predominantly agricultural and rural residential character. Future development allowed by the Specific Plan would introduce intensified building development compared with what is currently characteristic of the Plan Area. However, some rural residential, open space, and agricultural land uses would be preserved.

The proposed project includes updates to the Development Code to implement the proposed land use and zoning updates. The Specific Plan also includes policies intended to guide the visual character of the Plan Area to ensure visually appealing and cohesive design. Policy UF-2.3 outlines

[7] California Department of Transportation (Caltrans). 2018. California State Scenic Highway System Map. Website: https://caltrans.maps.arcgis.com/apps/webappviewer/index.html?id=465dfd3d807c46cc8e8057116f1aacaa. Accessed June 22, 2022.

design principles for the character of buildings, streets blocks, commercial uses, and town centers. Policy UF-7.3 supports vibrant, walkable, and accessible communities by enabling parking lot design that is pleasant unobtrusive to the streetscape by adhering to listed standards. Policy OS-2.2 supports natural landscape and wildlife habitats by encouraging the maintenance of passive open spaces. Policy OS-4.1 encourages the establishment of a planned network of multiuse greenway trails. Policy CF-3.3 encourages the expansion of a viable community farming program, which would help preserve the agricultural character of the area. Lastly, Policy CR-3.6 requires the incorporation of historic sites, infrastructure, and landscape features into new developments to preserve the Plan Area's sense of place.

The Specific Plan includes updates to the Development Code, which would require that the size, density, composition, and building character of residential districts be consistent with the SEDA Land Use District Standards set forth in the SEDA Development Code Update. These updates, along with Specific Plan policies, would guide the development of the area such that visual quality is maintained. Any future individual development projects would be reviewed by the City for compliance with the Development Code, which provides a precise guide for the physical development of the City, promotes high quality architecture and sustainable design, and aims to safeguard and enhance the appearance of the City. In addition, all future development would be required to comply with the policies and actions of the General Plan and Specific Plan designed to protect visual character and quality. Consistent with the General Plan and Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts.

However, buildout of the Specific Plan would alter the existing visual character by increasing the intensity of development in many areas that are primarily agricultural. No feasible mitigation measures are available to mitigate the impact to a less than significant level. Therefore, impacts are considered significant and unavoidable.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Significant and unavoidable impact.

Light and Glare

Impact AES-4:	**The proposed project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area.**

Impact Analysis

All future development in accordance with the Specific Plan would result in land use changes within the Plan Area. These land use changes include the development of new residential and nonresidential land uses.

Intensified development in the Plan Area could increase the amount of light from streetlights, exterior lighting from buildings, and vehicle headlights. The increase in lighting within the Plan Area could result in light spillover onto adjacent areas and could substantially illuminate the sky during nighttime. This increase in illumination is considered a significant impact.

Many areas directly adjacent to the Plan Area are exposed to a small amount of light due to the existing rural and agricultural setting. Intensified development in the Plan Area would considerably increase the amount of lighting systems within the Plan Area, which could result in an increase in light spillover to adjacent areas. Furthermore, increased nighttime traffic resulting from intensified development would create additional sources of light from car headlights. Therefore, development would increase the amount of light, causing spillover onto properties adjacent to the Plan Area and an increase in the nighttime sky illumination. This increase in light is considered a significant impact.

Development in accordance with the proposed Specific Plan and the Development Code would increase the number of new structures that could create new sources of glare within the Plan Area and directly adjacent to the Plan Area. These new sources of glare could result from materials used on building façades, parking lots, signs, roadway surfaces, and motor vehicles. Because of the amount of new building square footage planned for the Plan Area, new buildings would result in a substantial increase in glare. This increase could result in significant glare impacts.

Future development facilitated by implementation of the proposed project would be required to comply with the lighting standards established in the City Municipal Code (Article 25, Performance Standards). Future development would also comply with the proposed Specific Plan policies related to light and glare including Policy OS-4.3, which provides guidance on lighting standards for trails.

Further, the General Plan does not include any specific existing policies related to light and glare; however, the General Plan PEIR includes Mitigation Measure (MM) AES-1, which requires outdoor lighting to include shields; MM AES-2, which requires lighting in public locations to have enough light for activities but while minimizing light spill; MM AES-3, which requires light to be oriented away from other residential uses; MM AES-4, which requires freestanding signs to not exceed 100 footlambert (ft-L); and MM AES-5, which restricts use of reflective surfaces. These mitigation measures are applicable to the proposed project, and implementation of MM AES-1 through MM AES-5 would reduce impacts related to light and glare.

Consistent with the existing General Plan and proposed SEDA Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts. For example, all future development would be required to comply with glare standards established

Article 25 of the Municipal Code.[8] Additionally, implementation of MM AES-1 through MM AES-5 would reduce potential glare impacts resulting from the proposed project. However, impacts would remain significant and unavoidable.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.1, the following mitigation measures from the General Plan PEIR are applicable to the proposed project.

MM AES-4.1 Lighting systems for street and parking areas shall include shields to direct light to the roadway surfaces and parking areas. Vertical shields on the light fixtures shall also be used to direct light away from adjacent light sensitive land uses such as residences.

MM AES-4.2 Lighting systems for public facilities such as active play areas shall provide adequate illumination for the activity; however, low-intensity light fixtures and shields shall be used to minimize spillover light onto adjacent properties.

MM AES-4.3 Lighting systems for nonresidential uses, not including public facilities, shall provide shields on the light fixtures and orient the lighting system away from adjacent properties. Low-intensity light fixtures shall also be used if excessive spillover light onto adjacent properties will occur.

MM AES-4.4 Lighting systems for freestanding signs shall not exceed 100 footlambert (ft-L) when adjacent to streets which have an average light intensity of less than 2.0 horizontal foot-candles and shall not exceed 500 ft-L when adjacent to streets that have an average light intensity of 2.0 horizontal foot-candles or greater.

MM AES-4.5 Materials used on building façades shall be non-reflective.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Significant and unavoidable impact.

3.1.7 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for aesthetics is the Plan Area and portions of the City of Fresno, City of Clovis, and unincorporated Fresno County located outside of the Plan Area that can be viewed from and have views of the Plan Area. This analysis evaluates whether

[8] City of Fresno. Fresno Municipal Code Chapter 15 – Citywide Development Code. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIIIREAPSOALDI_ART25PEST. Accessed June 22, 2022.

impacts of the Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to aesthetics. This analysis then considers whether incremental contribution of the impacts associated with implementation of the Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to the level of significance.

In general, potential visual impacts to the character of an area take into account the immediate surroundings; thus, the analysis of cumulative aesthetic impacts focus on areas that share a viewshed with the Plan Area. The Plan Area and most of the surrounding area is predominately rural and rural residential. Future development in the cumulative context would include new residential, commercial, and industrial development consistent with the General Plan or the applicable General Plans of each of the surrounding municipalities. Future development would be subject to the design review processes of the individual jurisdiction, and the applicable land use plans contain policies and implementing actions to preserve visual character, land use compatibility, and views in those jurisdictions. Cumulative projects within the City would be required to comply with applicable City General Plan policies and programs and adhere to development and design standards in the Municipal Code that address aesthetics, including lighting and glare, the alteration of scenic resources and natural features, the alteration of views of scenic resources and natural features. However, consistent with the findings of the General Plan PEIR, continued buildout of the General Plan and nonagricultural development in the surrounding communities identified by the geographic scope would continue to significantly change the visual character of the area and amount of nighttime illumination, even with adherence to General Plan policies and project-specific design review. For these reasons, cumulative impacts to aesthetics or nighttime lighting and daytime glare would be significant.

As previously discussed above, there are no designated scenic vistas or State-designated Scenic Highways in the Plan Area or the City. The proposed project and cumulative development would be subject to specific regulations and guidelines related to building heights, setbacks, undergrounding of utilities, landscaping, signage, and permitted land uses. However, cumulative development is anticipated to contribute to the conversion of rural and agricultural uses to urban uses. This cumulative change is expected to result in a substantial alteration of the existing visual character of the area. Additionally, the project's contribution to light and glare is also expected to generate new sources of light and glare, even with the implementation of MM AES-1 through MM AES-5. These new sources of glare could result from materials used on building façades, parking lots, signs, roadway surfaces, and motor vehicles. Therefore, the proposed project could result in cumulatively considerable visual character and light and glare impacts. Thus, overall, the project would result in significant and unavoidable cumulative impacts.

Level of Cumulative Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM AES-4.1 through MM AES-4.5.

Project Specific Mitigation Measures

None.

Level of Cumulative Significance After Mitigation

Significant and unavoidable impact.

3.2 - Agricultural Resources and Forestry Resources

3.2.1 - Introduction

This section of the Administrative Draft Program Environmental Impact Report (Draft PEIR) describes the existing agricultural and forestry resources in the Plan Area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to agricultural and forestry resources that could result from implementation of the project. Descriptions and analysis in this section are based, in part, upon existing site conditions, plans/exhibits of the Planning Area, the Fresno General Plan (General Plan), and the California Department of Conservation website as well as aerial photographs, topographical maps, and street maps.

Eleven public comments were received during the EIR scoping period related to Agricultural Resources and Forestry Resources:

- Request to consider whether agricultural conservation easements are feasible mitigation.
- Request for the Draft PEIR to discuss the type, amount, and location of farmland conversion resulting from the proposed project.
- Request for the Draft PEIR to evaluate impacts on any current or future agriculture operations in the vicinity.
- Requests for the Draft PEIR to evaluate incremental impacts leading to cumulative impacts on agricultural land.
- Request for the Draft PEIR to include mitigation measures for impacts to agricultural land.
- Requests for the Draft PEIR to evaluate the proposed project's compatibility with any agricultural land enrolled in a Williams Act Contract and for the notification to the Department of Conservation of non-renewal and/or cancellation of a Williams Act Contract.
- Recommendations that the current and former agricultural lands in the Plan Area be evaluated in accordance with Department of Toxic Substances Control (DTSC) 2008 Interim Guidance for Sampling Agricultural Properties (Third Addition).
- Recommendations that any construction and/or development within an Agricultural Preserve consult with/obtain approval from the County Policy and Planning Department.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Plan Area.
- Requests that the Draft PEIR identify and adopt all feasible and enforceable mitigation measures that avoid and reduce negative impacts.
- Requests that the Draft PEIR analyze and create mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.2.2 - Environmental Setting

City of Fresno

According to the General Plan PEIR, the City of Fresno's (City) Sphere of Influence (SOI) contains approximately 9,134 acres of Prime Farmland, approximately 3,224 acres of Unique Farmland, and approximately 2,269 acres of Farmland of Statewide Importance (totaling approximately 14,627 acres), as mapped by the California Department of Conservation Farmland Mapping and Monitoring Program (FMMP).[1] Based on existing farmland data received from the Fresno County Assessor's Office Land Use Codes that were provided by City staff, there is a total of approximately 11,495 acres in active agricultural production[2]. According to the General Plan, much of the City's agricultural uses within the City's SOI are located outside the city limits; the Fresno Southeast Development Area (SEDA) contains approximately 5,000 acres in agricultural production, representing roughly 50 percent of the existing farming within the Planning Area of the General Plan.

While the General Plan includes a variety of land use designations, there is no land use designation that only allows for agriculture uses. The General Plan does include a Buffer designation, which allows for agricultural uses and other complementary uses, including environmental, habitat, water conveyance, retention and recharge, and preservation and preparation of gravel resources for beneficial uses related to permanent water resource facilities. The Buffer designation is intended to separate urban uses from long-term agricultural uses in order to preserve long-term viable agricultural production and intensive farming operations adjacent to the Planning Area. The Buffer designation is approximately one-quarter mile wide and is located along the eastern boundary of the City, within the Plan Area, encompassing approximately 715 acres. Additionally, the City and its SOI contains approximately 1,012 acres of prime agricultural land that are under a Williamson Act Contract as well as approximately 931 acres of non-prime agricultural land under a Williamson Act Contract (i.e., Statewide Importance, Unique, or Local Importance, and other lands).

The General Plan PEIR contemplated the conversion of this farmland to nonagricultural uses and determined the impact to be significant and unavoidable, even with the implementation of General Plan PEIR Mitigation Measure (MM) AG-1.1 in addition to Policies RC-9-a, RC-9-b, and RC-8-c under Objective RC-9 included in the General Plan.[3] Implementation of MM AG-1.1 would require a program to be established to offset potential impacts from the loss of farmland; however, the loss would not be fully mitigated because the conversion of farmland to non-farmland uses is a permanent loss as such resources cannot likely be reversed.

Plan Area

The Plan Area is located in the City of Fresno. As discussed in Chapter 2 of this Draft PEIR, Project Description, the predominant existing use in the Plan Area (approximately 5,000 acres) is agriculture, with the primary crops being vineyards, fruit trees within orchards, and vegetables. The SEDA Specific Plan Area (Plan Area) also contains agriculture-related uses such as plant nurseries and

[1] City of Fresno. 2020. Fresno General Plan Draft PEIR, Agriculture and Forestry. Accessed June 20, 2022.
[2] It should be noted that agricultural operations are not necessarily occurring on all of the land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, and conversely agricultural operations are also occurring on parcels that are not designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.
[3] City of Fresno. 2020. Fresno General Plan Draft PEIR, Agriculture and Forestry. Accessed June 20, 2022.

wineries. According to the FMMP data, the Plan Area contains a variety of soil types, including Prime Farmland, Unique Farmland, and Farmland of Statewide Importance.[4] As shown in Exhibit 3.2-1, the Plan Area contains approximately 2,475 acres of Prime Farmland, approximately 1,352 acres of Farmland of Statewide Importance, approximately 1,189 acres of Farmland of Local Importance, and approximately 1,725 acres of Unique Farmland. These uses are spread intermittently throughout the Plan Area. Further, the majority of land under Williamson Act Contract in the City and SOI is located in the Plan Area.

3.2.3 - Regulatory Framework

Federal

Farmland Protection Policy Act

The Farmland Protection and Policy Act (FPPA) was designed to minimize the impact federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses. This Act assures that to the extent possible, federal programs are administered to be compatible with State, local units of government, and private programs and policies to protect farmland. Federal agencies are required to develop and review their policies and procedures to implement the FPPA every 2 years. This Act does not authorize the federal government to regulate the use of private or nonfederal land or, in any way, affect the property rights of owners. For the purposes of the Act, "farmland" includes Prime Farmland, Unique Farmland, and Farmland of Statewide or Local Importance. Farmland subject to FPPA requirements does not have to be currently used for cropland. It can be forest land, pastureland, cropland, or other land, but not water or urban/built-up land.

State

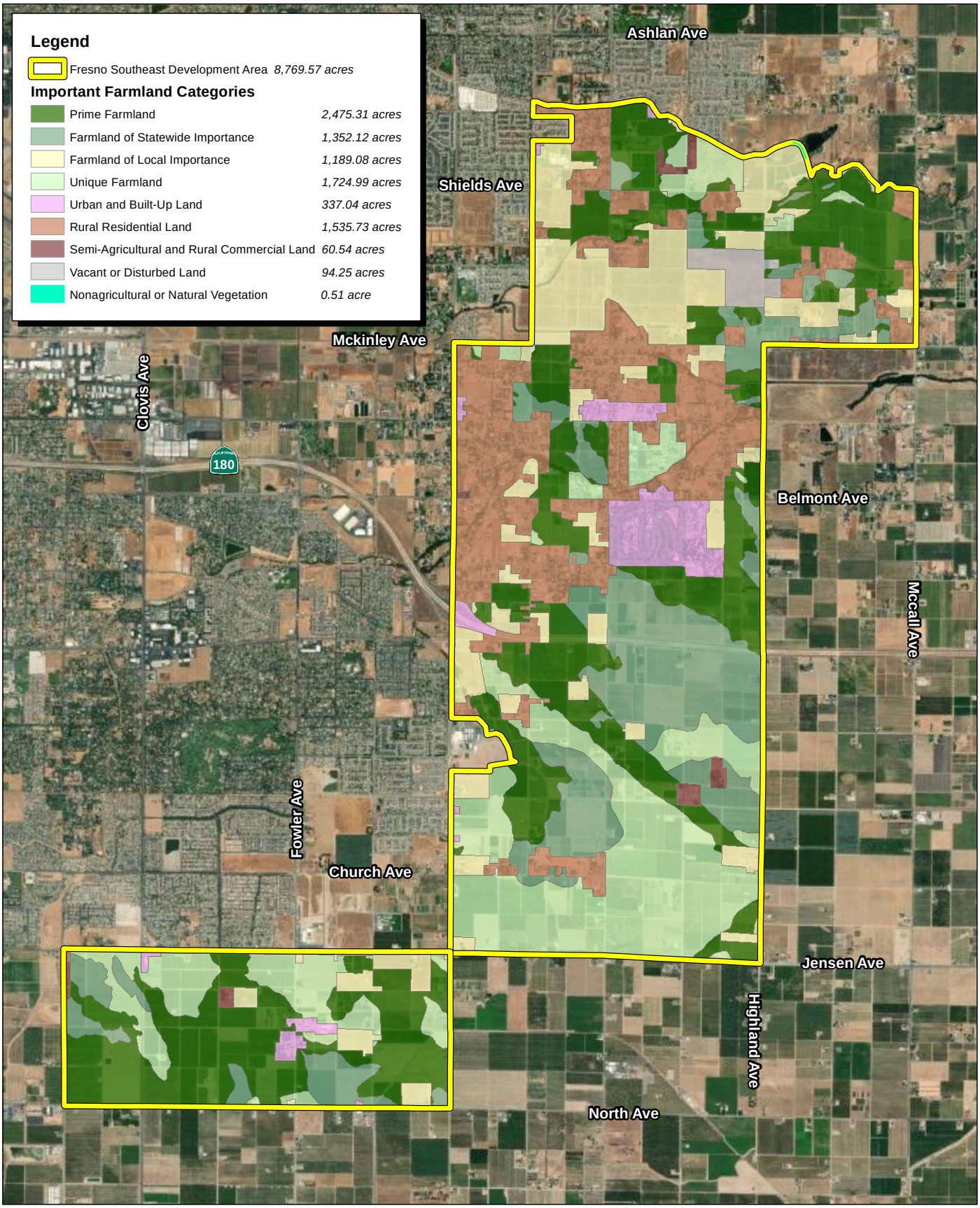
Farmland Mapping and Monitoring Program

The California Department of Conservation established the FMMP in 1982. The FMMP is a non-regulatory program that provides a consistent and impartial analysis of agricultural land use and land use changes throughout California. The FMMP produces maps and statistical data used for analyzing impacts on California's agricultural resources. The maps are updated every 2 years with the use of aerial photographs, a computer mapping system, public review, and field reconnaissance. The program rates agricultural lands according to physical characteristics and other factors such as irrigation status. The best-quality farmland is land that contains a combination of physical and chemical features able to sustain long-term agricultural production and is classified as Prime Farmland. Additional classifications include Farmland of Statewide Importance, Unique Farmland, and Farmland of Local Importance (Table 3.2-1).

The FMMP also inventories and maps a variety of other land use categories. For purposes of determining a proposed project's significance under the California Environmental Quality Act (CEQA), only Prime Farmland, Unique Farmland, and Farmland of Statewide Importance are used to

[4] California Department of Conservation. 2016. California Important Farmland Finder. Website: https://maps.conservation.ca.gov/DLRP/CIFF/. Accessed April 28, 2022.

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Source: ESRI Aerial Imagery. CA Department of Conservation Fresno County 2018

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Exhibit 3.2-1
Important Farmland Map

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determine impacts. Conversion to nonagricultural uses of lands falling under any of these classifications is considered a potentially significant impact under CEQA Guidelines.

Table 3.2-1 provides a description of the various farmland classifications from the United States Department of Agriculture.

Table 3.2-1: Description of Farmland Classifications

Farmland Category	Description
Prime (P)	Farmland with the best combination of physical and chemical features able to sustain long-term agricultural production. This land has the soil quality, growing season, and moisture supply needed to produce sustained high yields. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.
Statewide Importance (S)	Farmland similar to Prime Farmland but with minor shortcomings, such as greater slopes or less ability to store soil moisture. Land must have been used for irrigated agricultural production at some time during the 4 years prior to the mapping date.
Unique (U)	Farmland of lesser quality soils used for the production of the State's leading agricultural crops. This land is usually irrigated, but may include non-irrigated orchards or vineyards as found in some climatic zones in California. Land must have been cropped at some time during the 4 years prior to the mapping date.
Local (L)	Land of importance to the local agricultural economy as determined by each county's board of supervisors and a local advisory committee. In some counties, Confined Animal Agriculture facilities are part of Farmland of Local Importance, but they are shown separately.
Grazing (G)	Land on which the existing vegetation is suited to the grazing of livestock. This category was developed in cooperation with the California Cattlemen's Association, University of California Cooperative Extension, and other groups interested in the extent of grazing activities.
Urban and Built-Up Land (U)	Land occupied by structures with a building density of at least one unit to 1.5 acres, or approximately six structures to a 10-acre parcel. This land is used for residential, industrial, commercial, construction, institutional, public administration, railroad and other transportation yards, cemeteries, airports, golf courses, sanitary landfills, sewage treatment, water control structures, and other developed purposes.
Other (X)	Land not included in any other mapping category. Common examples include low density rural developments; brush, timber, wetland, and riparian areas not suitable for livestock grazing; confined livestock, poultry or aquaculture facilities; strip mines, borrow pits; and water bodies smaller than 40 acres. Vacant and nonagricultural land surrounded on all sides by urban development and greater than 40 acres is mapped as Other Land.
Water (W)	Perennial water bodies with an extent of at least 40 acres.

California Land Conservation Act

The California Land Conservation Act, better known as the Williamson Act, was enacted by the State Legislature in 1965 to encourage the preservation of agricultural lands. Under the provisions of the act, landowners agreeing to keep their lands under agricultural production for a minimum of 10 years receive property tax adjustments. Williamson Act Contracts limit the use of the properties to

agricultural, open space, and other compatible uses. Williamson Act lands are assessed based on their agricultural value rather than their potential market value under nonagricultural uses.

Local

Fresno General Plan

Resource Conservation and Resilience Element

Objective RC-9 Preserve agricultural land outside of the area planned for urbanization under this General Plan.

Policy RC-9-a **Regional Cooperation.** Work to establish a cooperative research and planning program with the Counties of Fresno and Madera, the City of Clovis, and other public agencies to conserve agricultural land resources.

Policy RC-9-b **Land Outside SOI.** Express opposition to residential and commercial development proposals in unincorporated areas (excluding County Islands) within or adjacent to the Planning Area when these proposals would do any of the following:

- Make it difficult or infeasible to implement the General Plan;
- Contribute to the premature conversion of agricultural, open space, or grazing lands; or
- Constitute a detriment to the management of resources and/or facilities important to the Fresno Metropolitan Area (such as air quality, water quantity and quality, traffic circulation, and riparian habitat).

Policy RC-9-c **Farmland Preservation Program**. In coordination with regional partners or independently, establish a Farmland Preservation Program. When Prime Farmland, Unique Farmland, or Farmland of Statewide Importance is converted to urban uses outside city limits, this program would require that the developer of such a project mitigate the loss of such farmland consistent with the requirements of CEQA. The Farmland Preservation Program shall provide several mitigation options that may include, but are not limited to the following: Restrictive Covenants or Deeds, In Lieu Fees, Mitigation Banks, Fee Title Acquisition, Conservation Easements, Land Use Regulations, or any other mitigation method that is in compliance with the requirements of CEQA. The Farmland Preservation Program may be modeled after some of all of the programs described by the California Council of Land Trusts.

Healthy Communities Element

Policy HC-5-f Urban Agriculture. Promote a full range of urban agriculture activities, including farmers' markets, farm stands, community gardens, on-site garden produce market stands, and urban farms. Support associations involved in these activities, which can be accomplished by a combination of the following:

- Amend the Fresno Municipal Code (FMC) to provide clear and concise permitting procedures regarding Community Gardens, On-site Garden Produce Market Stands, and Urban Farms that allow sale of foods grown locally.
- Create a policy for reduced planning entitlements and plan check fees.
- Make publicly available an inventory of City-owned surplus land that could be used for urban agriculture.
- Continue to allow and promote community gardens in City-owned parks.
- Support the planning of community gardens within walking distance of high-density residential areas to compensate for the reduced amount of open space in these areas.
- Emphasize opportunities for urban agriculture in all areas of the City, schools, parks, residential food deserts, and especially in areas of the City with a relatively high proportion of "food insecure" individuals.

Policy HC-5-g **Commercial Agriculture.** Continue to develop policies to allow agriculture on land greater than 50 acres in area.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Specific Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to agricultural resources:

Urban Form, Land Use and Design Element

Objective UF-1 Create complete neighborhoods in the Southeast Development Area that integrate housing, business and retail amenities. Implement a Southeast Development Area plan that balances and mixes housing, jobs, commercial businesses, services, and public facilities to help meet existing thresholds for lower vehicle miles traveled, reduced air pollution, and the efficient use of groundwater resources in compliance with the Sustainable Groundwater Management Act of 2014.

Policy UF-1.6 **Right-to-Farm.** Establish right-to-farm practices in accordance with the Fresno County Right-to-Farm Ordinance to allow the continued operation of agricultural activities which occur adjacent to new residential developments. Require buffers between new residential development and existing farmlands.

Housing Element

Objective HC-1 Mix housing types and designs throughout the Plan Area to respond to the needs of all household types. The Southeast Development Area Specific Plan accommodates a diverse range of household demographics and preferences with housing types that range from higher-density multi-family homes to medium-lot single-family homes.

Policy HC-1.6 **Compatibility Between Uses.** Provide for urban edge transitions that protect existing rural residential and agricultural uses from new development.

Community Farming and Agricultural Element

Objective CF-1 Conserve strategic farmland outside the Southeast Development Area most likely to sustain economically viable agriculture over the long term. While the efficient, compact development pattern of the SEDA Specific Plan reduces development pressure on surrounding agricultural land, it must be bolstered by policies that directly limit farmland conversion. These policies require inter-governmental coordination between the cities of Fresno, Sanger, Clovis, Fresno County, and other neighboring cities.

Policy CF-1.1 **Efficient Land Use.** Reduce development pressure on farmland outside the City of Fresno Sphere of Influence (SOI) by adopting the compact, efficient land use pattern of the SEDA Specific Plan. The SEDA Plan clusters homes and jobs at more than twice the density of current trend development.

Policy CF-1.2 **Future Growth Planning.** Support planning efforts that channel new growth to areas already committed to urban uses inside the current SOIs of incorporated cities in Fresno County.

Policy CF-1.3 **Conversion of Farmland to Nonagricultural Uses.** The City of Fresno will strongly discourage the conversion of strategic farmland outside its current SOI.

- **Strategic Farmland Mapping Project.** Support the Strategic Farmland Mapping Project conducted by the Fresno Council of Governments to identify the 'best' or most strategic locations to preserve farmland outside the current SOIs of incorporated cities in Fresno County.

Policy CF-1.4 **Agricultural Farm Buffer.** Establish an agricultural farm belt along the eastern edge of the SEDA. Farm belts provide opportunities to link agricultural land preservation and increased urban efficiency with local food production in ways that positively support local economies, farms, and farmers.

Objective CF-2 Create a long-term transition zone between urban uses in the City of Fresno and agricultural land in Fresno County. Buffering urban and adjoining agricultural land uses reduce conflicts that can arise due to noise, pollution, or traffic.

Policy CF-2.1 **Rural Cluster Districts**. Establish Rural Cluster Districts at the eastern edge of the site, as depicted in the SEDA Plan. Rural clusters consist of clustered residential development surrounded by common land held under easements for agricultural or recreational use.

- **Rural cluster farming.** Allow small-scale and community farming Rural Cluster Districts.

Policy CF-2.2 **Passive Recreation.** Encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians.

- **What is the role of rural cluster development?**
  - A transitional buffer. Urban areas and large agricultural operations cannot always sit side-by-side. Noise, dust, and pesticides from farms can pose health concerns for residents, while farmers need space to move machinery and goods. Rural clusters along the eastern edge of SEDA form a transition between the urban area and the agricultural lands beyond. An attractive residential option. Rural clusters offer a rural lifestyle within an environmentally responsible land use framework that promotes active farming and open space preservation.
  - A means to preserve land. Rural cluster lands can be used for organic small-scale farming, equestrian activities, or other uses compatible with the nearby homes. The vast majority of the land is preserved as viable agricultural land or open space.

Objective CF-3 Promote community farming to provide opportunities for entrepreneurs and families to grow food for commercial and household production. Community farming is intended, in part, to diversify agriculture and make the residents of the Southeast Development Area stakeholders in the success of Fresno County agriculture.

Policy CF-3.1 **Organic and Pesticide-Free Farming.** Promote ecologically sensitive farming methods that are safe for farm workers, consumers, and residents by restricting pesticide use and promoting integrated pest management practices within the SEDA.

Policy CF-3.2 **Small Farms.** Create opportunities for entrepreneurs to grow food for commercial production on small plots of land (2 to 20 acres) that can provide economic opportunities for current and future Fresno residents.

- **Location.** Small farms in the SEDA should be located adjacent to and within open space corridors and within Rural Cluster Districts. If located within a Planned Development or Multi-Family Residential Complex, the Homeowner's Association and/or property management company shall be responsible for the site and shall designate a liaison between the property owner(s) and the City. (City of Fresno Development Code - 15-2720).
- **Access.** Public access to small farms should be limited or completely restricted; fencing may be required.
- **Management.** Management structures of small farms shall be determined as appropriate. Small farms may be privately owned or managed by non-profit organizations.

Policy CF-3.3 **Community Farming.** Create and expand a viable community farming program that promotes an appreciation of food and local ecology, instills a sense of stewardship and community, and provides a recreational activity.

- **Community/Neighborhood Gardens.** Create and support neighborhood gardens within local communities. Neighborhood gardens, such as Yo'Ville Community Garden in Southwest Fresno, are woven into the fabric of centers and residential areas, providing households with opportunities to grow some of their own produce and meet with other members of the community.
  - **Location.** Neighborhood gardens shall be integrated into Neighborhood Centers, open spaces, and other locations that place them within walking distance of most residents' homes.
  - **Access.** Access to community spaces can vary. Gardens can be open to the public, or only to designated users.
  - **Management.** Management structures of community spaces shall be determined as appropriate. Neighborhood gardens can be owned by a city or county agency or by a private landowner, and operated by a neighborhood collective, community garden association, non-profit, or city/county parks and recreation department that leases small plots of the garden to community members. Some neighborhood gardens are independent entities, while some jurisdictions have neighborhood garden programs that oversee all the gardens in a jurisdiction.
  - **Funding and staff assistance.** The City of Fresno shall encourage neighborhood organizations to seek funding for the neighborhood garden program and/or facilitate assistance through the Fresno Parks, After School, Recreation, and Community Services Department or other agency/organization.

- **School Gardens.** Support and foster the integration of school gardens within neighborhood schools, such as the school garden located at Kepler Neighborhood School in Downtown Fresno. School gardens can serve as outdoor classrooms where students learn about soil, botany, natural cycles, nutrition, and basic gardening principles in a hands-on setting.
  - **Location.** School gardens should be located on school grounds, or within a very short walk of a school. When possible, school gardens should be planned upon new school construction in order to maximize joint-use opportunities with the City of Fresno Parks, After School, Recreation, and Community Services Department.
  - **Access.** Access should be controlled based on school district policies.
  - **Management.** Management structures shall be determined as appropriate. School gardens are typically managed by at least one garden coordinator who works closely with school administration or one or more dedicated teachers.

  - **School gardens working group.** Create a working group of teachers, students, and residents to explore the development of school garden programs in the Clovis and Sanger Unified School Districts.

- **Community Orchards.** Support and preserve community orchards for both new and existing orchards within the SEDA. Community orchards can be integrated into the community's open space network, serving as park-like features and enhancing connections to agriculture.
  - **Location.** Community orchards can be integrated into public open spaces or associated with private development.
  - **Access.** Community orchards should be unfenced, with high levels of public access.
  - **Management.** Management structures shall be determined as appropriate. In a typical model, residents help to care for the orchards and pay fees to fund professional gardeners.

Objective CF-4 Support Fresno agriculture, agricultural industries, and farm employees through economic development, educational training, and social programs within the Southeast Development Area.

Policy CF-4.1 **Economic Competitiveness.** Support efforts to promote and market agricultural products to maintain the long-term viability of Fresno-area farmers.

- **Direct Marketing.** Implement direct marketing of locally-grown produce from Fresno County and the Southeast Development Area through farmers markets, community-supported agricultural programs, farm-to-restaurant- programs, produce stands, and other mechanisms.
- **Branding of local produce.** Utilize the opportunities in SEDA to support and establish Fresno as a center for locally-grown produce serving the Central Valley and California. Establish a "Fresno Grown" brand and support the "California Grown" program to promote locally-grown produce.
- **Agricultural Tourism.** Encourage agricultural tourism in the SEDA to educate visitors and generate income and support for farms.
- **Value-Added Process and Distribution.** Provide the opportunity for area farmers to utilize Flexible Research and Development districts for agricultural processing and distribution.

Policy CF-4.2 **Educational Training.** Support education and technical assistance for farm employees and aspiring farm owners through direct relationships with educational and non-profit institutions.

- **Public Institutions.** Encourage public institutions, including Fresno State University, the State Center Community College District, and other educational institutions, to provide assistance and training to farm employees.

- **Non-Profit Institutions.** Develop relations with non-profit agricultural training organizations and encourage those organizations to locate in the Southeast Development Area.

Policy CF-4.3 **Farm Worker Housing and Social Services.** Encourage the long-term economic viability of Fresno County agriculture by supporting the housing and social service needs of farm workers.

- **Housing.** Provide safe, affordable, efficient housing for farm workers, permitting housing on agricultural lands and other appropriate sites within the current Sphere of Influence (refer to the General Plan Housing Element).
- **Social Services.** Encourage organizations that support farm workers through family assistance programs, translation assistance, financial literacy training, medical assistance, and other services, to locate within the Southeast Development Area.

Policy CF-4.4 **Strategic Plan for Agriculture.** Encourage the long-term economic viability of Fresno County agriculture by creating a strategic plan that comprehensively addresses the needs of farmers and farmworkers. The plan should be developed in partnership with the County and private agricultural institutions. The plan should focus on, but is not limited to:

- Develop a pathway for protection of agricultural land at risk of conversion to nonagricultural uses through a review of why and to what extent agricultural land is being converted to other uses.
- Identify how to support agricultural land conservation and what economic, environmental, and public health co-benefits arise from conservation.
- Analyze the existing agricultural land base and its function in the regional food system.
- Recognize and protect environmental co-benefits of conserving agricultural lands and analyze how to reduce greenhouse gas emissions .
- Identify the benefit of agricultural land for priority populations such as beginning or Veteran farmers and ranchers; residents of disadvantaged or low-income communities; or California Native American Tribes.

Fresno Municipal Code

City of Fresno Zoning Ordinance

Chapter 15 of the Municipal Code outlines the City's Zoning Ordinance, which provides a guide for the physical development of the City in order to achieve the arrangement of land uses depicted in the approved General Plan, as well as implement goals, objectives, and policies of the approved General Plan. There are zoning designations related to agricultural or forestry use in the City's Zoning Ordinance, including Residential Single-Family District, (RE and RS-1 through RS-5) Residential Multi-Family (RM-1 through RM-3 and RM-MH), Light Industrial (IL), Heavy Industrial (IH), and Open Space (OS).

Fresno General Plan PEIR Mitigation Measures

The General Plan PEIR contains the following mitigation measures that are applicable to the proposed project:

MM AG-1.1 Consistent with Policy RC-9-c of the approved General Plan, the City, in coordination with regional partners or independently, shall establish a Farmland Preservation Program by 2025. The intent of the Farmland Preservation Program would be that, when Prime Farmland, Unique Farmland, or Farmland of Statewide Importance are proposed for development and converted to urban uses within the Sphere of Influence outside city limits, this program would require that the developer of such a project mitigate the loss of farmland consistent with the requirements of CEQA. The Farmland Preservation Program shall establish thresholds of significance and provide several mitigation options that may include, but are not limited to, the following:

- Restrictive Covenants or Deeds
- In Lieu Fees
- Mitigation Banks
- Fee Title Acquisition
- Conservation Easements
- Land Use Regulations

The Farmland Preservation Program may be modeled after some or all of the programs described by the California Council of Land Trusts.

Prior to the adoption of the Farmland Preservation Program, projects shall be required to comply with CEQA to address potential environmental impacts on an individual basis.

3.2.4 - Methodology

The proposed project was evaluated for potential impacts on agriculture resources resulting from implementation of the proposed project through a review of applicable plans and policies. FirstCarbon Solutions (FCS) personnel reviewed resources from the California Department of Conservation and also reviewed aerial photographs, topographical maps, and street maps to identify surrounding land uses and evaluate potential impacts from future development that may occur pursuant to the Fresno SEDA Specific Plan. The General Plan was reviewed to confirm applicable land use, zoning, and policies related to agricultural land uses.

3.2.5 - Impacts and Mitigation Measures

Significance Criteria

The City utilizes the criteria in CEQA Guidelines Appendix G, to determine whether impacts to agriculture and forestry resources are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of

planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part, on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would have a significant effect on agriculture or forestry resources if the project would:

a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use.

b) Conflict with existing zoning for agricultural use, or a Williamson Act Contract.

c) Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g)).

d) Result in the loss of forest land or conversion of forest land to non-forest use.

e) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or conversion of forest land to non-forest use.

Impact Evaluation

Convert Farmland to Nonagricultural Use

Impact AG-1:	**The proposed project would convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland) as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to nonagricultural use.**

According to the FMMP California Important Farmland Finder, as shown in Exhibit 3.2-1, there are approximately 2,475 acres of land designated as Prime Farmland, approximately 1,352 acres of Farmland of Statewide Importance, approximately 1,189 acres of land designated as Farmland of Local Importance, and approximately 1,725 acres of land designated as Unique Farmland scattered throughout the Plan Area.[5] The remainder of the Plan Area has a variety of designations, including approximately 337 acres of Urban Built-Up Land and approximately 1,536 acres of Rural Residential Land. As previously discussed, the Plan Area contains approximately 5,000 acres of agricultural uses, about half of the land in the Plan Area. Therefore, buildout of the Specific Plan would occur on land with soil types designated by the FMMP as farmland.

The Specific Plan does not contemplate or approve any specific development; however, agricultural preservation is a guiding principle behind the planning and design of the Specific Plan. Buildout of

[5] California Department of Conservation. 2022. California Important Farmland Finder. Available: https://maps.conservation.ca.gov/DLRP/CLIFF/. Accessed April 28, 2022.

the Specific Plan would include components designed to preserve the continuity and viability surrounding land for agricultural uses and open space and to integrate community-scale farming and agriculture. Furthermore, the proposed project's objectives include integrating small farms, community gardens, and farmers' markets into neighborhoods, schools, and town centers and creating a buffer that includes rural homes, organic farming, and open spaces to serve as a transition between the Plan Area and commercial agriculture to the east. However, the proposed project would increase housing and, as a result, would result in the conversion of Prime Farmland, Farmland of Local Importance, and Unique Farmland to nonagricultural uses.

To counter the effects of agricultural conversion, the Specific Plan includes a policy framework to support the integration of agriculture within the urban sphere. Programs that would be integrated into the Specific Plan may include school and neighborhood gardens, community orchards, agricultural education centers, and small farming operations in green belts and on the buffer edge. Furthermore, the Specific Plan includes policies to address land use compatibility through a Buffer District. Buffer Districts act as a transitional buffer between the urban areas of the Plan Area and larger-scale agricultural uses. Unlike the patchwork of rural ranchette development that is typically found at the rural outskirts of cities, the Buffer District would discourage outward sprawl by clearly delineating the urban-rural edge. Therefore, the policies included in the Specific Plan would directly limit farmland conversion and thereby help to preserve agriculture in the Plan Area.

Additionally, the proposed project would comply with the General Plan, which includes several policies intended to protect agricultural uses in the City. Policy RC-9-a directs the City to work with the Counties of Fresno and Madera, the City of Clovis, and other public agencies to conserve agricultural land resources. Additionally, Policy RC-9-b defines when residential and commercial development on unincorporated agricultural land should be prohibited, and Policy RC-9-c describes implementation of the Farmland Preservation Program (FPP). Consistent with Policy RC-9-c, incorporation of the General Plan MM AG-1.1, which requires future development to comply with the FPP once adopted for the SEDA would ensure that all future development would be required to mitigate the loss of farmland if Prime Farmland, Unique Farmland, or Farmland of Statewide Importance where such lands are proposed to be converted to urban uses within the SOI outside city limits. However, because the FPP has not yet been developed, the proposed project would implement project-specific MM AG-2, which requires all future development to mitigate the loss of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, on a project-by-project basis before the initiation of construction or ground-disturbing activities. However, while implementation of MM AG-2 would reduce some project-specific impacts, loss of Prime Farmland would still occur with implementation of the project. Therefore, this impact would be significant and unavoidable even with implementation of available mitigation.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.2, the following mitigation measures from the General Plan PEIR are applicable to the project.

MM AG-1.1 Consistent with Policy RC-9-c of the approved General Plan, the City, in coordination with regional partners or independently, shall establish a Farmland Preservation Program by 2025. The intent of the Farmland Preservation Program would be that, when Prime Farmland, Unique Farmland, or Farmland of Statewide Importance are proposed for development and converted to urban uses within the Sphere of Influence outside city limits, this program would require that the developer of such a project mitigate the loss of farmland consistent with the requirements of CEQA. The Farmland Preservation Program shall establish thresholds of significance and provide several mitigation options that may include, but are not limited to, the following:

- Restrictive Covenants or Deeds
- In Lieu Fees
- Mitigation Banks
- Fee Title Acquisition
- Conservation Easements
- Land Use Regulations

The Farmland Preservation Program may be modeled after some or all of the programs described by the California Council of Land Trusts. Prior to the adoption of the Farmland Preservation Program, projects shall be required to comply with CEQA to address potential environmental impacts on an individual basis.

Project Specific Mitigation Measures

The following project-specific mitigation measure applies to the proposed project:

MM AG-2 **Prime Farmland, Unique Farmland, and Farmland of Statewide Importance Impact Reduction Measure.** Until the City's Farmland Preservation Program is implemented consistent with the General Plan Program Environmental Impact Report Mitigation Measure (MM) AG-1.1 and the General Plan Policy RC-9-c, all development in the Fresno Southeast Development Area Specific Plan Area which would convert land designated as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses shall be analyzed on a project-by-project basis, consistent with the requirements of the California Environmental Quality Act (CEQA) at the time the project application is submitted. Where a specific development project site would include the conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance to nonagricultural uses, the project applicant shall identify feasible mitigation prior to project approval and implement such mitigation prior to any construction or ground-disturbing activities. Such mitigation may include but is not limited to siting project to avoid farmland; payment of in lieu fees; or, the acquisition and/or conservation of equivalent Prime Farmland, Unique Farmland, or Farmland of Statewide Importance at another location, where it is financially feasible to do so, in the form of agricultural conservation easements, or other feasible mitigation.

Level of Significance After Mitigation

Significant and unavoidable impact.

Conflict with Existing Zoning or Williamson Act Contract

Impact AG-2: The proposed project would not conflict with existing zoning for agricultural use, or a Williamson Act Contract.

According to the General Plan, the City and its SOI includes lands under Williamson Act Contract, and the majority of these lands are located within the Plan Area. Exhibit 3.2-2 shows the locations of the Williamson Act Contract parcels within the Plan Area. Comparing these parcels to Exhibit 2-2, the majority of land within the Plan Area that is under Williamson Act Contract would be designated for non-agricultural land uses (such as various types of residential, regional and community center land uses) with implementation of the Specific Plan. The General Plan PEIR identifies that implementation of the approved General Plan would conflict with land under Williamson Act Contracts, which would result in a significant and unavoidable impact.

Therefore, the continued implementation of the approved General Plan as well as implementation of the proposed Specific Plan could conflict with existing Williamson Act Contracts because non-agricultural uses would be allowed on lands under a Williamson Act Contract. As a result, the continued implementation proposed Specific Plan could result in a significant impact on existing Williamson Act Contract land.

Therefore, project impacts would remain significant and unavoidable. No feasible mitigation measures are available.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

No feasible mitigation measures are available.

Level of Significance After Mitigation

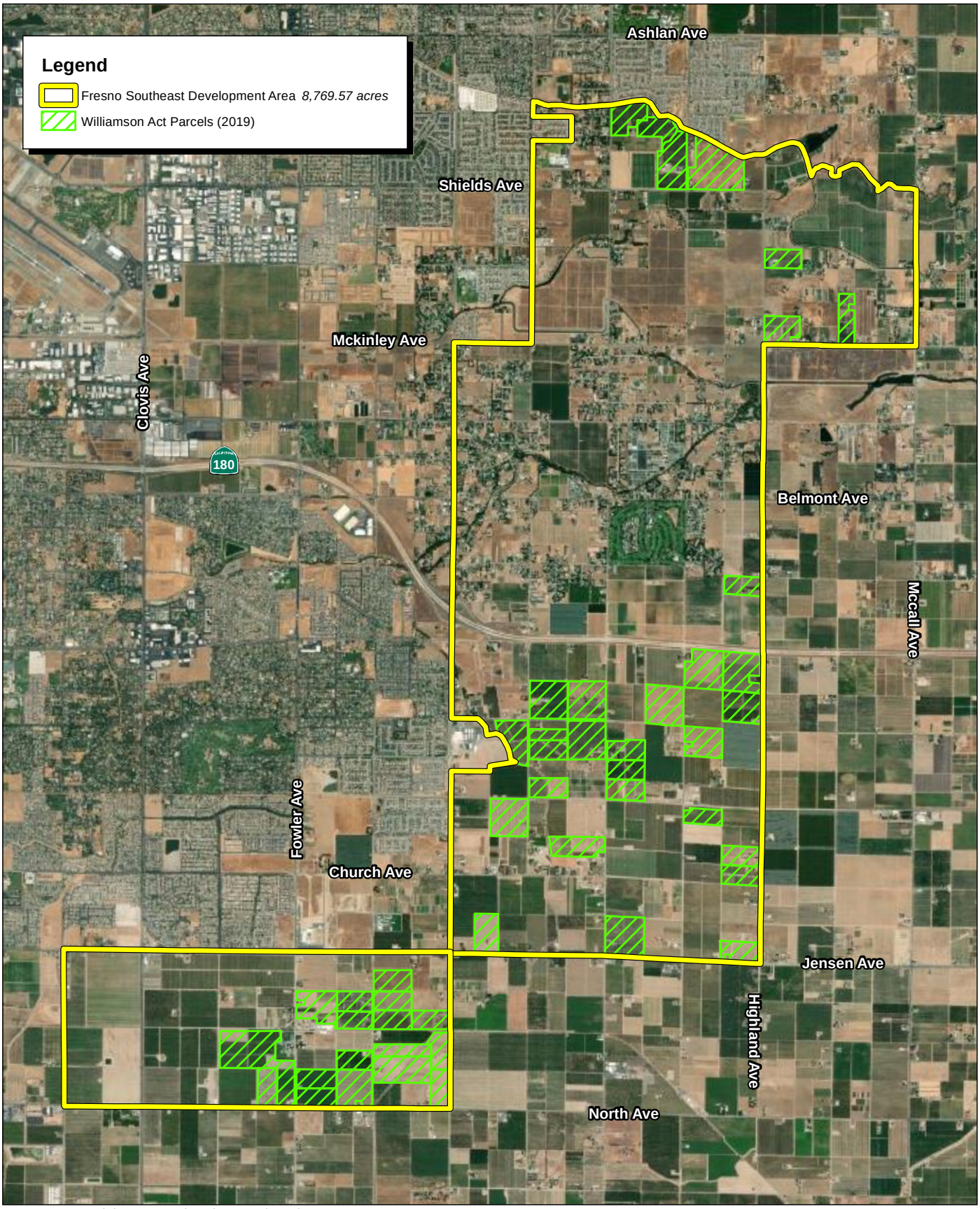
Significant and unavoidable impact.

Forest Land and Timberland

Impact AG-3: The proposed project would not conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code Section 12220(g)), timberland (as defined by Public Resources Code Section 4526), or timberland zoned Timberland Production (as defined by Government Code Section 51104(g)).

As identified in the General Plan, no land within the City or SOI is used for forestry purposes and no land within the City or SOI is designated or zoned for forestry resources. Therefore, the Plan Area

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Source: ESRI Aerial Imagery. City of Fresno (2019). LSA

FIRSTCARBON SOLUTIONS™

4,600 2,300 0 4,600 Feet

Exhibit 3.2-2
Williamson Act Contract Parcels

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does not contain any forestry uses or land designated or zoned for forestry resources. Therefore, the proposed project would not conflict with existing zoning for forest land uses or timberland zoned Timberland Production and would not conflict with any existing zoning for forest land or timberland. No impacts are anticipated to occur. Therefore, the proposed project would have no impact on existing zoning of forest land.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Conversion of Forestry Land

Impact AG-4:	**The proposed project would not result in the loss of forest land or conversion of forest land to non-forest use.**

The proposed project would not involve the conversion of forest land because the Plan Area does not contain any forest land. Additionally, the proposed amendments to the land use map, rezoning of properties, and annexation would not cause any conversion of forest land to a non-forest use in another location. The proposed project would provide for increased density and accelerate housing production throughout the Plan Area and would not have any direct or indirect impacts on forest lands. The Plan Area is not used for forest use and is not zoned for forest uses. Therefore, the proposed project would have no impact on forestry resources.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Existing Zoning—Forest Land

Impact AG-5:	**The proposed project would not involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to nonagricultural use or conversion of forest land to non-forest use.**

As discussed above under Impact AG-1, future development under the proposed project would result in the conversion of farmland to nonagricultural use and those impacts would be less than significant with the incorporation of General Plan PEIR MM AG-1.1 and project-specific MM AG-2. Except for direct conversion of farmland to nonagricultural uses, which would be mitigated on a

project-by-project basis through the implementation of project-specific MM AG-2, until such time as the FPP is established, the implementation of the proposed project would not result in other changes in the existing environment that would impact agricultural land outside of the Plan Area. Additionally, there is no designated forest land or Timberland in the Plan Area and therefore development in accordance with the proposed project would not impact forest land, as discussed in above under Impact AG-3 and Impact AG-4. Therefore, the proposed project would result in no impact on farmland or forest land involving other changes to the existing environment.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM AG-1.1.

Project Specific Mitigation Measures

Implementation of MM AG-2.

Level of Significance After Mitigation

No impact.

3.2.6 - Cumulative Impacts

The cumulative setting for agriculture and forestry resources includes the cities of Fresno, Clovis, and Sanger, and Counties of Fresno and Madera. This analysis evaluates whether impacts of the proposed Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to agriculture and forestry resources. This analysis then considers whether incremental contribution of the impacts associated with implementation of the proposed Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to level of significance.

Agriculture

Cumulative development is anticipated to convert agricultural uses to non-agricultural uses, as well as to conflict with existing agricultural zoning and Williamson Act Contracts. Development in accordance with the continued implementation of the approved General Plan would result in a significant impact on agricultural resources. To reduce potential cumulative impacts on agriculture uses, the approved General Plan includes Objective RC-9 and Policies RC-9-a through RC-9-c, which would reduce cumulative impacts to agricultural resources. In addition, the proposed project would incorporate General Plan MM AG-1.1 and project-specific MM AG-2, which requires all future development to mitigate the loss of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance on a project-by-project basis before construction or ground-disturbing activities, to address the conversion of farmland to non-farmland uses. However, even with incorporation of the approved General Plan mitigation and project-specific mitigation, cumulative impacts related to conversion of agricultural land would remain significant. For these reasons, cumulative impacts to agriculture are significant and unavoidable.

In addition, as identified in Impact AG-2 discussion, development consistent with the proposed Specific Plan could conflict with existing agricultural zoning and land under Williamson Act Contracts, and there is no feasible mitigation that would reduce this impact to less than significant. Therefore, the proposed project's incremental contribution to the conversion of farmland is cumulatively considerable. Thus, cumulative impacts related to the conversion of Williams Act Contract land would be significant and unavoidable.

Forestry

No cumulative impacts would occur to forestland because there is no identified or zoned forestland in the geographic scope of cumulative projects. Given the location of the proposed project and the surrounding area and the lack of any forestland or land zoned as forest, the proposed project would not contribute to any cumulative impact.

In conclusion, although the implementation of the above objective and policies would reduce cumulative impacts related to the conversion of farmland, cumulative impacts to farmland and land under Williamson Act Contracts would remain significant and unavoidable. No feasible mitigation measures are available.

Level of Cumulative Significance Before Mitigation

Significant and unavoidable impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM AG-1.1.

Project Specific Mitigation Measures

Implementation of MM AG-2.

Level of Cumulative Significance After Mitigation

Significant and unavoidable impact.

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3.3 - Air Quality

This section describes existing air quality conditions regionally and locally as well as the relevant regulatory framework. This section also evaluates the possible impacts related to air quality that could result from implementation of the proposed project. Information included in this section is based on project-specific air quality modeling results utilizing California Emissions Estimator Model (CalEEMod) Version 2020.4.0. Complete modeling output is provided in Appendix B.

Two public comments were received during the Program Environmental Impact Report (PEIR) scoping period related to air quality.

- The San Joaquin Valley Air Pollution Control District (Valley Air District) made the following comments:
  - Recommends that the PEIR incorporate strategies that reduce Vehicle Miles Traveled (VMTs) and require the cleanest available heavy-duty trucks and vehicles, including zero and near-zero technologies.
  - Recommends the incorporation of strategies that will advance implementation of the best practices related to the siting, design, construction, and operation of freight facilities to minimize health impacts on nearby communities.
  - Provides general recommendations regarding disclosure of air quality impacts.
  - Provides health risk reduction strategies.
  - Provides resources to assist with identifying mitigation measures.

- A group letter from the Leadership Council for Justice & Accountability, the Central California Environmental Justice Network, the Fresno Building Healthy Communities, and Fresno Barrios Unidos recommended that the City of Fresno, as the lead agency:
  - Thoroughly assess the impacts that the proposed project may have on air quality for Southeast Fresno residents; and
  - Adopt enforceable mitigation measures to minimize those impacts to the fullest extent possible.

3.3.1 - Environmental Setting

The proposed project is located in unincorporated Fresno County, adjacent to the City of Fresno's municipal boundaries, within the San Joaquin Valley Air Basin (SJVAB). The SJVAB consists of Kings, Madera, San Joaquin, Merced, Stanislaus, and Fresno counties, as well as a portion of Kern County. The local agency with jurisdiction over air quality in the SJVAB is the Valley Air District. Regional and local air quality is impacted by topography, dominant airflows, atmospheric inversions, location, and season. The following section describes these conditions as they pertain to the SJVAB.

San Joaquin Valley Air Basin

The information in this section is primarily from the Valley Air District's Guide for Assessing and Mitigating Air Quality Impacts (GAMAQI) and the accompanying technical document.[1,2]

Topography

The topography of a region is important for air quality because mountains can block airflow that would help to disperse pollutants and can channel air from upwind areas that transports pollutants to downwind areas. The Valley Air District covers the entirety of the SJVAB. The SJVAB is generally shaped like a bowl. It is open in the north and is surrounded by mountain ranges on all other sides. The Sierra Nevada lies along the eastern boundary (8,000 to 14,000 feet in elevation), the Coast Ranges are along the western boundary (3,000 feet in elevation), and the Tehachapi Mountains are along the southern boundary (6,000 to 8,000 feet in elevation).

Climate

Climate is important for air quality because of differences in the atmosphere's ability to trap pollutants close to the ground, creating adverse air quality or rapidly dispersing pollutants over a wide area, thus preventing high concentrations from accumulating under different climatic conditions. The SJVAB has an "inland Mediterranean" climate and is characterized by long, hot, dry summers and short, foggy winters. Mediterranean climates are defined by sparse rainfall, which occurs mainly in winter, while summers are hot and dry. Summertime temperatures in the SJVAB often exceed 100°F. The subtropical high-pressure cell is strongest during spring, summer, and fall and produces subsiding air, which can result in temperature inversions in the valley. A temperature inversion can act like a lid, inhibiting vertical mixing of the air mass at the surface. Any emissions of pollutants can be trapped below the inversion. Most of the surrounding mountains are above the normal height of summer inversions (1,500 to 3,000 feet). Wintertime high-pressure events can often last many weeks, with surface temperatures lowering to the 30°F (degrees Fahrenheit) range. During these events, fog can be present and inversions are extremely strong. These wintertime inversions can inhibit vertical mixing of pollutants to a few hundred feet.[3]

Wind

Wind speed and direction play an important role in dispersion and transport of air pollutants. For example, wind at the surface and aloft can disperse pollution by mixing and transporting it to other locations.

Winds in the SJVAB most frequently blow from the northwest, and the region's mountain ranges restrict air movement and channel the air mass toward the southeastern end of the valley. The general wind patterns in the SJVAB start with marine air from the San Francisco Bay that flow into the SJVAB from the San Joaquin River Delta and over the Altamont Pass and Pacheco Pass. Then, winds flow along the valley, over the Tehachapi Pass, and into the Southeast Desert Air Basin. This wind pattern contributes to transporting pollutants from the Sacramento Valley and the Bay Area

[1] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impact.
[2] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. 2015 Plan for the 1997 PM 2.5 Standard.
[3] Ibid.

into the SJVAB. During the winter, many days are marked by air stagnation events where winds are very weak, which can result in limited transport of pollutants.

Temperature

Sunlight can be a catalyst in the formation of some air pollutants (such as ozone). Solar radiation and high temperature are particularly important in the chemistry of ozone formation. Photochemical air pollution (primarily ozone) is produced by the atmospheric reaction of organic substances (such as volatile organic compounds [VOCs]) and nitrogen dioxide (NO_2) under the influence of sunlight. Ozone concentrations are very dependent on the amount of solar radiation, especially during late spring, summer, and early fall. Ozone levels typically peak in the afternoon as the temperatures are highest and the land has absorbed most of the solar radiation during the day. After the sun goes down, the chemical reaction between nitrous oxides and ozone begins to dominate. This reaction tends to scavenge and remove the ozone in the metropolitan areas through the early morning hours, resulting in the lowest ozone levels, possibly reaching zero, at sunrise in areas with high nitrogen oxides emissions. At sunrise, nitrogen oxides tend to peak, partly due to low levels of ozone at this time and also due to the morning commuter vehicle emissions of nitrogen oxides. Generally, the higher the temperature, the more ozone is formed, since reaction rates increase with temperature. However, extremely hot temperatures can "lift" or "break" the inversion layer. Typically, if the inversion layer does not lift to allow the buildup of contaminants to be dispersed, the ozone levels will peak in the late afternoon. If the inversion layer breaks and the resultant afternoon winds occur, the ozone will peak in the early afternoon and decrease in the late afternoon as the contaminants are dispersed or transported out of the SJVAB. Ozone levels are low during winter periods when there is much less sunlight to drive the photochemical reaction.[4]

Precipitation

Precipitation and fog may reduce or limit some pollutant concentrations by cleansing the air of pollutants and depositing them on the surface. In addition, ozone formation requires sunlight, and clouds and fog can block the required solar radiation. However, atmospheric moisture can also increase pollution levels. In fog with less water content, the moisture acts to form secondary ammonium nitrate particulate matter. This ammonium nitrate is part of the valley's particulate matter, including dust, 2.5 micrometers or less in diameter ($PM_{2.5}$) and particulate matter, including dust, 10 micrometers or less in diameter (PM_{10}) problem. Between winter storms, high pressure and light winds allow cold, moist air to pool on the SJVAB floor, which creates strong low-level temperature inversions and very stable air conditions leading to tule fog. Wintertime conditions favorable to fog formation are also conditions favorable to high concentrations of $PM_{2.5}$ and PM_{10}.[5]

Existing Air Quality Conditions

The local air quality can be evaluated by reviewing relevant air pollution concentrations near the proposed project area. Table 3.3-1 summarizes published monitoring data from 2018 through 2020. The table displays data from the nearest monitoring stations to the proposed project site with available data:

[4] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. 2015 Plan for the 1997 PM 2.5 Standard.
[5] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impact.

- Fresno–Drummond Street Monitoring Station, 4706 East Drummond Avenue, Fresno, CA 93725
- Fresno–Foundry Park, 2482 Foundry Park Avenue, Fresno, CA 93706

The data shows that during the past few years, the project area has exceeded the standards for ozone (State and national), and PM_{10} (State), and $PM_{2.5}$ (federal). The data in the table reflects the concentration of the pollutants in the air, measured using air monitoring equipment. This differs from emissions, which are calculations of a pollutant being emitted over a certain period. No recent monitoring data for the area was available for carbon monoxide (CO) or sulfur dioxide (SO_2). Generally, no monitoring is conducted for pollutants that are no longer likely to exceed Ambient Air Quality Standards (AAQS).

Table 3.3-1: Air Quality Monitoring Summary

Air Pollutant	Averaging Time	Item	2018	2019	2020
Ozone[1]	1 Hour	Max 1 Hour (ppm)	**0.119**	**0.099**	**0.123**
		Days > State Standard (0.09 ppm)	**6**	**1**	**11**
	8 Hours	Max 8 Hours (ppm)	**0.097**	**0.080**	**0.091**
		Days > Standard (0.070 ppm)	**32**	**10**	**27**
		Days > National Standard (0.075 ppm)	**15**	**2**	**14**
Carbon monoxide (CO)	8 Hours	Max 8 Hours (ppm)	ND	ND	ND
		Days > State Standard (9.0 ppm)	ND	ND	ND
		Days > National Standard (9 ppm)	ND	ND	ND
Nitrogen dioxide (NO_2)[1]	Annual	Annual Average (ppm)	0.013	ND	ND
	1 Hour	Max 1 Hour (ppm)	0.0759	0.0423	0.0668
		Days > State Standard (0.18 ppm)	0	0	0
Sulfur dioxide (SO_2)	Annual	Annual Average (ppm)	ND	ND	ND
	24 Hours	Max 24 Hours (ppm)	ND	ND	ND
		Days > State Standard (0.04 ppm)	ND	ND	ND
Inhalable coarse particles (PM_{10})[1]	Annual	State Annual Average (µg/m^3)	**45.7**	**39.6**	**ND**
	24 Hours	Highest Daily 24 Hours (µg/m^3)	**154.8**	**181.3**	**349.2**
		Days > State Standard (50 µg/m^3)	**19**	**13**	**25**
		Days > National Standard (150 µg/m^3)	0	**1**	**1**
Fine particulate matter ($PM_{2.5}$)[2]	Annual	State Annual Average (µg/m^3)	ND	ND	**20.3**
	24 Hours	Highest Daily 24 Hours (µg/m^3)	ND	ND	**157.2**
		Days > National Standard (35 µg/m^3)	ND	ND	**48**

Air Pollutant	Averaging Time	Item	2018	2019	2020
Notes: > = exceed µg/m^3 = micrograms per cubic meter **Bold** = exceedance max = maximum National Standard = National Ambient Air Quality Standard ND = no data PM_{10} = particulate matter, including dust, 10 micrometers or less in diameter $PM_{2.5}$ = particulate matter including dust, 2.5 micrometers or less in diameter ppm = parts per million State Standard = California Ambient Air Quality Standard [1] Fresno–Drummond Street Monitoring Station, 4706 E. Drummond Ave., Fresno, CA 93725 [2] Fresno–Foundry Park, 2482 Foundry Park Ave., Fresno, CA 93706 Sources: California Air Resources Board (ARB). 2020. Trends Summary. Website: https://www.arb.ca.gov/adam/trends/trends1.php. Accessed May 25, 2022. California Air Resources Board (ARB). 2020. Top Four Summary. Website: https://www.arb.ca.gov/adam/topfour/topfour1.php. Accessed May 25, 2022.					

Air Quality Index

The health impacts of the various air pollutants of concern can be presented in several ways. The clearest comparison is to the State and federal ozone standards. If concentrations are below the standard, it is safe to say that no health impact would occur to anyone. When concentrations exceed the standard, impacts will vary based on the amount by which the standard is exceeded. The United States Environmental Protection Agency (EPA) developed the Air Quality Index (AQI) as an easy-to-understand measure of health impacts compared with concentrations in the air. Table 3.3-2 provides a description of the health impacts of ozone at different concentrations.

Table 3.3-2: Air Quality Index and Health Effects from Ozone

Air Quality Index/ 8-hour Ozone Concentration	Health Effects Description
AQI (51-100)—Moderate	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
Concentration 55-70 ppb	**Health Effects Statements**: Unusually sensitive individuals may experience respiratory symptoms.
	Cautionary Statements: Unusually sensitive people should consider limiting prolonged outdoor exertion.
AQI (101-150)—Unhealthy for Sensitive Groups	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
Concentration 71-85 ppb	**Health Effects Statements**: Increasing likelihood of respiratory symptoms and breathing discomfort in active children and adults and people with respiratory disease, such as asthma.
	Cautionary Statements: Active children and adults, and people with respiratory disease, such as asthma, should limit prolonged outdoor exertion.

Air Quality Index/ 8-hour Ozone Concentration	Health Effects Description
AQI (151-200)—Unhealthy	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
Concentration 86-105 ppb	**Health Effects Statements**: Greater likelihood of respiratory symptoms and breathing difficulty in active children and adults and people with respiratory disease, such as asthma; possible respiratory effects in general population.
	Cautionary Statements: Active children and adults, and people with respiratory disease, such as asthma, should avoid prolonged outdoor exertion; everyone else, especially children, should limit prolonged outdoor exertion.
AQI (201-300)—Very Unhealthy	**Sensitive Groups**: Children and people with asthma are the groups most at risk.
Concentration 106-200 ppb	**Health Effects Statements**: Increasingly severe symptoms and impaired breathing likely in active children and adults and people with respiratory disease, such as asthma; increasing likelihood of respiratory effects in general population.
	Cautionary Statements: Active children and adults, and people with respiratory disease, such as asthma, should avoid all outdoor exertion; everyone else, especially children, should limit outdoor exertion.
Notes: AQI = Air Quality Index ppb = parts per billion Source: Air Now. 2015. AQI Calculator: AQI to Concentration. Website: https://www.airnow.gov/aqi/aqi-calculator/. Accessed June 24, 2022.	

Based on the AQI scale for the 8-hour ozone standard, the City of Fresno experienced no days in the last three years that would be categorized as Very Unhealthy (AQI 201-300) and as many as 15 days that were unhealthful for sensitive groups (AQI 150) or moderate (AQI 100) as measured at the Fresno–Drummond Street Station. The highest 1-hour maximum reading was 123 parts per billion (ppb) in 2020, compared with the 115-ppb cutoff point for unhealthy (AQI 200).

The other nonattainment pollutant of concern is $PM_{2.5}$. An AQI of 100 or lower is considered moderate and would be triggered by a 24-hour average concentration of 35.4 µg/m^3, which is considered an exceedance of the federal $PM_{2.5}$ standard. The Fresno–Foundry Park Station exceeded the standard for 48 days in 2020 and no data was available for 2018 or 2019. The highest concentration recorded at the Fresno–Foundry Park Station was 157.2 µg/m^3 in 2020. The relationship of the AQI to health effects is shown in Table 3.3-3.

Table 3.3-3: Air Quality Index and Health Effects of Particulate Pollution

Air Quality Index/ 24-hour $PM_{2.5}$ Concentration	Health Effects Description
AQI 51–100—Moderate	**Sensitive Groups**: Some people who may be unusually sensitive to particulates.

Air Quality Index/ 24-hour $PM_{2.5}$ Concentration	Health Effects Description
Concentration 12.1-35.4 µg/m^3	**Health Effects Statements**: Unusually sensitive people should consider reducing prolonged or heavy exertion.
	Cautionary Statements: Unusually sensitive people: Consider reducing prolonged or heavy exertion. Watch for symptoms such as coughing or shortness of breath. These are signs to take it easier.
AQI 101–150—Unhealthy for Sensitive Groups	**Sensitive Groups**: Sensitive groups include people with heart or lung disease, older adults, children, and teenagers.
Concentration 35.5-55.4 µg/m^3	**Health Effects Statements**: Increasing likelihood of respiratory symptoms in sensitive individuals, aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly.
	Cautionary Statements: Sensitive groups: Reduce prolonged or heavy exertion. It is OK to be active outside but take more breaks and do less intense activities. Watch for symptoms such as coughing or shortness of breath. People with asthma should follow their asthma action plans and keep quick relief medicine handy. If you have heart disease: Symptoms such as palpitations, shortness of breath, or unusual fatigue may indicate a serious problem. If you have any of these, contact your health care provider.
AQI 151–200—Unhealthy	Sensitive Groups: Everyone
Concentration 55.5-150.4 µg/m^3	**Health Effects Statements**: Increased aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; increased respiratory effects in general population.
	Cautionary Statements: Sensitive groups: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling. Everyone else: Reduce prolonged or heavy exertion. Take more breaks during outdoor activities.
AQI 201-300—Very Unhealthy	Sensitive Groups: Everyone
Concentration 150.5-250.4 µg/m^3	**Health Effects Statements**: Significant aggravation of heart or lung disease and premature mortality in persons with cardiopulmonary disease and the elderly; significant increase in respiratory effects in general population.
	Cautionary Statements: Sensitive groups: Avoid all physical activity outdoors. Move activities indoors or reschedule to a time when air quality is better. Everyone else: Avoid prolonged or heavy exertion. Consider moving activities indoors or rescheduling to a time when air quality is better.
Notes: µg/m^3 = micrograms per cubic meter AQI = Air Quality Index Source: Air Now. 2015. AQI Calculator: AQI to Concentration. Website: https://www.airnow.gov/aqi/aqi-calculator/. Accessed June 24, 2022.	

Sensitive Receptors

Some land uses are considered more sensitive to air pollution than others due to the types of population groups or activities involved. Sensitive population groups include children, the elderly, the acutely ill, and the chronically ill, especially those with cardiorespiratory diseases.

Residential areas are considered sensitive receptors to air pollution because residents, including children and the elderly, tend to be at home for extended periods of time, resulting in sustained exposure to any pollutants present. Other sensitive receptors include retirement facilities, hospitals, and schools. Recreational land uses are considered moderately sensitive to air pollution. Although exposure periods are generally short, exercise places a high demand on respiratory functions, which can be impaired by air pollution. In addition, noticeable air pollution can detract from the enjoyment of recreation. Industrial, commercial, retail, and office areas are considered the least sensitive to air pollution. Exposure periods are relatively short and intermittent as the majority of the workers tend to stay indoors most of the time. In addition, the working population is generally the healthiest segment of the public.

Project Site and Vicinity

Sensitive receptors exist within and adjacent to the proposed project site. The majority of sensitive receptors would be residential land uses to the north and west located within the City of Fresno. Specifically, the sensitive receptors located within the proposed project boundaries and closest to the proposed project site include:

- Lone Star Elementary School
- Sequoia Elementary School
- Sanger West High School
- Residential subdivisions located north of East Jensen Avenue and west of South Temperance Avenue
- Residential subdivisions located west of North Locan Avenue

Existing Air Pollutant Emissions

Project Site Vicinity

In the proposed project vicinity, the primary sources of air pollutant emissions would be mobile vehicles traveling along local roadways and agricultural activity.

Project Site

Similar to the proposed project vicinity, the primary source of air pollutant emissions within the proposed Plan Area would be mobile vehicles traveling along local roadways and agricultural activity.

Attainment Status

The EPA and the California Air Resources Board (ARB) designate air basins where AAQS are exceeded as “nonattainment” areas. If standards are met, the area is designated as an “attainment” area. If there is inadequate or inconclusive data to make a definitive attainment designation, they are considered “unclassified.” National nonattainment areas are further designated as marginal, moderate, serious, severe, or extreme as a function of deviation from standards.

Each standard has a different definition, or “form,” of what constitutes attainment, based on specific air quality statistics. For example, the federal 8-hour CO standard is not to be exceeded more than once per

year; therefore, an area is in attainment of the CO standard if no more than one 8-hour ambient air monitoring values exceeds the threshold per year. In contrast, the federal annual $PM_{2.5}$ standard is met if the 3-year average of the annual average $PM_{2.5}$ concentration is less than or equal to the standard.

The Air Quality Management Plans (AQMPs) prepared by the Valley Air District provide the framework for the SJVAB to achieve attainment of the State and federal AAQS through the State Implementation Plan (SIP). Areas are classified as attainment or nonattainment areas for particular pollutants depending on whether they meet the AAQS. Severity classifications for ozone nonattainment range in magnitude from marginal, moderate, and serious to severe and extreme.

The current attainment designations for the SJVAB are shown in Table 3.3-4 The SJVAB is currently classified as a federal and State nonattainment area for ozone, a federal nonattainment area for $PM_{2.5}$, and a State nonattainment area for PM_{10}.

Table 3.3-4: San Joaquin Valley Air Basin Attainment Status

Pollutant	State Status	National Status[1]
Ozone (1-hour) [a]	Nonattainment	–
Ozone (8-hours)	Nonattainment	Nonattainment
Carbon monoxide	Attainment	Attainment
Nitrogen dioxide (annual)	Attainment	Unclassified
Nitrogen dioxide (1-hour)	Attainment	Attainment
Sulfur dioxide	Attainment	Attainment
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
Lead	Attainment	Attainment
Hydrogen Sulfide (H_2S)	Unclassified	–
Sulfates	Attainment	–

Notes:
PM_{10} = particulate matter less than 10 microns in diameter
$PM_{2.5}$ = particulate matter less than 2.5 microns in diameter
[1] On June 15, 2005, the 1-Hour Ozone National Ambient Air Quality Standards (NAAQS) was revoked for all areas except the 8-Hour Ozone nonattainment Early Action Compact areas.
Source: California Air Resources Board (ARB). 2022. Maps of State and Federal Area Designations. Website: https://ww2.arb.ca.gov/resources/documents/maps-state-and-federal-area-designations. Accessed July 6, 2022.

3.3.2 - Regulatory Framework

Air pollutants are regulated primarily to protect human health and for secondary effects such as visibility and property damage from pollutant deposition. The Clean Air Act (CAA) of 1970 tasks the EPA with setting air quality standards. The State of California also sets air quality standards that are in some cases more stringent than federal standards and address additional pollutants. The following

section describes these federal and State standards and the health effects of the regulated pollutants.

Clean Air Act

Congress established much of the basic structure of the CAA in 1970 and made major revisions in 1977 and 1990. Six common air pollutants (also known as criteria pollutants) are addressed in the CAA. These are particulate matter, ground level ozone, carbon monoxide, sulfur oxides, nitrogen oxides, and lead. The EPA calls these pollutants criteria air pollutants because it regulates them by developing human health-based and/or environmentally based criteria (science-based guidelines) for setting permissible levels. The set of limits based on human health are called primary standards. Another set of limits intended to prevent environmental and property damage are called secondary standards.[6] The federal standards are called National Ambient Air Quality Standards (NAAQS). The air quality standards provide benchmarks for determining whether air quality is healthy at specific locations and whether development activities will cause or contribute to a violation of the standards.

The criteria pollutants are:

Ozone	Particulate matter (PM_{10} and $PM_{2.5}$)
Nitrogen dioxide (NO_2)	Carbon monoxide (CO)
Lead (Pb)	Sulfur dioxide (SO_2)

The federal standards were set to protect public health, including that of sensitive individuals; thus, the EPA is tasked with updating the standards as more medical research is available regarding the health effects of the criteria pollutants. Primary federal standards are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

The CAA also requires each state to prepare an air quality control plan referred to as a SIP. The federal CAA amendments of 1990 added requirements for states with nonattainment areas to revise their SIPs to incorporate additional control measures to reduce air pollution. The SIP is periodically modified to reflect the latest emissions inventories, planning documents, and rules and regulations of the air basins, as reported by their jurisdictional agencies.

California Clean Air Act

The California Legislature enacted the California Clean Air Act (CCAA) in 1988 to address air quality issues of concern not adequately addressed by the federal CAA at the time. California's air quality problems were and continue to be some of the most severe in the nation and required additional actions beyond the federal mandates. The ARB administers the California Ambient Air Quality Standards (CAAQS) for the 10 air pollutants designated in the CCAA. The 10 State air pollutants are the six federal standards listed above as well as visibility-reducing particulates, hydrogen sulfide, sulfates, and vinyl chloride. The EPA authorized California to adopt its own regulations for motor vehicles and other sources that are more stringent than similar federal regulations implementing the

[6] United States Environmental Protection Agency (EPA). 2021. NAAQS Table. Website: https://www.epa.gov/criteria-air-pollutants/naaqs-table. Accessed June 24, 2022.

CAA. Generally, the planning requirements of the federal CAA are less stringent than the CCAA; therefore, consistency with the CCAA will also demonstrate consistency with the federal CAA.

Air Pollutant Description and Health Effects

The federal and State AAQS, the most relevant effects, the properties, and sources of the pollutants are summarized in Table 3.3-5.

Table 3.3-5: Description of Air Pollutants

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Ozone	1 Hour	0.09 ppm	—	Irritate respiratory system; reduce lung function; breathing pattern changes; reduction of breathing capacity; inflame and damage cells that line the lungs; make lungs more susceptible to infection; aggravate asthma; aggravate other chronic lung diseases; cause permanent lung damage; some immunological changes; increased mortality risk; vegetation and property damage.	Ozone is a photochemical pollutant as it is not emitted directly into the atmosphere but is formed by a complex series of chemical reactions between reactive organic gases (ROG), nitrous oxides (NO_X), and sunlight. Ozone is a regional pollutant that is generated over a large area and is transported and spread by the wind.	Ozone is a secondary pollutant; thus, it is not emitted directly into the lower level of the atmosphere. The primary sources of ozone precursors (ROG and NO_X) are mobile sources (on-road and off-road vehicle exhaust).
	8 Hours	0.070 ppm	0.070 ppm			
Carbon monoxide (CO)	1 Hour	20 ppm	35 ppm	Ranges depending on exposure: slight headaches; nausea; aggravation of angina pectoris (chest pain) and other aspects of coronary heart disease; decreased exercise tolerance in persons with peripheral vascular disease and lung disease; impairment of central nervous system functions; possible increased risk to fetuses; death.	CO is a colorless, odorless, toxic gas. CO is somewhat soluble in water; therefore, rainfall and fog can suppress CO conditions. CO enters the body through the lungs, dissolves in the blood, replaces oxygen as an attachment to hemoglobin, and reduces available oxygen in the blood.	CO is produced by incomplete combustion of carbon-containing fuels (e.g., gasoline, diesel fuel, and biomass). Sources include motor vehicle exhaust, industrial processes (metals processing and chemical manufacturing), residential wood-burning, and natural sources.
	8 Hours	9.0 ppm	9 ppm			
Nitrogen dioxide[b] (NO_2)	1 Hour	0.18 ppm	0.100 ppm	Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; contributions to atmospheric discoloration; increased visits to hospital for respiratory illnesses.	During combustion of fossil fuels, oxygen reacts with nitrogen to produce nitrogen oxides—NO_X (NO, NO_2, NO_3, N_2O, N_2O_3, N_2O_4, and N_2O_5). NO_X is a precursor to ozone, PM_{10}, and $PM_{2.5}$ formation. NO_X can react with compounds to form nitric acid and related small particles and result in particulate matter (PM) related health effects.	NO_x is produced in motor vehicle internal combustion engines and fossil fuel-fired electric utility and industrial boilers. Nitrogen dioxide forms quickly from NO_X emissions. NO_2 concentrations near major roads can be 30 to 100 percent higher than those at monitoring stations.
	Annual	0.030 ppm	0.053 ppm			

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Sulfur dioxide[c] (SO_2)	1 Hour	0.25 ppm	0.075 ppm	Bronchoconstriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma. Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient sulfur dioxide levels. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.	Sulfur dioxide is a colorless, pungent gas. At levels greater than 0.5 ppm, the gas has a strong odor similar to rotten eggs. Sulfur oxides (SO_x) include sulfur dioxide and sulfur trioxide. Sulfuric acid is formed from sulfur dioxide, which can lead to acid deposition and can harm natural resources and materials. Although sulfur dioxide concentrations have been reduced to levels well below State and federal standards, further reductions are desirable because sulfur dioxide is a precursor to sulfate and PM_{10}.	Human caused sources include fossil fuel combustion, mineral ore processing, and chemical manufacturing. Volcanic emissions are a natural source of sulfur dioxide. The gas can also be produced in the air by dimethylsulfide and hydrogen sulfide. Sulfur dioxide is removed from the air by dissolution in water, chemical reactions, and transfer to soils and ice caps. The sulfur dioxide levels in the State are well below the maximum standards.
	3 Hours	—	0.5 ppm			
	24 Hours	0.04 ppm	0.14 (for certain areas)			
	Annual	—	0.030 ppm (for certain areas)			
Particulate matter (PM_{10})	24 Hours	50 µg/m^3	150 µg/m^3	- Short-term exposure (hours/days): irritation of the eyes, nose, throat; coughing; phlegm; chest tightness; shortness of breath; aggravate existing lung disease, causing asthma attacks and acute bronchitis; those with heart disease can suffer heart attacks and arrhythmias. - Long-term exposure: reduced lung function; chronic bronchitis; changes in lung morphology; death.	Suspended particulate matter is a mixture of small particles that consist of dry solid fragments, droplets of water, or solid cores with liquid coatings. The particles vary in shape, size, and composition. PM_{10} refers to particulate matter that is between 2.5 and 10 microns in diameter, (one micron is one-millionth of a meter). $PM_{2.5}$ refers to particulate matter that is 2.5 microns or less in diameter, about one-thirtieth the size of the average human hair.	Stationary sources include fuel or wood combustion for electrical utilities, residential space heating, and industrial processes; construction and demolition; metals, minerals, and petrochemicals; wood products processing; mills and elevators used in agriculture; erosion from tilled lands; waste disposal, and recycling. Mobile or transportation related sources are from vehicle exhaust and road dust. Secondary particles form from reactions in the atmosphere.
	Mean	20 µg/m^3	—			
Particulate matter ($PM_{2.5}$)	24 Hours	—	35 µg/m^3			
	Annual	12 µg/m^3	12.0 µg/m^3			
Visibility-reducing particles	8 Hours	See note below[d]				
Sulfates	24 Hours	25 µg/m^3	—	(a) Decrease in ventilatory function; (b) aggravation of asthmatic symptoms;	The sulfate ion is a polyatomic anion with the empirical formula	Sulfates are particulates formed through the photochemical

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
				(c) aggravation of cardiopulmonary disease; (d) vegetation damage; (e) degradation of visibility; (f) property damage.	SO_4^{2-}. Sulfates occur in combination with metal and/or hydrogen ions. Many sulfates are soluble in water.	oxidation of sulfur dioxide. In California, the main source of sulfur compounds is combustion of gasoline and diesel fuel.
Lead[e]	30-days	1.5 µg/m^3	—	Lead accumulates in bones, soft tissue, and blood and can affect the kidneys, liver, and nervous system. It can cause impairment of blood formation and nerve conduction, behavior disorders, mental retardation, neurological impairment, learning deficiencies, and low IQs.	Lead is a solid heavy metal that can exist in air pollution as an aerosol particle component. Leaded gasoline was used in motor vehicles until around 1970. Lead concentrations have not exceeded State or federal standards at any monitoring station since 1982.	Lead ore crushing, lead ore smelting, and battery manufacturing are currently the largest sources of lead in the atmosphere in the United States. Other sources include dust from soils contaminated with lead-based paint, solid waste disposal, and crustal physical weathering.
	Quarter	—	1.5 µg/m^3			
	Rolling 3-month average	—	0.15 µg/m^3			
Vinyl chloride[e]	24 Hours	0.01 ppm	—	Short-term exposure to high levels of vinyl chloride in the air causes central nervous system effects, such as dizziness, drowsiness, and headaches. Epidemiological studies of occupationally exposed workers have linked vinyl chloride exposure to development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and lung and brain cancers.	Vinyl chloride, or chloroethene, is a chlorinated hydrocarbon and a colorless gas with a mild, sweet odor. In 1990, ARB identified vinyl chloride as a toxic air contaminant and estimated a cancer unit risk factor.	Most vinyl chloride is used to make polyvinyl chloride plastic and vinyl products, including pipes, wire and cable coatings, and packaging materials. It can be formed when plastics containing these substances are left to decompose in solid waste landfills. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites.
Hydrogen sulfide	1 Hour	0.03 ppm	—	High levels of hydrogen sulfide can cause immediate respiratory arrest. It can irritate the eyes and respiratory tract and cause headache, nausea, vomiting, and cough. Long exposure can cause pulmonary edema.	Hydrogen sulfide (H_2S) is a flammable, colorless, poisonous gas that smells like rotten eggs.	Manure, storage tanks, ponds, anaerobic lagoons, and land application sites are the primary sources of hydrogen sulfide. Anthropogenic sources include the combustion of sulfur containing fuels (oil and coal).

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
Volatile organic compounds (VOC)		There are no State or federal standards for VOCs because they are not classified as criteria pollutants.		Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations because of interference with oxygen uptake. In general, concentrations of VOCs are suspected to cause eye, nose, and throat irritation; headaches; loss of coordination; nausea; and damage to the liver, the kidneys, and the central nervous system. Many VOCs have been classified as toxic air contaminants.	ROGs, or VOCs, are defined as any compound of carbon—excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate—that participates in atmospheric photochemical reactions. Although there are slight differences in the definition of ROGs and VOCs, the two terms are often used interchangeably.	Indoor sources of VOCs include paints, solvents, aerosol sprays, cleansers, tobacco smoke, etc. Outdoor sources of VOCs are from combustion and fuel evaporation. A reduction in VOC emissions reduces certain chemical reactions that contribute to the formulation of ozone. VOCs are transformed into organic aerosols in the atmosphere, which contribute to higher PM_{10} and lower visibility.
Benzene		There are no ambient air quality standards for benzene.		Short-term (acute) exposure of high doses from inhalation of benzene may cause dizziness, drowsiness, headaches, eye irritation, skin irritation, and respiratory tract irritation, and at higher levels, loss of consciousness can occur. Long-term (chronic) occupational exposure of high doses has caused blood disorders, leukemia, and lymphatic cancer.	Benzene is VOC. It is a clear or colorless light-yellow, volatile, highly flammable liquid with a gasoline-like odor. The EPA has classified benzene as a "Group A" carcinogen.	Benzene is emitted into the air from fuel evaporation, motor vehicle exhaust, tobacco smoke, and from burning oil and coal. Benzene is used as a solvent for paints, inks, oils, waxes, plastic, and rubber. Benzene occurs naturally in gasoline at one to 2 percent by volume. The primary route of human exposure is through inhalation.
Diesel particulate matter (DPM)		There are no ambient air quality standards for DPM.		Some short-term (acute) effects of DPM exposure include eye, nose, throat, and lung irritation, coughs, headaches, lightheadedness, and nausea. Studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems. Human studies on the carcinogenicity of DPM demonstrate an increased risk of lung cancer, although the increased risk	Diesel PM is a source of $PM_{2.5}$—diesel particles are typically 2.5 microns and smaller. Diesel exhaust is a complex mixture of thousands of particles and gases that is produced when an engine burns diesel fuel. Organic compounds account for 80 percent of the total particulate matter mass, which consists of compounds such as hydrocarbons and their	Diesel exhaust is a major source of ambient particulate matter pollution in urban environments. Typically, the main source of DPM is from combustion of diesel fuel in diesel-powered engines. Such engines are in on-road vehicles such as diesel trucks, off-road construction vehicles, diesel electrical generators, and

Air Pollutant	Averaging Time	California Standard	Federal Standard[a]	Most Relevant Effects from Pollutant Exposure	Properties	Sources
				cannot be clearly attributed to diesel exhaust exposure.	derivatives, and polycyclic aromatic hydrocarbons and their derivatives. Fifteen polycyclic aromatic hydrocarbons are confirmed carcinogens, a number of which are found in diesel exhaust.	various pieces of stationary construction equipment.

Notes:
ppm = parts per million (concentration)
$\mu g/m^3$ = micrograms per cubic meter
Annual = Annual Arithmetic Mean
30-day = 30-day average
Quarter = Calendar quarter

[a] Federal standard refers to the primary National Ambient Air Quality Standard (NAAQS), or the levels of air quality necessary, with an adequate margin of safety, to protect the public health. All standards listed are primary standards except for 3-Hour SO_2, which is a secondary standard. A secondary standard is the level of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[b] To attain the 1-hour nitrogen dioxide national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 parts per billion (0.100 ppm).

[c] On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

[d] Visibility-reducing particles: In 1989, the California Air Resources Board (ARB) converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

[e] The ARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

Sources:
California Air Resources Board (ARB). 2016. Ambient Air Quality Standards. May 4.
California Air Resources Board (ARB). 2022. Vinyl Chloride and Health. Website: https://ww2.arb.ca.gov/resources/vinyl-chloride-and-health. Accessed June 29, 2022.
California Office of Environmental Health Hazard Assessment (OEHHA). 2001. Health Effects of Diesel Exhaust.
National Archives and Records Administration. 2009. Part II, United States Environmental Protection Agency. 40 Code of Federal Regulations Parts 50 and 58, Primary National Ambient Air Quality Standard (NAAQS) for Nitrogen Dioxide; Proposed Rule. July 15.
National Toxicology Program. 2016. Report on Carcinogens, 14th Edition; U.S. Department of Health and Human Services, Public Health Service. Benzene. November 3.
National Toxicology Program. 2016. Report on Carcinogens, 14th Edition; U.S. Department of Health and Human Services, Public Health Service. Diesel Exhaust Particles. November 3.
South Coast Air Quality Management District (South Coast AQMD). 2007. Final 2007 Air Quality Management Plan. June.
United States Environmental Protection Agency (EPA). 2021. Nitrogen Dioxide (NO_2) Pollution. Basic Information about NO_2. Website: https://www.epa.gov/no2-pollution/basic-information-about-no2#What%20is%20NO2. Accessed June 29, 2022.

Several pollutants listed in Table 3.3-5 are not addressed in this analysis. Visibility-reducing particles are not explicitly addressed in this analysis because particulate matter is addressed as PM_{10} and $PM_{2.5}$ and thus evaluated accordingly (see below). In addition, given the nature of the proposed uses, no components of the proposed project would result in vinyl chloride or hydrogen sulfide emissions in any substantial quantity and thus are not addressed further.

Toxic Air Contaminants Health Effects

A toxic air contaminant (TAC) is defined as an air pollutant that may cause or contribute to an increase in mortality or serious illness or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. The California Almanac of Emissions and Air Quality presents the relevant concentration and cancer risk data for the 10 TACs that pose the most substantial health risk in California based on available data. The 10 TACs are acetaldehyde, benzene, 1.3-butadiene, carbon tetrachloride, hexavalent chromium, para-dichlorobenzene, formaldehyde, methylene chloride, perchloroethylene, and diesel particulate matter (DPM).

Some studies indicate that DPM poses the greatest health risk among the TACs listed above. A 10-year research program demonstrated that DPM from diesel-fueled engines is a human carcinogen and that chronic (long-term) inhalation exposure to DPM poses a chronic health risk.[7] In addition to increasing the risk of lung cancer, exposure to diesel exhaust can have other health effects. Diesel exhaust can irritate the eyes, nose, throat, and lungs, and it can cause coughs, headaches, lightheadedness, and nausea. Diesel exhaust is a major source of fine particulate pollution as well, and studies have linked elevated particle levels in the air to increased hospital admissions, emergency room visits, asthma attacks, and premature deaths among those suffering from respiratory problems.

DPM differs from other TACs in that it is not a single substance but a complex mixture of hundreds of substances. Although DPM is emitted by diesel-fueled, internal combustion engines, the composition of the emissions varies depending on engine type, operating conditions, fuel composition, lubricating oil, and whether an emission control system is present. Unlike the other TACs, however, no ambient monitoring data are available for DPM because no routine measurement method currently exists. The ARB has made preliminary concentration estimates based on a DPM exposure method. This method uses the ARB emissions inventory's PM_{10} database, ambient PM_{10} monitoring data, and the results from several studies to estimate concentrations of DPM.

Limited data on levels and health risks attributable to the top 10 TACs listed above is available from the ARB as part of its California Almanac of Emissions and Air Quality—2013 Edition.[8] Risks associated with DPM emissions are only provided for the year 2000 and have not been updated in the Almanac. Although recent editions of the Almanac do not provide estimated risk, they do provide emission inventories for DPM for later years. The 2013 Almanac provides emission inventory

[7] California Air Resources Board (ARB). 1998. Initial Statement of Reasons for Rulemaking, Staff Report, Proposed Identification of Diesel Exhaust as a Toxic Air Contaminant.

[8] California Air Resources Board (ARB). 2013. California Almanac of Emissions and Air Quality—2013 Edition. Website: https://ww2.arb.ca.gov/our-work/programs/resource-center/technical-assistance/air-quality-and-emissions-data/almanac. Accessed June 24, 2022.

trends for DPM from 2000 through 2035. The 2013 Almanac reports that DPM emissions were reduced in the SJVAB from 16 tons per day in 2000 to 11 tons per day in 2010, a 31 percent decrease. DPM emissions in the San Joaquin Valley were projected to decrease to 6 tons per day by 2015, a 62 percent reduction from year 2000 levels. The ARB predicts a reduction to 3 tons per day by 2035, which would represent an 81 percent reduction from year 2000 levels. Continued implementation of the ARB's Diesel Risk Reduction Plan is expected to provide continued reductions in DPM through 2020 and beyond through regulations on this source.[9]

Asbestos

Asbestos is the name given to a number of naturally occurring fibrous silicate minerals that have been mined for their useful properties such as thermal insulation, chemical and thermal stability, and high tensile strength. The three most common types of asbestos are chrysotile, amosite, and crocidolite. Chrysotile, also known as white asbestos, is the most common type of asbestos found in buildings. Chrysotile makes up approximately 90 to 95 percent of all asbestos contained in buildings in the United States.

Exposure to asbestos is a health threat; exposure to asbestos fibers may result in health issues such as lung cancer, mesothelioma (a rare cancer of the thin membranes lining the lungs, chest, and abdominal cavity), and asbestosis (a non-cancerous lung disease that causes scarring of the lungs). Exposure to asbestos can occur during demolition or remodeling of buildings that were constructed prior to the 1977 ban on asbestos for use in buildings. Exposure to naturally occurring asbestos can occur during soil-disturbing activities in areas with deposits present.

Federal

Air pollutants are regulated at the national, state, and air basin or county level; each agency has a different level of regulatory responsibility. The EPA regulates at the national level. The ARB regulates at the State level. The Valley Air District regulates at the air basin level.

The EPA is responsible for national and interstate air pollution issues and policies. The EPA sets national vehicle and stationary source emission standards, oversees approval of all SIPs, provides research and guidance for air pollution programs, and sets the federal standards, or NAAQS, described earlier.

An SIP is a document prepared by each state describing existing air quality conditions and measures that will be followed to attain and maintain federal standards. The SIP for the State of California is administered by the ARB, which has overall responsibility for statewide air quality maintenance and air pollution prevention. California's SIP incorporates individual federal attainment plans for regional air districts—an air district prepares their federal attainment plan, which is sent to ARB to be approved and incorporated into the California SIP. Federal attainment plans include the technical foundation for understanding air quality (e.g., emission inventories and air quality monitoring), control measures and strategies, and enforcement mechanisms. The most recent attainment plans

[9] California Air Resources Board (ARB). 2013. California Almanac of Emissions and Air Quality – 2013 Edition. Website: https://ww2.arb.ca.gov/our-work/programs/resource-center/technical-assistance/air-quality-and-emissions-data/almanac. Accessed June 24, 2022.

for the Valley Air District are the 2007 8-hour Ozone Attainment Plan and the 2012 $PM_{2.5}$ Plan for the 2006 $PM_{2.5}$ standard. The SJVAB is designated as an extreme ozone nonattainment area for the EPA's 2008 8-hour ozone standard of 75 ppb. The EPA Administrator signed the Final Rule revising the 8-hour ozone standard to 70 ppm on October 1, 2015. Adoption of a new standard requires an implementation process that includes making attainment designations and the development of new plans to attain the standard based on each area's designation.

Areas designated nonattainment must develop Air Quality Plans (AQPs) and regulations to achieve standards by specified dates, depending on the severity of the exceedances. For much of the country, implementation of federal motor vehicle standards and compliance with federal permitting requirements for industrial sources are adequate to attain air quality standards on schedule. For many areas of California, however, additional State and local regulation is required to achieve the standards. Regulations adopted by California are described below.

State

California Health and Safety Code Section 39655 and California Code of Regulations Title 17 Section 93000 (Substances Identified as Toxic Air Contaminants)

The ARB identifies substances as TACs as defined in Health and Safety Code Section 39655 and listed in Title 17, Section 93000 of the California Code of Regulations, "Substances Identified as Toxic Air Contaminants." A TAC is defined as an air pollutant that may cause or contribute to an increase in mortality or serious illness, or that may pose a hazard to human health. TACs are usually present in minute quantities in the ambient air; however, their high toxicity or health risk may pose a threat to public health even at low concentrations. In general, for those TACs that may cause cancer, there are thresholds set by regulatory agencies below which adverse health impacts are not expected to occur. This contrasts with the criteria pollutants for which acceptable levels of exposure can be determined and for which the state and federal governments have set AAQS. According to the California Almanac of Emissions and Air Quality, the majority of the estimated health risk from TACs for the State of California can be attributed to relatively few compounds, the most important of which is DPM from diesel-fueled engines.

California Low Emission Vehicle Program

The ARB first adopted Low Emission Vehicle (LEV) program standards in 1990. These first LEV standards ran from 1994 through 2003. LEV II regulations, running from 2004 through 2010, represent continuing progress in emission reductions. As the State's passenger vehicle fleet continues to grow and more sport utility vehicles and pickup trucks are used as passenger cars rather than work vehicles, the more stringent LEV II standards were adopted to provide reductions necessary for California to meet federally mandated clean air goals outlined in the 1994 SIP. In 2012, the ARB adopted the LEV III amendments to California's LEV regulations. These amendments, also known as the Advanced Clean Car Program, include more stringent emission standards for model years 2017 through 2025 for both criteria pollutants and greenhouse gas (GHG) emissions for new passenger vehicles.[10]

[10] California Air Resources Board (ARB). 2013. Advanced Clean Car Program. Website: https://ww3.arb.ca.gov/cc/ccms/documents/ab1493.pdf?bay. Accessed June 24, 2022.

California On-Road Heavy-Duty Vehicle Program

The ARB has adopted standards for emissions from various types of new on-road heavy-duty vehicles. Section 1956.8, Title 13, California Code of Regulations contains California's emission standards for on-road heavy-duty engines and vehicles, and test procedures. The ARB has also adopted programs to reduce emissions from in-use heavy-duty vehicles including the Heavy-Duty Diesel Vehicle Idling Reduction Program, the Heavy-Duty Diesel In-Use Compliance Program, the Public Bus Fleet Rule and Engine Standards, the School Bus Program, and others.[11]

California In-Use Off-Road Diesel Vehicle Regulation

On July 26, 2007, the ARB adopted a regulation to reduce DPM and NO_X emissions from in-use (existing) off-road heavy-duty diesel vehicles in California. Such vehicles are used in construction, mining, and industrial operations. The regulation limits idling to no more than five consecutive minutes, requires reporting and labeling, and requires disclosure of the regulation upon vehicle sale. The ARB is enforcing that part of the rule with fines up to $10,000 per day for each vehicle in violation. Performance requirements of the rule are based on a fleet's average NO_X emissions, which can be met by replacing older vehicles with newer, cleaner vehicles or by applying exhaust retrofits. The regulation was amended in 2010 to delay the original timeline of the performance requirements, making the first compliance deadline January 1, 2014, for large fleets (over 5,000 horsepower), 2017 for medium fleets (2,501-5,000 horsepower), and 2019 for small fleets (2,500 horsepower or less).

The latest amendments to the Truck and Bus regulation became effective on December 31, 2014. The amended regulation requires diesel trucks and buses that operate in California to be upgraded to reduce emissions. Newer heavier trucks and buses were required to meet PM filter requirements beginning January 1, 2012, while lighter and older heavier trucks required replacement starting January 1, 2015. By January 1, 2023, nearly all trucks and buses will need to have 2010 model year engines or equivalent.

The regulation applies to nearly all privately and federally owned diesel-fueled trucks and buses and to privately and publicly owned school buses with a gross vehicle weight rating greater than 14,000 pounds. The regulation provides a variety of flexibility options tailored to fleets operating low-use vehicles, fleets operating in selected vocations like agricultural and construction, and small fleets of three or fewer trucks.[12]

California Airborne Toxic Control Measures for Asbestos

In July 2001, the ARB approved Airborne Toxic Control Measures (ATCM) for construction, grading, quarrying and surface mining operations to minimize emissions of naturally occurring asbestos. The regulation requires application of Best Management Practices (BMPs) to control fugitive dust in areas known to have naturally occurring asbestos and requires notification to the local air district prior to commencement of ground-disturbing activities. The measure establishes specific testing, notification, and engineering controls prior to grading, quarrying, or surface mining in construction

[11] California Air Resources Board (ARB). 2013. The California Almanac of Air Quality and Emissions—2013 Edition. Website: http://www.arb.ca.gov/aqd/almanac/almanac13/almanac13.htm. Accessed June 24, 2022.

[12] California Air Resources Board (ARB). 2015. Truck and Bus Regulation. Website: http://ww2.arb.ca.gov/our-work/programs/truck-and-bus-regulation. Accessed June 24, 2022.

zones where naturally occurring asbestos is located on projects of any size. There are additional notification and engineering controls at work sites larger than one acre in size. These projects require the submittal of a "Dust Mitigation Plan" and approval by the air district prior to the start of a project.

Construction sometimes requires the demolition of existing buildings where construction occurs. Asbestos is also found in a natural state, known as naturally occurring asbestos. Exposure and disturbance of rock and soil that naturally contain asbestos can result in the release of fibers into the air and consequent exposure to the public. Asbestos most commonly occurs in ultramafic rock that has undergone partial or complete alteration to serpentine rock (serpentinite) and often contains chrysotile asbestos. In addition, another form of asbestos, tremolite, can be found associated with ultramafic rock, particularly near faults. Sources of asbestos emissions include unpaved roads or driveways surfaced with ultramafic rock, construction activities in ultramafic rock deposits, or rock quarrying activities where ultramafic rock is present. Review of the Department of Conservation maps indicates that no ultramafic rock has been found near the proposed project site or in the City of Fresno.

Diesel Risk Reduction Plan

The ARB Diesel Risk Reduction Plan led to the adoption of new State regulatory standards for all new on-road, off-road, and stationary diesel-fueled engines and vehicles to reduce DPM emissions in 2020 by about 90 percent overall from year 2000 levels. The projected emission benefits associated with the full implementation of this plan, including federal measures, were reductions in DPM emissions and associated cancer risks of 75 percent by 2010 and 85 percent by 2020.[13]

Tanner Air Toxics Act and Air Toxics Hot Spots Information and Assessment Act

TACs in California are primarily regulated through the Tanner Air Toxics Act (Assembly Bill [AB] 1807) and the Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588), also known as the Hot Spots Act. To date, the ARB has identified more than 21 TACs, and has adopted the EPA's list of Hazardous Air Pollutants (HAPs) as TACs.

Carl Moyer Memorial Air Quality Standards Attainment Program

The Carl Moyer Memorial Air Quality Standards Attainment Program (Carl Moyer Program), a partnership between the ARB and local air districts, issues grants to replace or retrofit older engines and equipment with engines and equipment that exceed current regulatory requirements to reduce air pollution. Money collected through the Carl Moyer Program complements California's regulatory program by providing incentives to effect early or extra emission reductions, especially from emission sources in environmental justice communities and areas disproportionately affected by air pollution. The program has established guidelines and criteria for the funding of emissions reduction projects. Within the SJVAB, the Valley Air District administers the Carl Moyer Program. The program has established guidelines and criteria for the funding of emissions reduction projects and has

[13] California Air Resources Board (ARB). 2000. Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-fueled Engines and Vehicles.

established cost-effectiveness criteria for funding emission reductions projects, which under the final 2017 Carl Moyer Program Guidelines are $30,000 per weighted ton of NO_X, ROG, and PM.[14]

Regional

San Joaquin Valley Air Pollution Control District

The primary role of the Valley Air District is to develop plans and implement control measures in the SJVAB to control air pollution. These controls primarily affect stationary sources such as industry and power plants. Rules and regulations have been developed by the Valley Air District to control air pollution from a wide range of air pollution sources. The Valley Air District also provides uniform procedures for assessing potential air quality impacts of proposed projects and for preparing the air quality section of environmental documents.[15]

The following Valley Air District rules and regulations are relevant to this analysis:

Rule 2010–Permits Required. Rule 2010 requires operators of emission sources to obtain an authority to construct and permit to operate from the Valley Air District.

Rule 2201–New and Modified Stationary Source Review. This rule applies to any stationary/industrial equipment that emits regulated pollutants in amounts specified by the rule. Rule 2201 requires stationary source projects that exceed certain thresholds to install Best Available Control Technology (BACT) and to obtain emission offsets to ensure that growth in stationary sources on a cumulative basis will not result in an increase in emissions.

Rule 4002–National Emissions Standards for Hazardous Air Pollutants. The purpose of the rule is to incorporate the National Emission Standards for Hazardous Air Pollutants from Part 61, Chapter I, Subchapter C, Title 40, Code of Federal Regulations and the National Emission Standards for Hazardous Air Pollutants for Source Categories from Part 63, Chapter I, Subchapter C, Title 40, Code of Federal Regulations to protect the health and safety of the public from hazardous air pollutants such as asbestos.

Rule 4102–Nuisance. The purpose of this rule is to protect the health and safety of the public and applies to any source operation that emits or may emit air contaminants or other materials.

Rule 4601–Architectural Coatings. The purpose of this rule is to limit volatile organic compounds (VOC) emissions from architectural coatings. Emissions are reduced by limits on VOC content and providing requirements on coatings storage, cleanup, and labeling.

Rule 4641–Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations. The purpose of this rule is to limit VOC emissions from asphalt paving and maintenance operations. If asphalt paving will be used, then the paving operations will be subject to Rule 4641.

[14] California Air Resources Board (ARB). 2017. 2017 Carl Moyer Program Guidelines. April.
[15] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impact.

Rule 4692–Commercial Charbroiling. The purpose of this rule is to limit VOC and PM-10 emissions from commercial charbroiling. New and existing businesses with charbroiling equipment are subject to this rule.

Rule 4901–Wood-Burning Fireplaces and Wood-Burning Heaters. The purposes of this rule are to limit emissions of carbon monoxide and particulate matter from wood-burning fireplaces, wood-burning heaters, and outdoor wood-burning devices, and to establish a public education program to reduce wood-burning emissions. All development that includes wood-burning devices are subject to this rule.

Regulation VIII–Fugitive PM_{10} Prohibitions. Rules 8011-8081 are designed to reduce PM_{10} emissions (predominantly dust/dirt) generated by human activity, including construction and demolition activities, road construction, bulk materials storage, paved and unpaved roads, carryout and trackout, etc. All development projects that involve soil disturbance are subject to at least one provision of the Regulation VIII series of rules.

Rule 9410–Employer Based Trip Reduction. The purpose of this rule is reduce VMT from private vehicles used by employees to commute to and from their worksites to reduce emissions of NO_X, VOC and PM. The rule would require larger employers (those with 100 or more eligible employees) to establish employee trip reduction programs to reduce VMT, reducing emissions associated with work commutes. The rule uses a menu-based Employer Trip Reduction Implementation Plan and periodic reporting requirements to evaluate performance on a phased-in compliance schedule.

Rule 9510–Indirect Source Review. This rule reduces the impact of NO_X and PM_{10} emissions from growth within the SJVAB. The rule places application and emission reduction requirements on development projects meeting applicability criteria in order to reduce emissions through on-site mitigation, off-site District-administered projects, or a combination of the two.

In addition to establishing control measures, the EPA requires states that have areas that do not meet the NAAQS to prepare and submit AQPs showing how the NAAQS will be met. If a state cannot show how the NAAQS will be met, then the state must show progress toward meeting the NAAQS in the SIP. The *2016 State Strategy for the State Implementation Plan* was adopted by ARB in March 2017,[16] and the State is currently in the process of developing the *2022 State SIP Strategy.*[17] In addition, ARB requires regions that do not meet CAAQS for ozone to submit AQPs that describe measures to attain the standard or show progress toward attainment. The following describes the air plans prepared by the Valley Air District which are incorporated by reference per California Environmental Quality Act (CEQA) Guidelines Section 15150.

Ozone Plans

The SJVAB is designated nonattainment of State and federal health-based air quality standards for ozone. Although the EPA revoked its 1979 1-hour ozone standard in June 2005, many planning

[16] California Air Resources Board (ARB). 2022. Implementation of the State SIP Strategy. Website: https://ww2.arb.ca.gov/resources/documents/implementation-state-sip-strategy. Accessed June 29, 2022.

[17] California Air Resources Board (ARB). 2022. 2022 State Strategy for the State Implementation Plan (2022 State SIP Strategy). Website: https://ww2.arb.ca.gov/resources/documents/2022-state-strategy-state-implementation-plan-2022-state-sip-strategy. Accessed June 29, 2022.

requirements remain in place and the Valley Air District must still attain this standard before it can rescind CAA Section 185 fees. The Valley Air District's most recent 1-hour ozone plan, the 2013 Plan for the Revoked 1-hour Ozone Standard, demonstrated attainment of the 1-hour ozone standard by 2017. However, on July 18, 2016, the EPA published in the Federal Register a final action determining that SJVAB has attained the 1-hour ozone NAAQS based on the 2012 to 2014 3-year period, allowing nonattainment penalties to be lifted under federal CAA Section 179b.[18]

The EPA originally classified the SJVAB as serious nonattainment for the 1997 federal 8-hour ozone standard with an attainment date of 2013. On April 30, 2007, the Valley Air District's Governing Board adopted the 2007 Ozone Plan, which contained analysis showing a 2013 attainment target to be infeasible. The 2007 Ozone Plan details the plan for achieving attainment on schedule with an "extreme nonattainment" deadline of 2024. At its adoption of the 2007 Ozone Plan, the Valley Air District also requested a reclassification to extreme nonattainment. ARB approved the plan in June 2007, and the EPA approved the request for reclassification to extreme nonattainment on April 15, 2010. The SJVAB is designated as an extreme ozone nonattainment area for the EPA's 2008 8-hour ozone standard of 75 ppb. The plan to address this standard was developed for the region to attain EPA's 2008 8-hour ozone standard by December 31, 2031. The District is currently in the process of developing a new attainment plan for the recently strengthened 2015 Ozone NAAQS of 70 ppb, with submittal required to EPA by August 2022.[19]

State ozone standards do not have an attainment deadline but require implementation of all feasible measures to achieve attainment at the earliest date possible. This is achieved through compliance with the federal deadlines and control measure requirements.

PM_{10} Plan

Based on PM_{10} measurements from 2003 to 2006, EPA found that the SJVAB has reached federal PM_{10} standards. On September 21, 2007, the Valley Air District's Governing Board adopted the 2007 PM_{10} Maintenance Plan and Request for Redesignation. This plan demonstrates that the valley will continue to meet the PM_{10} standard. EPA approved the document and on September 25, 2008, the SJVAB was redesignated to attainment/maintenance.[20]

$PM_{2.5}$ Plan

The Valley Air District adopted the 2012 $PM_{2.5}$ Plan on December 20, 2012. This plan was approved by ARB on January 24, 2013. This plan will assure that the SJVAB will attain the 2006 $PM_{2.5}$ National AAQS. The plan uses control measures to reduce NO_X, which also leads to fine particulate formation in the atmosphere. The plan incorporates measures to reduce direct emissions of $PM_{2.5}$, including a strengthening of regulations for various SJVAB industries and the general public through new rules and amendments. On August 19, 2021, the District's Governing Board approved the *Attainment Plan*

[18] San Joaquin Valley Air Pollution Control District (Valley Air District). 2022. Ozone Plans. Website: http://valleyair.org/Air_Quality_Plans/Ozone_Plans.htm. Accessed June 29, 2022.
[19] Ibid.
[20] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impact.

Revision for the 1997 Annual $PM_{2.5}$ Standard to establish a new attainment target for the 1997 annual $PM_{2.5}$ standard of 2023.[21]

On June 30, 2020, EPA approved portions of the *2018 Plan for the 1997, 2006, and 2012 $PM_{2.5}$ Standards* and the *San Joaquin Valley Supplement to the 2016 State Strategy for the State Implementation Plan* related to the 2006 24-hour $PM_{2.5}$ National AAQS of 35 µg/m³. Additionally, EPA granted an extension of the serious area attainment date for the 2006 $PM_{2.5}$ NAAQS from December 31, 2019, to December 31, 2024. Federal review of portions of the plan that pertain to the other $PM_{2.5}$ standards is ongoing.[22]

Fresno Council of Governments

Fresno Council of Governments (Fresno COG) is responsible for regional transportation planning in Fresno County and participates in developing mobile source emission inventories used in air quality attainment plans.

Regional Transportation Plans/Sustainable Communities Strategy

Regional Transportation Plans (RTPs) address the mobility needed to keep the Fresno region moving and connected. Fresno COG 2018-2042 RTP charts the long-range vision of regional transportation in Fresno County through the year 2042. The RTP identifies existing and future transportation related needs while considering all modes of travel, analyzing alternative solutions, and identifying what can be completed with anticipated available funding for the projects and programs included within it. Senate Bill (SB) 375, which went into effect in 2009, added statutes to the California Government Code to encourage planning practices that create sustainable communities. It calls for each metropolitan planning organization to prepare a Sustainable Communities Strategy (SCS) as an integrated element of the RTP that is to be updated every 4 years. The SCS is intended to show how integrated land use and transportation planning can lead to lower greenhouse gas (GHG) emissions from autos and light trucks in support of ARB's GHG emission reduction targets.[23] At the time of this writing, the draft Fresno COG 2022-2046 RTP/SCS has not been adopted and so was not considered as a part of this analysis.

Transportation Conformity

Fresno COG must ensure that transportation plans and projects comply with federal transportation conformity. Transportation conformity is a way to ensure that federal funding and approval are given to those transportation activities that are consistent with air quality goals. It ensures that these transportation activities do not worsen air quality or interfere with the "purpose" of the SIP, which is to meet the NAAQS. Meeting the NAAQS often requires emissions reductions from mobile sources.

According to the CAA, transportation plans, programs, and projects cannot:

- Create new NAAQS violations;
- Increase the frequency or severity of existing NAAQS violations; or
- Delay attainment of the NAAQS.

[21] San Joaquin Valley Air Pollution Control District (Valley Air District). 2022. 2018 $PM_{2.5}$ Plan for the San Joaquin Valley.
[22] Ibid.
[23] Fresno Council of Governments (Fresno COG). 2022. Regional Transportation Plan, Chapter 1.

In practice, AQPs include criteria pollutant emission budgets required for attainment of air quality standards by mandated deadlines. The budgets must not be exceeded considering projected growth in mobile source activity. Emissions from projected growth must not exceed the budgets in any year.

California Environmental Quality Act

The Valley Air District provides guidance and thresholds for (CEQA) air quality and GHG analyses. The result of this guidance, as well as State regulations to control air pollution, is an overall improvement in the SJVAB. In particular, the Valley Air District's 2015 GAMAQI states the following:

> The District's Air Quality Attainment Plans include measures to promote air quality elements in county and city general plans as one of the primary indirect source programs. The general plan is the primary long range planning document used by cities and counties to direct development. Since air districts have no authority over land use decisions, it is up to cities and counties to ensure that their general plans help achieve air quality goals. Section 65302.1 of the California Government Code requires cities and counties in the San Joaquin Valley to amend appropriate elements of their general plans to include data, analysis, comprehensive goals, policies, and feasible implementation strategies to improve air quality in their next housing element revisions.
>
> The Air Quality Guidelines for General Plans (AQGGP), adopted by the District in 1994 and amended in 2005, is a guidance document containing goals and policy examples that cities and counties may want to incorporate into their General Plans to satisfy Section 65302.1. When adopted in a general plan and implemented, the suggestions in the AQGGP can reduce vehicle trips and miles traveled and improve air quality. The specific suggestions in the AQGGP are voluntary. The District strongly encourages cities and counties to use their land use and transportation planning authority to help achieve air quality goals by adopting the suggested policies and programs.[24]

Local

City of Fresno General Plan

The City of Fresno General Plan was adopted in 2014. The General Plan contains the following elements, objectives, and policies that relate to air quality:

Urban Form, Land Use, and Design Element

Policy UF-1-c **Identifiable City Structure.** Focus integrated and ongoing planning efforts to achieve an identifiable City structure, comprised of a concentration of buildings, people, and pedestrian-oriented activity in Downtown; along a small number of prominent east-west and north-south transit-oriented, mixed-use corridors with distinctive and strategically located Activity Centers; and in existing and new neighborhoods augmented with parks and connected by multi-purpose trails and tree lined bike lanes and streets.

[24] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impact.

Objective UF-12 Locate roughly one-half of future residential development in infill areas – defined as being within the City on December 31, 2012 – including the Downtown core area and surrounding neighborhoods, mixed-use centers and transit-oriented development along major BRT corridors, and other non-corridor infill areas, and vacant land.

Policy UF-12-a **BRT Corridors.** Design land uses and integrate development site plans along BRT corridors, with transit-oriented development that supports transit ridership and convenient pedestrian access to bus stops and BRT station stops.

Policy UF-12-b **Activity Centers.** Mixed-use designated areas along BRT and/or transit corridors are appropriate for more intensive concentrations of urban uses. Typical uses could include commercial areas; employment centers; schools; compact residential development; religious institutions; parks; and other gathering points where residents may interact, work, and obtain goods and services in the same place.

Policy UF-12-d **Appropriate Mixed-Use.** Facilitate the development of vertical and horizontal mixed-uses to blend residential, commercial, and public land uses on one site or adjacent sites. Ensure land use compatibility between mixed-use districts in Activity Centers and the surrounding residential neighborhoods.

Policy UF-12e **Access to Activity Centers.** Promote adoptions and implementation of standards supporting pedestrian activities and bicycle linkages from surrounding land uses and neighborhoods into Activity Centers and to transit stops. Provide for priority transit routes and facilities to serve the Activity Centers.

Policy UF-12-f **Mixed-Use in Activity Centers.** Update the Development Code to include use regulations and standards to allow for mixed-uses and shared parking facilities, including multi-story and underground parking facilities, within Activity Centers.

Objective UF-14 Create an urban form that facilitates multi-modal connectivity.

Policy UF-14-a **Design Guidelines for Walkability.** Develop and use design guidelines and standards for a walkable and pedestrian-scaled environment with a network of streets and connections for pedestrians and bicyclists, as well as transit and autos.

Policy UF-14-b **Local Street Connectivity.** Design local roadways to connect throughout neighborhoods and large private developments with adjacent major streets and pathways of existing adjacent development. Create access for pedestrians and bicycles where a local street must dead end or be designed as a cul-de-sac to adjoining uses that provide services, shopping, and connecting pathways for access to the greater community area.

Objective LU-2 Plan for infill development that includes a range of housing types, building forms, and land uses to meet the needs of both current and future residents.

Policy LU-2-a **Infill Development and Redevelopment.** Promote development of vacant, underdeveloped, and re-developable land uses within the City Limit where urban services are available considering the establishment and implementation of supportive regulations and programs.

Policy LU-2-b **Infill Development for Affordable Housing.** Consider a priority infill incentive program for residential infill development of existing vacant lots and underutilized sites within the City as a strategy to help to meet the affordable housing needs of the community.

Policy LU-3-c **Zoning for High Density on Major BRT Corridors.** Consider the adoption of supportive zoning regulations for compact development along BRT corridors leading to the Downtown Core that will not diminish the long-term growth and development potential for Downtown.

Policy LU-5-f **High Density Residential Uses.** Promote high-density residential uses to support Activity Centers and BRT Corridors, affordable housing and walkable access to transit stops.

Policy LU-6-d **Neighborhood and Community Commercial Center Design.** Plan for neighborhood mixed use and community commercial uses to implement the Urban Form concepts of the General Plan, promote the stability and identity of neighborhood and community shopping areas, and allow efficient access without compromising the operational effectiveness of the street system. Neighborhoods will be anchored by community commercial centers with a mix of uses that meet the area's needs and create a sense of place. Community commercial centers will be located within Activity Centers.

Policy LU-6-f **Auto-Oriented Commercial Uses.** Direct highway-oriented and auto-serving commercial uses to locations that are compatible with the Urban Form policies of the General Plan. Ensure adequate buffering measures for adjacent residential uses noise, glare, odors, and dust.

Policy LU-8-b **Access to Public Facilities.** Ensure that major public facilities and institutions have adequate multi-modal access and can be easily reached by public transit.

Resource Conservation and Resiliency Element

Objective RC-4 In cooperation with other jurisdictions and agencies in the San Joaquin Valley Air Basin, take necessary actions to achieve and maintain compliance with State and federal air quality standards for criteria pollutants.

Policy RC-4-a **Support Regional Efforts.** Support and lead, where appropriate, regional, State and federal programs and actions for the improvement of air quality, especially the SJVAPCD's efforts to monitor and control air pollutants from both stationary and

mobile sources and implement Reasonably Available Control Measures in the Ozone Attainment Plan.

Policy RC-4-b **Conditions of Approval.** Develop and incorporate air quality maintenance requirements, compatible with Air Quality Attainment and Maintenance Plans, as conditions of approval for General Plan amendments, community plans, Specific Plans, neighborhood plans, Concept Plans, and development proposals.

Policy RC-4-c **Evaluate Impacts with Models.** Continue to require the use of computer models used by SJVAPCD to evaluate the air quality impacts of plans and projects that require such environmental review by the City.

Policy RC-4-d **Forward Information.** Forward information regarding proposed General Plan amendments, community plans, Specific Plans, neighborhood plans, Concept Plans, and development proposals that require air quality evaluation, and amendments to development regulations to the SJVAPCD for their review of potential air quality and health impacts.

Policy RC-4-e **Support Employer-Based Efforts.** Support and promote employer implementation of staggered work hours and employee incentives to use carpools, public transit and other measures to reduce vehicular use and traffic congestion.

Policy RC-4-f **Municipal Operations and Fleet Actions.** Continue to control and reduce air pollution emissions from vehicles owned by the City operations and municipal operations and facilities by undertaking the following:

- Expand the use of alternative fuel, electric, and hybrid vehicles in City fleets.
- Create preventive maintenance schedules that will ensure efficient engine operation.
- Include air conditioning recycling and charging stations in the City vehicle maintenance facilities, to reduce freon gases being released into the atmosphere and electrostatic filtering systems in City maintenance shops, when feasible or when required by health regulations.
- Use satellite corporation yards for decentralized storage and vehicle maintenance.
- Convert City-owned emergency backup generators to natural gas fuels whenever possible, and
- Create an advanced energy storage system.

Policy RC-4-j **All Departments.** Continue to develop and implement in all City departments, operational policies to reduce air pollution.

Policy RC-4-k **Electric Charging.** Develop standards to facilitate electric charging infrastructure in both new and existing public and private buildings, in order to accommodate these vehicles as the technology becomes widespread.

Policy RC-8-j **Alternative Fuel Network.** Support the development of a network of integrated charging and alternate fuel station for both public and private vehicles, and if feasible, open up municipal stations to the public as part of network development.

Healthy Communities Element

Policy HC-3-d **Green Standards for Affordable Housing.** Provide appropriate incentives for affordable housing providers, agencies, non-profit and market rate developers to use LEED® and CalGreen Tier 1 or Tier 2 standards or third party equivalents.

Policy HC-3-f **New Drive-Through Facilities.** Include in the Development Code design review to reduce vehicle emissions resulting from queued idling vehicles at drive-through facilities in proximity to residential neighborhoods.

Mobility and Transportation Element

Objective MT-3 Identify, promote and preserve scenic or aesthetically unique corridors by application of appropriate policies and regulations.

Policy MT-1-f **Match Travel Demand with Transportation Facilities.** Designate the types and intensities of land uses at locations such that related travel demands can be accommodated by a variety of viable transportation modes and support Complete Neighborhoods while avoiding the rerouting of excessive or incompatible traffic through local residential streets.

Policy MT-1-g **Complete Streets Concept Implementation.** Provide transportation facilities based upon a Complete Streets concept that facilitates the balanced use of all viable travel modes (pedestrians, bicyclists, motor vehicle and transit users), meeting the transportation needs of all ages, income groups, and abilities and providing mobility for a variety of trip purposes, while also supporting other City goals.

Policy MT-2-b **Reduce Vehicle Miles Traveled and Trips.** Partner with major employers and other responsible agencies, such the San Joaquin Valley Air Pollution Control District and the Fresno Council of Governments, to implement trip reduction strategies, such as eTRIP, to reduce total vehicle miles traveled and the total number of daily and peak-hour vehicle trips, thereby making better use of the existing transportation system.

Policy MT-2-c **Reduce VMT through Infill Development.** Provide incentives for infill development that would provide jobs and services closer to housing and multimodal transportations corridors in order to reduce citywide Vehicle Miles Traveled (VMT).

Policy MT-2-g **Transportation Demand Management and Transportation System Management.** Pursue implementation of Transportation Demand Management and Transportation System Management strategies to reduce peak-hour vehicle traffic and supplement the capacity of the transportation system.

Policy MT-2-m **Use VMT Analysis for CEQA**. Use Vehicle Miles Traveled (VMT) as the criteria for evaluating transportation impacts under the California Environmental Quality Act (CEQA) pursuant to Senate Bill 743. Level of Service (LOS) may still be used for planning purposes and implementation of Capital Improvement Projects, however VMT shall be used for determining mitigation under CEQA beginning in July of 2020.**Objective MT-4** To establish and maintain a continuous, safe, and easily accessible bikeways system throughout the metropolitan area to reduce vehicle use, improve air quality and the quality of life, and provide public health benefits.

Policy MT-4-b **Bikeway Improvements.** Establish and implement property development standards to assure that projects adjacent to designated bikeways provide adequate right-of-way and that necessary improvements are constructed to implement the planned bikeway system shown on Figure MT-2 to provide for bikeways, to the extent feasible, when existing roadways are reconstructed; and alternative bikeway alignments or routes where inadequate right-of-way is available.

Policy MT-4-d **Prioritization of Bikeway Improvements.** Prioritize bikeway components that link existing separated sections of the system, or that are likely to serve the highest concentration of existing or potential cyclists, particularly in those neighborhoods with low vehicle ownership rates, or that are likely to serve destination areas with the highest demand such as schools, shopping areas, recreational and park areas, and employment centers.

Policy MT-5-a **Sidewalk Development.** Pursue funding and implement standards for development of sidewalks on public streets, with priority given to meeting the needs of persons with physical and vision limitations; providing safe routes to school; completing pedestrian improvements in established neighborhoods with lower vehicle ownership rates; or providing pedestrian access to public transportation routes.

Policy MT-5-b **Sidewalk Requirements.** Assure adequate access for pedestrians and people with disabilities in new residential developments per adopted City policies, consistent with the California Building Code and the Americans with Disabilities Act.

Policy MT-8-c **New Development Facilitating Transit.** Continue to review development proposals in transportation corridors to ensure they are designed to facilitate transit. Coordinate all projects that have residential or employment densities suitable for transit services, so they are located along existing or planned transit corridors or that otherwise have the potential for transit orientation to FAX and consider FAX's comments in decision-making.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan Programmatic Environmental Impact Report (PEIR) contains the following mitigation measures that are applicable to the proposed project.[25]

MM AIR-2.1 Prior to future discretionary project approval, development project applicants shall prepare and submit to the Director of the City Planning and Development Department, or designee, a technical assessment evaluating potential project construction phase-related air quality impacts. The evaluation shall be prepared in conformance with SJVAPCD methodology for assessing construction impacts. If construction-related air pollutants are determined to have the potential to exceed the SJVAPCD adopted threshold of significance, the Planning and Development Department shall require that applicants for new development projects incorporate mitigation measures into construction plans to reduce air pollutant emissions during construction activities. The identified measures shall be included as part of the Project Conditions of Approval. Possible mitigation measures to reduce construction emissions include but are not limited to:

- Install temporary construction power supply meters on-site and use these to provide power to electric power tools whenever feasible. If temporary electric power is available on-site, forbid the use of portable gasoline- or diesel-fueled electric generators.
- Use of diesel oxidation catalysts and/or catalyzed diesel particulate traps on diesel equipment as feasible.
- Maintain equipment according to manufacturers' specifications.
- Restrict idling of equipment and trucks to a maximum of 5 minutes (per California Air Resources Board regulation).
- Phase grading operations to reduce disturbed areas and times of exposure.
- Avoid excavation and grading during wet weather.
- Limit on-site construction routes and stabilize construction entrance(s).
- Remove existing vegetation only when absolutely necessary.
- Sweep up spilled dry materials (e.g., cement, mortar, or dirt track-out) immediately. Never attempt to wash them away with water. Use only minimal water for dust control.
- Store stockpiled materials and wastes under a temporary roof or secured plastic sheeting or tarp.

MM AIR-2.2 Prior to future discretionary project approval, development project applicants shall prepare and submit to the Director of the City Planning and Development Department, or designee, a technical assessment evaluating potential project operation-related air quality impacts. The evaluation shall be prepared in conformance with SJVAPCD methodology in assessing air quality impacts. If operation-related air pollutants are determined to have the potential to exceed the SJVAPCD adopted thresholds of significance, the Planning and Development

[25] City of Fresno. 2021. Fresno General Plan Recirculated Public Review Draft Program Environmental Impact Report.

Department shall require that applicants for new development projects incorporate mitigation measures to reduce air pollutant emissions during operational activities. The identified measures shall be included as part of the Project Conditions of Approval. Possible mitigation measures to reduce long-term emissions include but are not limited to:

- For site-specific development that requires refrigerated vehicles, the construction documents shall demonstrate an adequate number of electrical service connections at loading docks for plugging in the anticipated number of refrigerated trailers to reduce idling time and emissions.
- Applicants for manufacturing and light industrial uses shall consider energy storage (i.e., battery) and combined heat and power (CHP, also known as cogeneration) in appropriate applications to optimize renewable energy generation systems and avoid peak energy use.
- Site-specific developments with truck delivery and loading areas and truck parking spaces shall include signage as a reminder to limit idling of vehicles while parked for loading/unloading in accordance with ARB Rule 2845 (13 California Code of Regulations Chapter 10, Section 2485).
- Require that 240-volt electrical outlets or Level 3 chargers be installed in parking lots that would enable charging of neighborhood electric vehicles (NEVs) and/or battery powered vehicles.
- Maximize use of solar energy including solar panels; installing the maximum possible number of solar energy arrays on building roofs throughout the City to generate solar energy.
- Maximize the planting of trees in landscaping and parking lots.
- Use light-colored paving and roofing materials.
- Require use of electric or alternatively fueled street-sweepers with HEPA filters.
- Require use of electric lawn mowers and leaf blowers.
- Utilize only Energy Star heating, cooling, and lighting devices and appliances.
- Use of water-based or low volatile organic compound (VOC) cleaning products.

MM AIR-3.1 Prior to future discretionary approval for projects that require environmental evaluation under CEQA, the City of Fresno shall evaluate new development proposals for new industrial or warehousing land uses that: (1) have the potential to generate 100 or more truck trips per day or have 40 or more trucks with operating diesel-powered transport refrigeration units, and (2) are within 1,000 feet of a sensitive land use (e.g., residential, schools, hospitals, or nursing homes), as measured from the property line of the proposed project to the property line of the nearest sensitive use. Such projects shall submit a Health Risk Assessment (HRA) to the City Planning and Development Department. The HRA shall be prepared in accordance with policies and procedures of the most current State Office of Environmental Health Hazard Assessment (OEHHA) and the SJVAPCD. If the HRA shows that the incremental health risks exceed their respective thresholds, as established by the SJVAPCD at the time a project is considered, the Applicant will be

required to identify and demonstrate that Best Available Control Technologies for toxics (T-BACTs), including appropriate enforcement mechanisms to reduce risks to an acceptable level. T-BACTs may include, but are not limited to:

- Restricting idling on-site or electrifying warehousing docks to reduce diesel particulate matter;
- Requiring use of newer equipment and/or vehicles;
- Provide charging infrastructure for: electric forklifts, electric yard trucks, local drayage trucks, last mile delivery trucks, electric and fuel-cell heavy-duty trucks; and/or
- Install solar panels, zero-emission backup electricity generators, and energy storage to minimize emissions associated with electricity generation at the project site.

T-BACTs identified in the HRA shall be identified as mitigation measures in the environmental document and/or incorporated into the site plan.

The City will, in addition to noticing procedures in the Development Code, notice all residents within 1,000 feet of a proposed warehouse project before any discretionary project approval, and consider "Warehouse Projects: Best Practices and Mitigation Measures to comply with the California Environmental Quality Act" published in March 2021 by Xavier Becerra, Attorney General State of California before any discretionary approval of a specific warehouse project where applicable.

MM AIR-3.2 Locate sensitive land uses (e.g., residences, schools, and daycare centers) to avoid incompatibilities with recommended buffer distances identified in the most current version of the ARB Air Quality and Land Use Handbook: A Community Health Perspective (ARB Handbook). Sensitive land uses that are within the recommended buffer distances listed in the ARB Handbook shall provide enhanced filtration units or submit a Health Risk Assessment (HRA) to the City. If the HRA shows that the project would exceed the applicable SJVAPCD thresholds, mitigation measures capable of reducing potential impacts to an acceptable level must be identified and approved by the City.

MM AIR-4.1 Require developers of projects with the potential to generate significant odor impacts as determined through review of SJVAPCD odor complaint history for similar facilities and consultation with the SJVAPCD, to prepare an odor impact assessment and to implement odor control measures recommended by the SJVAPCD or the City as needed to reduce the impact to a level deemed acceptable by the SJVAPCD. The City's Planning and Development Department shall verify that all odor control measures have been incorporated into the project design specifications prior to issuing a permit to operate.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to air quality:

Housing Element

Objective HC-3 Link housing and transportation together to limit family expenditures on both housing and transportation. The multimodal transportation network connects housing and jobs within the Southeast Development Area and to other major regional centers, facilitating internal travel by non-automobile means. The Urban Form Chapter addresses the location, distribution, and standards for transportation infrastructure investment, combining transportation options with land use development to ultimately lower travel costs for SEDA residents and employees.

Policy HC-3.2 **Travel**. Encourage accessible, mixed-use development that incorporates housing and jobs, while lowering daily vehicle miles traveled.

Policy HC-3.3 **Smart Land Uses.** Build smaller-lot single-family and multifamily housing types which use less energy and water than larger units.

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.5 **Renewable Energy Generation**. Support renewable energy technology systems in open spaces, where appropriate.

- Pursue arrangements with public agencies and private partners to accommodate renewable energy systems, such as solar arrays, in areas that can serve a joint use as passive open space.

Objective OS-6 Ensure that all park, trail, and recreational facilities make the most efficient use of energy, water, and other natural resources.

Policy OS-6.1 **Green Building.** As important civic structures, park buildings shall conform to green building standards for energy and water efficiency.

Policy OS-6.3 **Renewable Energy Systems.** Explore developing renewable energy systems to provide power to park facilities.

Objective OS-10 Civic facilities, such as libraries, community centers, senior centers, post offices, and other civic buildings, will be integrated into the urban fabric of centers and communities, and will be well-served by public transit, paths, and trails.

Policy OS-10.5 **On-site Renewable Energy Generation.** Pursue opportunities to develop renewable energy systems for civic facilities.

Conservation Element

Objective RC-1 Meet statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.1 **Land Use Strategies.** Link land use and transportation by incorporating the following components into SEDA's land use plan:

a) Compact Development. Maximize opportunities in the SEDA for compact, higher density development to provide more housing, conserve resources, and reduce travel distances.
b) Design the Neighborhood, Community, and Regional Town Centers in the SEDA as Mixed-Use Districts that include ground floor retail, civic and other commercial uses and upper floors of office and residential uses. Locate mixed-use development along high-quality transit corridors such as the Ventura/Kings Canyon Corridor that will serve SEDA's Regional Town Center. Incentivize developments that are mixed use, defined as pedestrian-friendly development that blends two or more residential, commercial, cultural or institutional uses, one of which must be residential.
c) Pedestrian-Oriented Development. Providing pedestrian-friendly infrastructure such as sidewalks, paths, and direct connections to neighboring uses such as shopping, schools, libraries and parks increases the potential for people to make trips on foot, bicycle or transit instead of by car. New development should include all sidewalks, paths, trails and facilities required by the General Plan, the Active Transportation Plan and the SEDA.
d) Incentives for Pedestrian-Oriented Anchor Retail. Consider adopting and implementing incentives for new pedestrian-friendly anchor retail to be applied within the SEDA's Regional, Community, and Neighborhood Town Centers.
e) Complete Streets. Ensure that all streets in the SEDA comply with the City's Complete Streets Policy.
f) Transit Oriented Development. Design land uses and integrate development along High-Quality Transit Corridors such as the Ventura/Kings Canyon Corridor, with transit-oriented development that supports transit ridership and convenient pedestrian access to bus stops and station stops.

Policy RC-1.2 **Transportation Facilities Strategies.** Provide the following interconnected transportation facilities to encourage use of alternative modes of transportation and reduce vehicle trips:

a) **Transit Facilities.** Ensure adequate transit routes and facilities are provided in the SEDA through coordination between the Planning and Development and FAX Departments. Planned facilities should include bus stops, multimodal transfer centers and information kiosks.
b) **Pedestrian and Bicycle Infrastructure.** Ensure the SEDA is well-served by pedestrian and bicycle infrastructure, including sidewalks, bicycle lanes, bicycle paths and trails, and safe crossing infrastructure pursuant to the Active Transportation Plan.
c) **Traffic Calming Measures**. Design features and strategies to reduce vehicle speeds and reduce conflicts with pedestrians to encourage more walking. Slower speeds encouraged by traffic calming can also improve safety and increase bicycling. Where appropriate, provide on-street parking or street trees and landscaping to separate vehicles from pedestrians to improve walkability.

Policy RC-1.3 **Transportation Demand Strategies.** Transportation Demand Strategies focus on commute trips and provide both incentives for using alternative modes of transportation and disincentives for use of the gas powered single-occupant vehicles. Examples include Transportation Demand Management (TDM) programs, parking strategies, and electric vehicle charging stations. The following strategies should be considered for implementation in the SEDA:

a) Support the San Joaquin Valley Air Pollution Control District's Rule 9410 by encouraging a Transportation Demand Management (TDM) Plan prior to issuance of certificates of occupancy at employer sites with 100 or more employees. TDM programs include making physical improvements to work sites, such as adding showers and lockers to encourage biking to work, free transit passes, carpool services, and preferential parking.
b) Consider requiring employers with 50 or more employees to implement TDM programs in the SEDA.
c) The City of Fresno and the San Joaquin Valley Air District should jointly fund a TDM Coordinator that would assist large employers in Fresno to develop and maintain TDM programs. This position would also support the creation of maintenance of these programs in the SEDA.
d) Develop a trip reduction parking strategy in the SEDA that would encourage the use of alternative transportation modes. Such a program might include parking pricing at worksites, paid parking structures, and limited parking requirements.
e) Develop minimum requirements for electric vehicle charging stations to be installed at worksites over a given size (50-100 employees).

Policy RC-1.4 **Energy Conservation Strategies.** Although new residential development now must meet zero-net-energy requirements, there is still a need to conserve energy to reduce GHG emissions. Energy use in buildings is the second largest generator of GHG emissions after transportation. The following policies will help accomplish needed GHG reductions:

a) Consider developing an incentive program in SEDA for new buildings that exceed the California Energy Code requirements by 15%.
b) Encourage and reward compliance with voluntary energy conservation certification programs such LEED®, EnergyStar, or Greenpoint Rating systems.
c) Promote compliance with State law mandating disclosure of a building's energy data and rating of the previous year to prospective buyers and lessees of the entire building or lenders financing the entire building.
d) Partner with PG&E or other organization to offer a home energy retrofit program to existing homeowners in the SEDA. Ensure that solar retrofits are made available to existing homeowners.

Policy RC-1.5 **Waste Diversion, Recycling, & Energy Recovery.** Establishing programs and actions that promote recycling and diversion of waste from landfills can reduce energy consumed in the transport and handling of the waste material and can reduce the greenhouse gases that are emitted during the decomposition of organic waste.

The State of California has adopted increasingly stringent mandates for the percentage of solid waste that can be disposed in landfills. In addition, certain landfills are mandated to install methane capture systems to result in greenhouse gas reductions from these sources. The effects of methane are powerful—as it is 21 times more effective than carbon dioxide in retaining heat in the atmosphere. Methane can be flared, producing mainly carbon dioxide or used in combustion devices to generate heat or power that can be used for productive purposes displacing the use of fossil fuels. The following policies are recommended in the SEDA to reduce GHGs and conserve energy:

1. Maintain current targets for recycling and re-use of all types of waste material in the City and enhance waste and wastewater management practices to reduce natural resource consumption, including the following measures:
   a) Continue to require recyclable material collection and storage areas in all residential development.
   b) Establish recycling collection and storage area standards for commercial and industrial facilities to size the recycling areas according to the anticipated types and amounts of recyclable material generated.
   c) Provide educational materials to residents on how and what to recycle and how to dispose of hazardous waste.
   d) Provide recycling canisters and collection in public areas where trash cans are also provided.
   e) Institute a program to evaluate major waste generators and identify recycling opportunities for their facilities and operations.
   f) Continue to partner with the California Integrated Waste Management Board on waste diversion and recycling programs and the CalMax (California Materials Exchange) program.

g) Evaluate the feasibility of a residential, restaurant and institutional food waste segregation and recycling program, to reduce the amount of organic material sent to landfill and minimize the emissions generated by decomposing organic material.
h) Evaluate the feasibility of "carbon footprinting" for the City's wastewater treatment facilities, biomass and composting operations, solid waste collection and recycling programs.
i) Expand yard waste collection to divert compostable waste from landfills.
j) Study the feasibility and cost-benefit analysis of a municipal composting program to collect and compost food and yard waste, including institutional food and yard waste, using the resulting compost matter for City park and median maintenance.

2. Create a strategic and operations plan for fulfilling the City Council resolution committing the City of Fresno to a Zero Waste goal.
3. Continue to pursue opportunities to reduce air pollution by using methane gas from the old City landfill and the City's wastewater treatment process.

Policy RC-1.6 **Municipal Facilities.** SEDA will include a range of municipal facilities from streetlights to parks and open spaces to community centers and police and fire facilities. It is important to include greenhouse gas reductions and energy conservation at City facilities, over which the City has direct control and can allocate resources for this purpose. In addition, implementing these measures at City facilities also establishes the City as a leader in GHG reduction and conservation, which is important as it implements these measures on a citywide basis. The following are potential citywide actions that can be initiated within the SEDA as opportunity allows:

a) Improve energy efficiency in City operations.
b) Exceed Title 24 energy efficiency standards for new City buildings.
c) Install renewable energy systems on City facilities.
d) Implement City operated transportation demand management for City employees.
e) Purchase green vehicles for City fleets.
f) Enhance reduction, reuse and recycling efforts at City facilities.
g) Implement water efficient landscaping in City parks and facilities.
h) Establish a green purchasing program.

Policy RC-1.7 **Urban Forestry Program.** Encouraging the integration and protection of new and existing mature trees within our communities can lead to significant reductions in the urban heat island effect and energy required for cooling. As another significant benefit, trees also store harmful carbon as they grow, in a process known as sequestration. As these trees continue to grow, mature and sequester carbon, it is also important for urban forestry projects to consider potential tree emissions that result from the maintenance and ultimate disposition of trees to ensure a net decrease in greenhouse gas emissions occurs.

Maintaining trees, vegetation and plants throughout City parks is important to the success and longevity of these publicly owned spaces. In addition, these areas provide opportunities for new tree planting and replacement of tree species that possess a low potential to store carbon, with tree species that possess higher carbon storage potential. To better understand how to achieve these opportunities, there are many tools that communities can utilize. The Climate Action Reserve, Urban Forest Project Reporting Protocol (CAR 2019) provides criteria for generating greenhouse gas emission offsets with tree planting along with procedures for project monitoring.

Development of the SEDA will present many opportunities for the strategic planting of trees with high carbon storage potential, as noted below:

a) Develop a tree palette for the SEDA that reinforces its sense of place, reflects native species, and includes tree species with high carbon storage potential.
b) Meet parks shading targets noted in the Parks Master Plan.
c) Plant shade trees to delineate corridors and the boundaries of urban areas, and to provide tree canopy for bike lanes, sidewalks, parking lots, and trails.

3.3.3 - Methodology

Regional air pollutant emissions are composed of those on-site and off-site construction and operational emissions generated from all facets of the proposed project. Air pollutant emissions can be estimated by using emission factors and a level of activity. Emission factors represent the emission rate of a pollutant over a given time or activity, for example, grams of NO_X per vehicle mile traveled or grams of NO_X per horsepower hour of equipment operation. The activity factor is a measure of how active a piece of equipment is and can be represented as the amount of material processed, elapsed time that a piece of equipment is in operation, horsepower of a piece of equipment used, the amount of fuel consumed in a given amount of time, or VMT per day. The ARB has published emission factors for on-road mobile vehicles/trucks in the Emission Factor (EMFAC) mobile source emissions model and emission factors for off-road equipment and vehicles in the OFFROAD emissions model. An air emissions model (or calculator) combines the emission factors and the levels of activity and outputs the emissions for the various pieces of equipment.

The California Emissions Estimator Model (CalEEMod) was developed in cooperation with the Valley Air District and other air districts throughout the State. CalEEMod is designed as a uniform platform for government agencies, land use planners, and environmental professionals to quantify potential criteria pollutant and GHG emissions associated with construction and operation from a variety of land uses. The current version of CalEEMod, Version 2020.4.0, was launched on June 1, 2021, as part of a coordinated development effort between the California Air Pollution Control Officers Association (CAPCOA), the California Air Districts and Trinity Consultants. Regional construction and operational emissions reported in this analysis were modeled using CalEEMod Version 2020.4.0.

Thresholds of Significance

The following air quality significance thresholds are contained in Appendix G of the CEQA Guidelines. Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following determinations. A significant impact would occur if the proposed project would:

a) Conflict with or obstruct implementation of the applicable air quality plan?

b) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard?

c) Expose sensitive receptors to substantial pollutant concentrations?

d) Result in other emissions (such as those leading to odors) adversely affecting a substantial number of people?

Approach to Analysis

While the final determination of whether a project is significant is within the purview of the lead agency pursuant to Section 15064(b) of the CEQA Guidelines, the Valley Air District recommends that its quantitative air pollution thresholds be used to determine the significance of project emissions. If the lead agency finds that the proposed project would exceed these air pollution thresholds, the proposed project should be considered to have significant air quality impacts. The applicable Valley Air District thresholds and methodologies are contained under each impact statement below, as the City, in its discretion, has determined to utilize these thresholds and methodologies, which are based on scientific and factual data.

This analysis was performed consistent with the guidance and methodologies provided by the District's GAMAQI.[26] Based on the Valley Air District New Source Review (NSR) offset requirements for stationary sources, the Valley Air District has established thresholds of significance for criteria pollutant emissions, shown in Table 3.3-6. These thresholds apply to the proposed project because these air pollutants would be generated during project construction and operation and constitute criteria pollutants or precursor emissions for criteria pollutants, which are regulated by the federal and State Clean Air Acts.

Table 3.3-6: San Joaquin Valley Air Pollution Control District Significance Thresholds

Pollutant	Construction Thresholds (TPY)	Operational Thresholds (TPY)	
		Permitted Equipment and Activities	Non-Permitted Equipment and Activities
ROG	10	10	10
NO_X	10	10	10
CO	100	100	100
SO_X	27	27	27

[26] San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impact.

Pollutant	Construction Thresholds (TPY)	Operational Thresholds (TPY)	
		Permitted Equipment and Activities	Non-Permitted Equipment and Activities
PM_{10}	15	15	15
$PM_{2.5}$	15	15	15

Notes:
CO = carbon monoxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter with aerodynamic diameter less than 10 microns
$PM_{2.5}$ = particulate matter with aerodynamic diameter less than 2.5 microns.
ROG = reactive organic gases
SO_X = oxides of sulfur
TPY = tons per year
Source:
San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impacts.

Where available, the significance criteria established by the applicable air quality management or air pollution control district may be relied upon to make the following significance determinations. As noted above, the City, in its discretion, has decided to rely upon the foregoing significance criteria for purposes of this analysis.

Air dispersion modeling is not applicable at a program level. Consequently, for the purpose of this Draft PEIR, emissions of any criteria air pollutant that would exceed the applicable threshold of significance identified in Table 3.3-6 is considered to result in elevated concentrations of air pollutants that have the potential to exceed the AAQS. It should be noted that CO hotspot monitoring was previously required under the GAMAQI. However, emissions from motor vehicles, by far the largest source of CO emissions, have been declining since 1985 despite increases in VMT, the introduction of new automotive emission controls, and fleet turnover. Consequently, no CO hotspots have been reported in the SJVAB even at the most congested intersections.

Odor Threshold Discussion

Odor impacts on residential areas and other sensitive receptors, such as hospitals, daycare centers, schools, etc., warrant the closest scrutiny, but consideration could also be given to other land uses where people may congregate, such as recreational facilities, worksites, and commercial areas. While offensive odors rarely cause any physical harm, they can be very unpleasant, leading to considerable distress among the public and often generating citizen complaints to local governments and the Valley Air District.

Two situations create a potential for odor impact. The first occurs when a new odor source is located near an existing sensitive receptor. The second occurs when a new sensitive receptor locates near an existing source of odor. The Valley Air District has determined the common land use types that are known to produce odors in the SJVAB. These types are shown in Table 3.3-7.

Table 3.3-7: Screening Levels for Potential Odor Sources

Odor Generator	Distance
Wastewater Treatment Facilities	2 miles
Sanitary Landfill	1 mile
Transfer Station	1 mile
Composting Facility	1 mile
Petroleum Refinery	2 miles
Asphalt Batch Plant	1 mile
Chemical Manufacturing	1 mile
Fiberglass Manufacturing	1 mile
Painting/Coating Operations (e.g., auto body shop)	1 mile
Food Processing Facility	1 mile
Feed Lot/Dairy	1 mile
Rendering Plant	1 mile
Source: San Joaquin Valley Air Pollution Control District (Valley Air District). 2015. Guidance for Assessing and Mitigating Air Quality Impacts.	

According to the District's GAMAQI, analysis of potential odor impacts should be conducted for the following two situations:

- **Generators**–projects that would potentially generate odorous emissions proposed to locate near existing sensitive receptors or other land uses where people may congregate, and
- **Receivers**–residential or other sensitive receptor projects or other projects built for the intent of attracting people locating near existing odor sources.

Projects proposing to locate facilities listed in Table 3.3-7 would require an odor assessment to determine whether the project would impact sensitive receptors. The first step is to determine whether the proposed project would result in existing or planned land uses with sensitive receptors being located within the distances listed in Table 3.3-7. If yes, a more detailed analysis including a review of the Valley Air District odor complaint records is warranted. The detailed analysis would involve contacting the Valley Air District's Compliance Division for information regarding odor complaints for similar facilities and review of the facilities operation statement to identify processes and emissions sources that have the potential to generate odors. Facilities with the potential to generate significant odors would be required to prepare an odor management plan for approval by the City and by the California Department of Resources Recycling and Recovery (CalRecycle) for facilities involved in handling solid waste.[27]

[27] California Department of Resources Recycling and Recovery (CalRecycle). 2022. Instructions for Completing the Odor Best Management Practice Feasibility Report. Website: https://calrecycle.ca.gov/lea/regs/implement/odorbmprpt/. Accessed June 29, 2022.

For a project locating near an existing source of odors, the proposed project should be identified as having a potentially significant odor impact if it is proposed for a site that is as close or closer to an existing odor source where there have been:

- More than one *confirmed* complaint per year averaged over a 3-year period, or
- Three *unconfirmed* complaints per year averaged over a 3-year period.

Projects meeting these criteria should provide an odor assessment to determine whether the odor issues from the facilities have been resolved or if mitigation measures are available to reduce odor impacts to future residents. In all cases, this information will be included as part of the proposed project file for public disclosure.

3.3.4 - Impact Analysis, Mitigation Measures, and Level of Significance After Mitigation

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Consistency with Air Quality Management Plan

Impact AIR-1	**The proposed project would conflict with or obstruct implementation of the applicable air quality plan.**

Impact Analysis

This document proposes the following criteria for determining project consistency with the current AQPs:

1. Will the project conform to the growth assumptions in the AQPs?
2. Will the project comply with applicable control measures in the AQPs?

The use of the criteria listed above is a standard approach for CEQA analysis of projects in the Valley Air District's jurisdiction, as well as within other air districts, for the following reasons:

- AQP emissions inventories and attainment modeling are based on growth assumptions for the area within the air district's jurisdiction.
- AQPs rely on a set of air district-initiated control measures, as well as implementation of federal and State measures, to reduce emissions within their jurisdictions, with the goal of attaining the air quality standards.

AQPs are plans for reaching attainment of air quality standards. The assumptions, inputs, and control measures are analyzed to determine whether the SJVAB can reach attainment for the AAQS. In order to show attainment of the standards, the Valley Air District analyzes the growth projections in the valley, contributing factors in air pollutant emissions and formations, and existing and adopted emissions controls. The Valley Air District then formulates a control strategy to reach attainment that includes both State and Valley Air District regulations and other local programs and measures.

Consistency with Assumptions in AQPs

A method for determining consistency with the AQP's assumptions is determining consistency with the applicable General Plan to ensure that the proposed project's population density and land use are consistent with the growth assumptions used in the AQPs for the SJVAB. The regional emissions inventory for the SJVAB is compiled by the Valley Air District and Fresno COG. Regional population, housing, and employment projections developed by Fresno COG are based, in part, on the local jurisdictions' general plan land use designations. These projections form the foundation for the emissions inventory of the AQMP. These demographic trends are incorporated into the 2022–2046 RTP/SCS, compiled by Fresno COG to determine priority transportation projects within the Fresno COG region.

Projects that are consistent with the local general plan are considered consistent with the air quality-related regional plan. CEQA Guidelines Section 15206(b) states that a project is of statewide, regional, or area-wide significance if it is a residential development of more than 500 dwelling units or a commercial office building of 250,000 square feet or more or that employs 1,000 or more employees. The proposed Specific Plan would introduce up to 114 million square feet of nonresidential building space and approximately 45,000 new dwelling units, in addition to 37,000 new jobs over existing conditions in the Plan Area, and is therefore a project of statewide, regional, or area-wide significance. Thus, implementation of the proposed project would have the potential to substantially affect Fresno COG's demographic projections beyond what is already anticipated for in the Plan Area.

The Valley Air District is tasked with implementing programs and regulations required by the federal CAA and the California CAA. The Valley Air District has prepared several plans to attain the National AAQS and California AAQS. Emission reductions achieved through implementation of the Valley Air District's NSR offset requirements are a major component of the Valley Air District's AQPs. The established thresholds of significance for criteria pollutant emissions are based on the Valley Air District's offset requirements for stationary sources. Therefore, projects with emissions below the thresholds of significance for criteria pollutants would be determined to "not conflict or obstruct implementation of the District's air quality plan." The analysis in the response to Impact AIR-2 demonstrate that the proposed Specific Plan would generate long-term emissions of criteria air pollutants that would exceed the Valley Air District's regional operation-phase significance thresholds, which were established to determine whether a project has the potential to cumulatively contribute to the SJVAB's nonattainment designations. Thus, implementation of the proposed Specific Plan would result in an increase in the frequency or severity of existing air quality violations; cause or contribute to new violations; or delay timely attainment of the AAQS.

Various policies of the General Plan and the proposed Specific Plan would promote complete streets, mixed-use and transit-oriented neighborhoods, and increased capacity for alternative transportation modes, which would help reduce air pollutant emissions. As included in the Regulatory Framework section above, these policies include General Plan policies UF-1c, UF-12a-f, UF-14a and 14b, LU-2, LU-3, LU-5-f, RC-4, HC-3-d, HC-3-f, MT-1 and MT-2. Proposed Fresno SEDA Specific Plan policies related to air quality include HC-3.2 and 3.3, OS-6, and the policies included in the draft Plan's Conservation Element, including Policy RC-1.1 through 1.7. These policies promote active transit,

clean air measures, and support the reduction in average vehicle trip distances, which contribute to reducing overall per capita VMT in the region.

The implementation of mitigation required by the General Plan PEIR, including Mitigation Measure (MM) AIR-2.1, MM AIR-2.2, and MM AIR-3.1, would serve to further reduce emissions generated by future development projects envisioned in the Plan Area. General Plan PEIR MM AIR-2.1 and MM AIR-2.2 requires the submittal of a technical assessment of project-specific construction phase and operation-related air quality impacts, and the identification of project-specific mitigation measures as appropriate, prior to future discretionary project approval. General Plan MM AIR-3.1 requires the submittal of an HRA and the inclusion of project-specific T-BACTs as appropriate, prior to future discretionary approval for future industrial or warehousing projects located within established screening distances. These requirements will ensure that individual future development projects in the Plan Area do not have a significant impact on sensitive receptors.

However, even with the implementation of these policies and mitigation measures, as further discussed under Impact AIR-2 and Impact AIR-3, due to the size of the proposed development, the proposed project could create a localized violation of State or federal air quality standards, significantly contribute to cumulative nonattainment pollutant violations, and potentially expose sensitive receptors to substantial pollutant concentrations under cumulative conditions. There is not mitigation available that would reduce the criteria pollutant emissions from the proposed project's construction or operation to less than significant levels, as compared to the recommended Valley Air District significance thresholds. Therefore, the proposed project would have a significant impact under this criterion.

Control Measures

The AQP contains a number of control measures, which are enforceable requirements through the adoption of rules and regulations. A detailed description of rules and regulations that apply to this project is provided in Section 3.3.2, Regulatory Framework. The proposed project would comply with all applicable District rules and regulations. Therefore, the proposed project complies with this criterion and would not conflict with or obstruct implementation of the applicable air quality attainment plan for this criterion.

Impact Summary

The proposed project has the potential to exceed the Valley Air District's significance thresholds during construction and operation. Implementation of the proposed project would result in the generation of substantial long-term criteria air pollutant emissions that would exceed the Valley Air District regional significance thresholds and would therefore not be considered consistent with the existing AQPs. No further measures to reduce operation-phase criteria air pollutant emissions are available beyond the applicable Valley Air District rules and regulations in addition to the proposed project's policies and design guidelines. The various goals and policies of the proposed project would contribute to reducing long-term criteria air pollutant emissions to the extent feasible. However, due to the magnitude and intensity of development accommodated by the proposed project, Impact AIR-1 would remain significant and avoidable.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.3, the following mitigation measures from the General Plan PEIR are applicable to the proposed project.

MM AIR-2.1 Prior to future discretionary project approval, development project applicants shall prepare and submit to the Director of the City Planning and Development Department, or designee, a technical assessment evaluating potential project construction phase-related air quality impacts. The evaluation shall be prepared in conformance with SJVAPCD methodology for assessing construction impacts. If construction-related air pollutants are determined to have the potential to exceed the SJVAPCD adopted threshold of significance, the Planning and Development Department shall require that applicants for new development projects incorporate mitigation measures into construction plans to reduce air pollutant emissions during construction activities. The identified measures shall be included as part of the Project Conditions of Approval. Possible mitigation measures to reduce construction emissions include but are not limited to:

- Install temporary construction power supply meters on-site and use these to provide power to electric power tools whenever feasible. If temporary electric power is available on-site, forbid the use of portable gasoline- or diesel-fueled electric generators.
- Use of diesel oxidation catalysts and/or catalyzed diesel particulate traps on diesel equipment, as feasible.
- Maintain equipment according to manufacturers' specifications.
- Restrict idling of equipment and trucks to a maximum of 5 minutes (per California Air Resources Board [ARB] regulation).
- Phase grading operations to reduce disturbed areas and times of exposure.
- Avoid excavation and grading during wet weather.
- Limit on-site construction routes and stabilize construction entrance(s).
- Remove existing vegetation only when absolutely necessary.
- Sweep up spilled dry materials (e.g., cement, mortar, or dirt trackout) immediately. Never attempt to wash them away with water. Use only minimal water for dust control.
- Store stockpiled materials and wastes under a temporary roof or secured plastic sheeting or tarp.

MM AIR-2.2 Prior to future discretionary project approval, development project applicants shall prepare and submit to the Director of the City Planning and Development Department, or designee, a technical assessment evaluating potential project operation-related air quality impacts. The evaluation shall be prepared in conformance with SJVAPCD methodology in assessing air quality impacts. If

operation-related air pollutants are determined to have the potential to exceed the SJVAPCD-adopted thresholds of significance, the Planning and Development Department shall require that applicants for new development projects incorporate mitigation measures to reduce air pollutant emissions during operational activities. The identified measures shall be included as part of the Project Conditions of Approval. Possible mitigation measures to reduce long-term emissions include but are not limited to:

- For site-specific development that requires refrigerated vehicles, the construction documents shall demonstrate an adequate number of electrical service connections at loading docks for plugging in the anticipated number of refrigerated trailers to reduce idling time and emissions.
- Applicants for manufacturing and light industrial uses shall consider energy storage (i.e., battery) and combined heat and power (CHP, also known as cogeneration) in appropriate applications to optimize renewable energy generation systems and avoid peak energy use.
- Site-specific developments with truck delivery and loading areas and truck parking spaces shall include signage as a reminder to limit idling of vehicles while parked for loading/unloading in accordance with ARB Rule 2845 (13 California Code of Regulations [CCR] Chapter 10, Section 2485).
- Require that 240-volt electrical outlets or Level 3 chargers be installed in parking lots that would enable charging of neighborhood electric vehicles (NEVs) and/or battery powered vehicles.
- Maximize use of solar energy including solar panels; installing the maximum possible number of solar energy arrays on building roofs throughout the city to generate solar energy.
- Maximize the planting of trees in landscaping and parking lots.
- Use light-colored paving and roofing materials.
- Require use of electric or alternatively fueled street-sweepers with HEPA filters.
- Require use of electric lawn mowers and leaf blowers.
- Utilize only Energy Star heating, cooling, and lighting devices, and appliances.
- Use of water-based or low volatile organic compound (VOC) cleaning products.

MM AIR-3.1 Prior to future discretionary approval for projects that require environmental evaluation under CEQA, the City of Fresno shall evaluate new development proposals for new industrial or warehousing land uses that: (1) have the potential to generate 100 or more truck trips per day or have 40 or more trucks with operating diesel-powered transport refrigeration units, and (2) are within 1,000 feet of a sensitive land use (e.g., residential, schools, hospitals, or nursing homes), as measured from the property line of the project to the property line of the nearest sensitive use. Such projects shall submit a Health Risk Assessment (HRA) to the City Planning and Development Department. The HRA shall be prepared in accordance with policies and procedures of the most current State Office of Environmental Health Hazard Assessment (OEHHA) and the SJVAPCD. If the HRA shows that the

incremental health risks exceed their respective thresholds, as established by the SJVAPCD at the time a project is considered, the Applicant will be required to identify and demonstrate that best available control technologies for toxics (T-BACTs), including appropriate enforcement mechanisms to reduce risks to an acceptable level. T-BACTs may include, but are not limited to:

- Restricting idling on-site or electrifying warehousing docks to reduce diesel particulate matter;
- Requiring use of newer equipment and/or vehicles;
- Provide charging infrastructure for: electric forklifts, electric yard trucks, local drayage trucks, last mile delivery trucks, electric and fuel-cell heavy-duty trucks; and/or
- Install solar panels, zero-emission backup electricity generators, and energy storage to minimize emissions associated with electricity generation at the project site.

T-BACTs identified in the HRA shall be identified as mitigation measures in the environmental document and/or incorporated into the site plan.

Project Specific Mitigation Measures

Measures required to reduce the impact of construction-related emissions from future development projects included in the Plan Area include MM AIR-1a and MM AIR-1b.

MM AIR-1a As part of a standard grading permit submittal, the project applicant shall submit documentation to the City of Fresno that demonstrates that all off-road construction equipment in excess of 50 horsepower is equipped with engines meeting the United States Environmental Protection Agency (EPA) Tier IV Final off-road engine emission standards or cleaner. The construction contractor shall maintain records concerning its efforts to comply with this requirement during construction, including equipment lists. Off-road equipment descriptions and information may include but are not limited to equipment type, equipment manufacturer, equipment identification number, engine model year, engine certification (tier rating), horsepower, and engine serial number. The project applicant and/or construction contractor shall submit the construction operations plan and records of compliance to the City of Fresno.

If engines that comply with Tier IV Final off-road emission standards are not commercially available, then the construction contractor shall use the next cleanest piece of off-road equipment (e.g., Tier IV Interim) available. For purposes of this mitigation measure, “commercially available” shall mean the availability of Tier IV Final engines taking into consideration factors such as (i) critical-path timing of construction; and (ii) geographic proximity to the project site of equipment. The contractor can maintain records for equipment that is not commercially available by providing letters from at least two rental companies for each piece of off-road equipment where the Tier IV Final engine is not available.

MM AIR-1b Prior to the issuance of grading or building permits for each individual development proposal within the project site, the relevant applicant for each development shall provide the City with documentation demonstrating the use of "Super-Compliant" architectural coatings during construction of the proposed project. "Super-Compliant" architectural coatings are paints which do not exceed 10 grams of reactive organic gas (ROG) per liter of paint.

All architectural coatings shall be applied either by (1) using a high-volume, low-pressure spray method operated at an air pressure between 0.1 and 10 pounds per square inch gauge to achieve a 65 percent application efficiency; or (2) manual application using a paintbrush, hand-roller, trowel, spatula, dauber, rag, or sponge, to achieve a 100 percent application efficiency. The construction contractor shall also use precoated/natural colored building materials, where feasible.

Measures designed to reduce the impact of operational emissions from future projects included in the Plan Area include MM AIR-1c through MM AIR-1e.

MM AIR-1c All nonresidential buildings shall be designed to provide infrastructure to support use of electric-powered forklifts and/or other interior vehicles.

All nonresidential buildings shall be designed to provide electric infrastructure to support use of exterior yard trucks and on-site vehicles. The operation of yard trucks that are used to move trailers and on-site vehicles within the project site shall be powered by electricity unless the project applicant can reasonably demonstrate that specific equipment is not available for a task. Compliance with this mitigation measure shall be verified by the City of Fresno prior to the issuance of a building permit.

MM AIR-1d Each implementing development project shall be required to implement, at a minimum, an increase in each building's energy efficiency 15 percent beyond Title 24, and reduce indoor water use by 25 percent. All requirements will be documented through a checklist to be submitted to the City of Fresno prior to issuance of building permits for the implementing development project with building plans and calculations.

MM AIR-1e Prior to issuance of building permits for non-single-family residential and mixed-use residential development projects in the Plan Area, the project applicant shall indicate on the building plans that the following features have been incorporated into the design of the building(s). Proper installation of these features shall be verified by the City of Fresno prior to the issuance of a Certificate of Occupancy.

- Electric vehicle (EV) charging shall be provided as specified in Section A4.106.8.2 (Residential Voluntary Measures) of the California Green Building Standards Code (CALGreen) Code.
- Bicycle parking shall be provided as specified in Section A4.106.9 (Residential Voluntary Measures) of the CALGreen Code.

MM AIR-1f Prior to the issuance of building permits for nonresidential development projects in the Plan Area, project applicants shall indicate on the building plans that the following features have been incorporated into the design of the building(s). Proper installation of these features shall be verified by the City of Fresno prior to the issuance of a Certificate of Occupancy.

- For buildings with more than 10 tenant-occupants, changing/shower facilities shall be provided as specified in Section A5.106.4.3 (Nonresidential Voluntary Measures) of the California Green Building Standards Code (CALGreen) Code.
- Long-term and short-term bicycle parking shall be provided as specified in Section A5.106.4 (Nonresidential Mandatory Measure) of the CALGreen Code.
- Preferential parking for low-emitting, fuel-efficient, and carpool/van vehicles shall be provided as specified in Section A5.106.5.1 (Nonresidential Voluntary Measures) of the CALGreen Code.
- Facilities shall be installed to support future electric vehicle (EV) charging at each nonresidential building with 30 or more parking spaces. Installation shall be consistent with Section A5.106.5.3 (Nonresidential Voluntary Measures) of the CALGreen Code.

Level of Significance After Mitigation

Significant and unavoidable impact.

Cumulative Criteria Pollutant Emissions Impacts

Impact AIR-2	**The proposed project would result in a cumulatively considerable net increase of any criteria pollutant for which the project region is nonattainment under an applicable federal or state ambient air quality standard.**

Impact Analysis

This impact is related to the cumulative effect of a project's regional criteria pollutant emissions. By its nature, air pollution is largely a cumulative impact resulting from emissions generated over a large geographic region. The nonattainment status of regional pollutants is a result of past and present development within the SJVAB, and this regional impact is a cumulative impact. In other words, new development projects (such as the proposed project) within the SJVAB would contribute to this impact only on a cumulative basis. No single project would be sufficient in size, by itself, to result in nonattainment of regional air quality standards. Instead, a project's emissions may be individually limited but cumulatively considerable when taken in combination with past, present, and future development projects. All new development that would result in an increase in air pollutant emissions above those assumed in regional AQPs would contribute to cumulative air quality impacts.

The cumulative analysis focuses on whether a specific project would result in cumulatively considerable emissions. According to Section 15064(h)(4) of the CEQA Guidelines, the existence of significant cumulative impacts caused by other projects alone does not constitute substantial evidence that the proposed project's incremental effects would be cumulatively considerable.

Rather, the determination of cumulative air quality impacts for construction and operational emissions is based on whether the proposed project would result in regional emissions that exceed the Valley Air District regional thresholds of significance for construction and operations on a project level. Projects that generate emissions below the significance thresholds would be considered consistent with regional air quality planning efforts and would not generate cumulatively considerable emissions. The primary pollutants of concern during project construction and operation are ROG, NO_X, PM_{10}, and $PM_{2.5}$. The Valley Air District's GAMAQI, adopted in 2015, contains thresholds for CO, NO_X, ROG, SO_X, PM_{10}, and $PM_{2.5}$.

Ozone is a secondary pollutant that can be formed miles from the source of emissions, through reactions of ROG and NO_X emissions in the presence of sunlight. Therefore, ROG and NO_X are termed ozone precursors. The SJVAB often exceeds the State and national ozone standards. Therefore, if the proposed project emits a substantial quantity of ozone precursors, the proposed project may contribute to an exceedance of the ozone standard. The SJVAB also exceeds air quality standards for PM_{10}, and $PM_{2.5}$; therefore, substantial project emissions may contribute to an exceedance for these pollutants. The Valley Air District's annual emission significance thresholds used for the proposed project define the substantial contribution for both operational and construction emissions as follows:

- 100 tons per year CO
- 10 tons per year NO_X
- 10 tons per year ROG
- 27 tons per year SO_X
- 15 tons per year PM_{10}
- 15 tons per year $PM_{2.5}$

Construction Emissions

Construction emissions result from on-site and off-site activities. On-site emissions principally consist of exhaust emissions from the heavy-duty off-road construction equipment, on-site motor vehicle operation, and fugitive dust from disturbed soil. Off-site emissions are caused by motor vehicle exhaust from delivery and haul truck vehicles, work traffic, and road dust (mainly $PM_{2.5}$ and PM_{10}). The majority of this fugitive dust will remain localized and will limited to the atmosphere around the proposed project site. However, the potential for off-site impacts from fugitive dust exists unless control measures are implemented to reduce the particulate emissions from this source prior to leaving construction sites.

Construction activities associated with buildout of the proposed project are anticipated to occur sporadically over approximately 25 years or more. Buildout would consist of multiple smaller projects, each having its own construction timeline and activities. Development of multiple properties could occur at the same time. However, there is no defined development schedule for these future projects at this time. For this analysis, the estimate of maximum daily emissions is based on a conservative scenario, where several construction projects occur at one time and all construction phases overlap. Table 3.3-8 shows the unmitigated daily construction emissions for

future development projects envisioned under the proposed project. The table shows the highest daily emissions that would be generated over the anticipated development period.

Table 3.3-8: Annual Construction Regional Emissions—Unmitigated

Construction Activity		Mass Daily Emissions (tons per year)					
		VOC	NO_X	CO	SO_X	Total PM_{10}	Total $PM_{2.5}$
Construction Year 2024	Total	1,770.60	201.58	340.25	1.62	131.49	37.21
Construction Year 2025	Total	668.30	188.85	285.15	1.47	118.91	33.38
Construction Year 2026	Total	30.45	180.53	251.56	1.38	111.69	31.28
Construction Year 2027	Total	28.71	178.02	239.10	1.35	111.66	31.25
Construction Year 2028	Total	27.01	175.33	227.91	1.31	111.21	31.11
Construction Year 2029	Total	25.59	174.10	219.84	1.28	111.61	31.20
Construction Year 2030	Total	24.16	172.00	212.31	1.26	111.53	31.13
Construction Year 2031	Total	22.80	170.82	205.81	1.23	111.51	31.11
Construction Year 2032	Total	21.70	170.51	201.14	1.22	111.92	31.21
Construction Year 2033	Total	20.47	168.46	195.01	1.19	111.04	30.95
Construction Year 2034	Total	19.55	167.74	191.02	1.17	111.02	30.94
Construction Year 2035	Total	18.78	167.59	188.31	1.16	111.43	31.03
Construction Year 2036	Total	18.85	168.23	189.03	1.17	111.85	31.15
Construction Year 2037	Total	18.78	167.59	188.31	1.16	111.43	31.03
Construction Year 2038	Total	18.78	167.59	188.31	1.16	111.43	31.03
Construction Year 2039	Total	18.70	166.95	187.59	1.16	111.00	30.91
Construction Year 2040	Total	15.74	165.69	177.17	1.12	111.37	30.98
Construction Year 2041	Total	15.74	165.69	177.17	1.12	111.37	30.98
Construction Year 2042	Total	15.74	165.69	177.17	1.12	111.37	30.98
Construction Year 2043	Total	5.19	54.60	58.38	0.37	36.70	10.21
Maximum Daily Emissions		**1,770.60**	**201.58**	**340.25**	**1.62**	**131.49**	**37.21**
Valley Air District Air Quality Significance Thresholds		10	10	100	27	15	15
Exceed Threshold?		**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Notes:
CO = carbon monoxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter with an aerodynamic resistance diameter of 10 micrometers or less.
$PM_{2.5}$ = particulate matter with an aerodynamic resistance diameter of 2.5 micrometers
The PM_{10} and $PM_{2.5}$ emissions reflect Regulation VIII—Fugitive PM_{10} Prohibitions.
VOC = Volatile Organic Compounds
Source of emissions: Appendix B.

As shown in the table, construction activities associated with implementation of the proposed Plan could potentially exceed the Valley Air District regional thresholds for VOC, NO_X, CO, $PM_{2.5}$, and PM_{10}. The primary source of NO_X emissions is vehicle and construction equipment exhaust. NO_X is a precursor to the formation of both ozone and particulate matter (PM_{10} and $PM_{2.5}$). VOC is a precursor to the formation of ozone. PM_{10} emissions primarily occur as fugitive dust due to disturbed soil, and road dust. Project-related emissions would contribute to the ozone, PM_{10}, and $PM_{2.5}$ nonattainment designations of the SJVAB.

As previously discussed, existing General Plan policies, and mitigation measures required as a part of the most recent General Plan PEIR would help minimize construction emissions from projects in the Plan Area. Compliance with the Valley Air District Regulation VIII requirements, which serve to reduce fugitive dust from construction and trackout, help to reduce particulate matter emissions from construction activities in the SJVAB. As part of the development process, individual site-specific projects accommodated under the proposed Specific Plan that meet the criteria of Valley Air District Rule 9510 would be required to prepare a detailed air quality impact assessment. To the extent applicable under Rule 9510 for each such individual development, the Valley Air District would require calculation of the construction emissions from the development. The purpose of the air quality impact assessment is to confirm a development's construction exhaust emissions and therefore be able to identify appropriate mitigation, either through implementation of specific mitigation measures or payment of applicable off-site fees. Compliance with Rule 9510 will be required for future development projects envisioned as part of the proposed project. However, because these future projects are not yet defined, it is not possible to quantify the potential emission reductions that would be associated with compliance with Rule 9510 at the project level. Furthermore, while adherence to Rule 9510 would contribute to reducing exhaust NO_X emissions, it would not be applicable to reducing VOC emissions generated by operation of equipment and from off-gassing from asphalt and paints.

There is the potential for multiple projects and construction phases to be constructed at one time in the Plan Area, which may result in the generation of cumulatively significant amounts of criteria pollutant emissions. Therefore, project-related construction activities would result in potentially significant regional air quality impacts due to the potential for overlapping impacts from multiple projects being constructed at one time.

To reduce the impacts of future development projects consistent with the proposed project, MM AIR-1a and MM AIR-1b are required. These mitigation measures will reduce emissions of VOC, NO_X, PM_{10}, and $PM_{2.5}$ associated with the construction of future development projects in the Plan Area to the extent feasible. However, due to the size of the proposed project and the potential for overlapping construction activities, future development projects could still potentially exceed the Valley Air District regional thresholds, even with the implementation of mitigation. Therefore, project-related construction activities would result in significant and unavoidable regional air quality impacts.

Operational Emissions

Buildout of the proposed project would result in direct and indirect criteria air pollutant emissions from area, energy, and mobile sources. Area sources would include activities such as landscape

maintenance and occasional architectural coatings. Energy sources would include electricity and natural gas combustion for space and water heating. Mobile sources would include vehicle trips associated with passenger cars. As previously discussed, the Valley Air District regional emission significance thresholds were used to determine the proposed project's impact significance. The proposed Fresno SEDA Specific Plan policies emphasize development of mixed-use areas and improvements to active and public transit facilities that would contribute to reducing vehicle trips and VMT. As an example, the proposed project would create mixed use areas and would integrate distinct neighborhood commercial development areas that would provide daily services and amenities for the nearby residences and businesses.

Overall, the general proposed guiding principles and objectives for land use planning and the proposed land use changes and transportation improvements would contribute to reducing vehicle trips and VMT per service population to the extent feasible. Furthermore, existing General Plan policies and required mitigation measures would further reduce emissions from the operation of future projects in the Plan Area. However, when compared to the existing land uses, due to the magnitude of planned growth in the Plan Area, implementation of the proposed project would generate significant emissions of criteria pollutants, and a net increase of approximately 602,972 in total regional VMT (see Appendix J). As the proposed project would become fully operational in 2050, Table 3.3-9 shows the net daily operational emissions for full buildout of the proposed project in 2050.

Table 3.3-9: Project Net Annual Operational Emissions–Unmitigated (2050)

	Pounds per Day					
Emissions Source	**VOC**	**NO_X**	**CO**	**SO_X**	**PM_{10} (Total)**	**$PM_{2.5}$ (Total)**
Area	1,100.19	19.43	320.23	0.12	3.02	3.02
Energy	6.47	56.24	30.23	0.35	4.47	4.47
Mobile	166.63	311.03	1,798.71	4.59	644.30	173.88
Daily Total Emissions	**1,273.29**	**386.69**	**2,149.17**	**5.06**	**651.79**	**181.37**
Existing Emissions	178.12	83.42	462.80	0.87	71.17	29.72
Net Daily Emissions	**1,095.17**	**303.27**	**1,686.37**	**4.19**	**580.62**	**151.65**
Valley Air District Significance Thresholds	10	10	100	27	15	15
Exceed Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Notes:
CO = carbon monoxide
NO_X = oxides of nitrogen
PM_{10} = particulate matter with aerodynamic diameter less than 10 microns
$PM_{2.5}$ = particulate matter with aerodynamic diameter less than 2.5 microns.
SO_X = oxides of sulfur
Source of emissions: Appendix B.

As shown in this table, due to the magnitude of the proposed growth, operation of the land uses accommodated under the proposed project at buildout would generate air pollutant emissions that exceed the Valley Air District's regional significance thresholds for VOC, NO_X, CO, PM_{10}, and $PM_{2.5}$ at full buildout. Emissions of VOC and NO_X that exceed the Valley Air District regional threshold would cumulatively contribute to the ozone nonattainment designation of the SJVAB. Emissions of NO_X that exceed the Valley Air District's regional significance thresholds would cumulatively contribute to the ozone and particulate matter nonattainment designations of the SJVAB. Emissions of direct PM_{10} and $PM_{2.5}$ would contribute to the $PM_{2.5}$ nonattainment designations.

The application of the Valley Air District Rule 9510 to future individual projects would contribute to reducing NO_X and particulate matter emissions. In addition, application of Valley Air District Rule 9410 (Employer Based Trip Reduction) would contribute to reducing mobile source emissions from the operation of the proposed project. The objectives and policies included in the proposed Specific Plan would generally support a more sustainable development pattern to accommodate growth within the Plan Area by creating complete neighborhoods, high-density housing in proximity to jobs and service amenities, and supporting alternative transit options through improvements to the pedestrian, bicycle, public transportation, and alternative-fueled vehicle networks and infrastructure, which would contribute in minimizing long-term criteria air pollutant emissions.

However, while compliance with the Valley Air District rules and the policies of the proposed Specific Plan may contribute to reducing operation-related regional air quality impacts of individual projects envisioned under the proposed Specific Plan to less than significant levels, the projected cumulative emissions associated with future development projects would be in exceedance of the Valley Air District thresholds. Therefore, implementation of the proposed project would result in a significant impact because it would significantly contribute to the nonattainment designations of the SJVAB. To reduce emissions from the operation of future projects envisioned in the proposed project, MM AIR-1c through MM AIR-1f are required to reduce emissions to the extent feasible, in combination with the existing General Plan policies and associated mitigation. However, due to the magnitude of emissions generated by the residential, office, and commercial land uses proposed as part of the proposed project, no mitigation measures are available that would reduce cumulative impacts below the Valley Air District's thresholds. Therefore, despite adherence to the applicable mitigation measures, Impact AIR-2 would remain significant and unavoidable.

Impact Summary

Regional emissions generated by the proposed project would exceed applicable thresholds after compliance with all rules, regulations, and mitigation measures during operation. Localized operational emissions would also present a potentially significant impact after incorporation of identified mitigation. This impact would be significant and unavoidable.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Implement MM AIR-1a through MM AIR-1f.

Level of Significance After Mitigation

Significant and unavoidable impact.

Buildout of the proposed project would occur over approximately 25 years, or longer. Construction activities associated with buildout of the proposed project could generate short-term emissions that exceed the Valley Air District's significance thresholds during this time and cumulatively contribute to the nonattainment designations of the SJVAB. Combined with the General Plan policies and the implementation of existing mitigation measures developed as part of the PEIR for the General Plan, the implementation of MM AIR-1a and MM AIR-1b would reduce criteria air pollutant emissions from construction-related activities to the extent feasible. However, specific construction time frames and equipment for individual site-specific projects are not available and there is a potential for multiple developments to be constructed at any one time, resulting in potentially significant cumulative construction-related emissions.

Buildout in accordance with the proposed project would generate long-term emissions that would exceed the Valley Air District's regional significance thresholds and cumulatively contribute to the nonattainment designations of the SJVAB. To reduce emissions from the operation of future projects envisioned in the proposed project, MM AIR-1c through MM AIR-1f are required to reduce emissions to the extent feasible, in combination with the existing General Plan policies and associated mitigation. However, due to the magnitude of emissions generated by the residential, office, and commercial land uses proposed as part of the proposed project, no mitigation measures are available that would reduce cumulative impacts below the Valley Air District's thresholds. Therefore, despite adherence to the applicable mitigation measures, Impact AIR-2 would remain significant and unavoidable.

Sensitive Receptors Exposure to Pollutant Concentrations

Impact AIR-3	**The proposed project would expose sensitive receptors to substantial pollutant concentrations.**

Impact Analysis

Sensitive Receptors

Those who are sensitive to air pollution include children, the elderly, and persons with preexisting respiratory or cardiovascular illness. The Valley Air District considers a sensitive receptor to be a location that houses or attracts children, the elderly, people with illnesses, or others who are especially sensitive to the effects of air pollutants. Examples of sensitive receptors include hospitals, residences, convalescent facilities, and schools.

Construction: ROG

ROG is emitted during the application of architectural coatings (painting). The amount emitted is dependent on the amount of ROG (or VOC) in the paint. ROG emissions are typically an indoor air

quality health hazard concern rather than an outdoor air quality health hazard concern. Therefore, exposure to ROG during architectural coatings is a less than significant health impact.

There are three types of asphalt that are typically used in paving: asphalt cements, cutback asphalts, and emulsified asphalts. However, District Rule 4641 prohibits the use of the following types of asphalt: rapid cure cutback asphalt; medium cure cutback asphalt; slow cure asphalt that contains more than 0.5 percent of organic compounds that evaporate at 500°F or lower; and emulsified asphalt containing organic compounds, in excess of 3 percent by volume, that evaporate at 500°F or lower. An exception to this is medium cure asphalt when the National Weather Service official forecast of the high temperature for the 24-hour period following application is below 50°F.

The acute (short-term) health effects from worker direct exposure to asphalt fumes include irritation of the eyes, nose, and throat. Other effects include respiratory tract symptoms and pulmonary function changes. The studies were based on occupational exposure of fumes. Residents are not in the immediate vicinity of the fumes; therefore, they would not be subjected to concentrations high enough to evoke a negative response. In addition, the restrictions that are placed on asphalt in the San Joaquin Valley reduce ROG emissions from asphalt and exposure. The impact to nearby sensitive receptors from ROG during construction is less than significant.

Operation: ROG

During operation, ROG would be emitted primarily from motor vehicles. Direct exposure to ROG from project motor vehicles would not result in health effects, because the ROG would be distributed across miles and miles of roadway and in the air. The concentrations would not be great enough to result in direct health effects.

Construction and Operation: NO_X, PM_{10}, and $PM_{2.5}$

As discussed in Impact AIR-2, construction and operation of future individual development projects accommodated under the proposed Specific Plan could potentially result in an exceedance of the Valley Air District's ambient air quality screening threshold of 100 pounds per day.

As stated, the planned improvements, objectives and policies under the proposed Specific Plan would generally support a sustainable development pattern in accommodating future growth within the Plan Area, which would generally contribute to reducing long-term criteria air pollutant emissions. In addition, application of the Valley Air District Rule 9510 and Regulation VIII would contribute to reducing operation- and construction-related NO_X and particulate matter emissions. Furthermore, Rule 9410 would also contribute to reducing operation-related mobile source emissions.

However, while individual development projects may not result in exceeding the screening threshold of 100 pounds per day, the projected cumulative emissions associated with future development projects accommodated under the proposed Specific Plan would be in exceedance and could result in causing an exceedance of the AAQS. Therefore, as construction and operation of future individual development projects accommodated under the proposed Specific Plan could result in causing or contribute to a violation of the AAQS, impacts to air quality would be significant.

Toxic Air Contaminants

During construction and operation, the proposed project could result in emissions of several TACs that could potentially impact nearby sensitive receptors. The Valley Air District has defined health risk significance thresholds. These thresholds are represented as a cancer risk to the public and a non-cancer hazard from exposures to TACs. Cancer risk represents the probability (in terms of risk per million individuals) that an individual would contract cancer resulting from exposure to TACs continuously over a period of several years. The Valley Air District's latest threshold of significance for TAC emissions is an increase in cancer risk for the maximally exposed individual of 20 in a million (formerly 10 in a million). Exposures to TACs can also result in both short-term (acute) or long-term (chronic) non-cancer health impacts. Such impacts could include illnesses related to reproductive effects, respiratory effects, eye sensitivity, immune effects, kidney effects, blood effects, central nervous system, birth defects, or other adverse environmental effects.

Project construction would involve the use of diesel-fueled vehicles and equipment that emit DPM, which is considered a TAC. Industrial land uses, such as chemical processing facilities, chrome-plating facilities, dry cleaners, and gasoline-dispensing facilities, have the potential to be substantial stationary sources that would require a permit from the Valley Air District for emissions of TACs. Emissions of TACs would be controlled through permits issued by the Valley Air District and would be subject to further study and an HRA prior to the issuance of any necessary air quality permits. In addition to stationary/area sources of TACs, commercial and industrial operations could generate a substantial amount of DPM emissions from off-road equipment use and truck idling. New land uses in the proposed Plan Area that use diesel trucks, including trucks with transport refrigeration units, could generate an increase in DPM that would contribute to cancer and non-cancer health risk in the SJVAB.

As it is not possible to determine the amount of TAC concentrations at the time of this analysis, it is not possible to calculate the risks for a particular health effect within the Plan Area. The proposed project is a programmatic project and until specific future projects are proposed, the associated TAC emissions cannot be determined or modeled at this time. Through the implementation of General Plan PEIR Mitigation Measures AIR-2.2 and AIR-3.1, future development projects subject to environmental review under CEQA would be required to analyze potential TAC emissions and include mitigation as appropriate.

ARB developed a guidance document, *Air Quality and Land Use Handbook: A Community Health Perspective* (ARB Handbook), to address the siting of sensitive land uses in the vicinity of freeways, distribution centers, rail yards, ports, refineries, chrome-plating facilities, dry cleaners, and gasoline-dispensing facilities. This guidance document was developed to assess compatibility and associated health risks when placing sensitive receptors near existing pollution sources. ARB's recommendations for the siting of new sensitive land uses were based on a compilation of studies that evaluated data on the adverse health effects from proximity to air pollution sources. The key observation in these studies is that proximity to air pollution sources substantially increases both exposure and the potential for adverse health effects. Respiratory and cardiovascular problems including asthma, lung cancer, and premature death have been associated with living near major roadways and freeways. Children who live near major roadways and freeways have been found to

have higher asthma rates and reduced lung function. There are three carcinogenic TACs that constitute the majority of the known health risks from motor vehicle traffic: DPM from trucks and benzene and butadiene from passenger vehicles. It has been found that outdoor concentrations are highest near the roadway and decrease with increasing distance downwind of the source. The ARB recommends avoiding siting new sensitive land uses within 500 feet of urban roads with more than 100,000 vehicles per day or rural roads with more than 50,000 vehicles per day.[28] General Plan PEIR Mitigation Measure AIR-3.2 requires that sources be sited in adherence to the recommendations included in the ARB Handbook, or that an HRA be performed and potential health impacts be mitigated.

Future development envisioned as a part of the proposed project would be required to comply with AB 2588, and ARB standards for diesel engines. While existing City policies and regulations are intended to minimize impacts associated with sensitive receptors, mitigation measures for future project developments that implement these policies and regulations are identified to ensure that the intended environmental protections are achieved. Compliance with General Plan PEIR Mitigation Measure AIR-3.1 would help to ensure that mobile sources of TACs not covered under the Valley Air District permits are considered during subsequent project-level environmental review. This mitigation measure requires the preparation of project-specific technical health risk assessments for certain discretionary large industrial or warehousing uses to evaluate operational-related health risk impacts to further ensure that operational-related emissions are reduced to a less than significant level. However, information regarding operational characteristics of future specific development projects and the associated emissions cannot be determined at the time of this analysis; therefore, cumulative growth within the Plan Area could result in an overall impact above the health-based thresholds established by the Valley Air District.

In addition to operational emissions from new stationary sources of emissions and vehicle trips to and within the Plan Area, the proposed project would locate new sensitive receptors (residents) that could be subject to existing sources of TACs within the proposed project boundary. The California Supreme Court in *California Building Industry Association v. Bay Area Air Quality Management District* concluded that agencies generally subject to CEQA are not required to analyze the impact of existing environmental conditions on a project's future users or residents. However, various types of mitigation are potentially available to reduce potential impacts to new sensitive receptors in the Plan Area. General Plan PEIR MM AIR-3.2 identifies the use of the discretionary review process for residential and other sensitive land uses near freeways to impose site plan and design features aimed at minimizing exposure to environmental pollution. This mitigation measure would apply to the proposed project and help to reduce the potential health risks to future sensitive receptors located in the Plan Area.

Compliance with existing regulatory programs, General Plan policies and mitigation measures, and MM AIR-1a through MM AIR-1f will serve to reduce the impacts of the proposed project to the extent feasible. However, the proposed project would result in the future development of numerous projects, each contributing incrementally to air emissions affecting sensitive receptors. Thus, it is possible that the proposed project would result in cumulatively significant impacts to sensitive

[28] California Air Resources Board (ARB). 2005. Air Quality and Land Use Handbook: A Community Health Perspective. April.

receptors, even if individual projects were each less than significant. This is particularly likely since none of the measures herein would prevent multiple development projects from being constructed concurrently within close proximity to sensitive receptors in such a manner as to cause substantial concentrations within the area. Further, neither the amount of construction occurring nor the exact location within the Plan Area is foreseeable and, as such, it cannot be determined whether the resultant construction emissions could be adequately controlled or reduced to below regulatory thresholds. Without such information, it is not possible to conclude that air pollutant emissions resulting from construction activities would be adequately reduced to the point that sensitive receptors are not exposed to substantial concentrations of air pollutants, and thus a significant and unavoidable impact may result.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.3, the following mitigation measures from the General Plan PEIR are applicable to the project.

Implementation of MM AIR-2.2 and MM AIR-3.1

MM AIR-3.2 Locate sensitive land uses (e.g., residences, schools, and daycare centers) to avoid incompatibilities with recommended buffer distances identified in the most current version of the ARB Air Quality and Land Use Handbook: A Community Health Perspective (ARB Handbook). Sensitive land uses that are within the recommended buffer distances listed in the CRB Handbook shall provide enhanced filtration units or submit a Health Risk Assessment (HRA) to the City. If the HRA shows that the project would exceed the applicable SJVAPCD thresholds, mitigation measures capable of reducing potential impacts to an acceptable level must be identified and approved by the City.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Significant and unavoidable impact.

Existing regulations and ordinances would reduce operation-related impacts by reducing air pollutant emissions from stationary and mobile sources. Even with the implementation of new project-specific mitigation measures, cumulative operational emissions resulting from future development would likely exceed Valley Air District thresholds, contributing to the nonattainment designation of the SJVAB for the health-based State and national AAQS. Therefore, the potential impacts from the proposed project to sensitive receptors would be significant and unavoidable.

Objectionable Odors Exposure

Impact AIR-4	**The proposed project would not result in other emissions (such as those leading to odors) adversely affecting a substantial number of people.**

Impact Analysis

Odors can cause a variety of responses. The impact of an odor is dependent on interacting factors such as frequency (how often), intensity (strength), duration (in time), offensiveness unpleasantness), location, and sensory perception. While offensive odors rarely cause any physical harm, they still can be very unpleasant, leading to considerable distress and often generating citizen complaints to local governments and regulatory agencies.

Growth within the proposed Plan Area could generate new sources of odors. Odors from the types of land uses that could generate objectional odors (see Table 3.3-7) are regulated under Regulation IV, Prohibitions, Rule 4102, Nuisance, which states:

> A person shall not discharge from any source whatsoever such quantities of air contaminants or other materials which cause injury, detriment, nuisance or annoyance to any considerable number of persons or to the public or which endanger the comfort, repose, health or safety of any such person or the public or which cause or have a natural tendency to cause injury or damage to business or property.

As further discussed in the "Methodology" section, the Valley Air District has published recommended screening distances, as included in Table 3.3-7, and guidance documentation related to odors, which has been referenced for this analysis.

Construction-related Odors

Potential sources that may emit odors during construction activities include exhaust from diesel construction equipment. However, because of the temporary nature of these emissions, the intermittent nature of construction activities, and the highly diffusive properties of diesel exhaust, nearby receptors would not be affected by diesel exhaust odors associated with project construction. Odors from these sources would be localized and generally confined to the immediate area surrounding the proposed project site. The proposed project would utilize typical construction techniques, and the odors would be typical of most construction sites and temporary in nature. Impacts would be less than significant.

Operational-related Odors

Industrial land uses have the potential to generate objectionable odors. Examples of industrial projects are wastewater treatment plants, compost facilities, landfills, solid waste transfer stations, fiberglass manufacturing facilities, paint/coating operations (e.g., auto body shops), dairy farms, petroleum refineries, asphalt batch manufacturing plants, chemical manufacturing, and food manufacturing facilities. Agricultural operations, such as the existing agricultural land uses currently included in the Plan Area, may also generate odors.

Future developments in the Plan Area could include light industrial land uses such as wastewater treatment plants, and so there is the potential for land uses typically considered to be associated

with odors to be developed in the Plan Area. The proposed project would also develop different types of residential and retail activities, which are not typical odor-generating land uses. Potential impacts from odor sources would be mitigated through compliance with General Plan Policy PU-9-d and by enforcement actions by agencies with regulatory authority over odors. General Plan Policy PU-9-d would ensure that waste and recycling facilities are properly located. The Valley Air District addresses odor issues through Rule 4102– Nuisance. Facilities creating nuisance odors generating public complaints can result in Valley Air District enforcement action.

Future individual development projects consistent with the proposed project will be required to determine whether odors would be a potentially significant impact as part of CEQA review. In addition, projects containing sensitive receptors are likely to be proposed near existing odor sources, such as agricultural operations. Projects proposing new receptors within screening level distances will reduce the impact to less than significant levels. Proposal of a new source within the screening distance would require the applicant to demonstrate that the proposed facility includes odor controls within its design and through implementation of odor management practices to reduce odors to less than significant.

Development consistent with the proposed project could also result in sensitive receptors being constructed within the screening level distances from existing odor sources. These potential odor impacts on new sensitive receptors could be significant. When potential odor impacts on these new sensitive receptors occur, the Valley Air District has authority under Rule 4102 to require the owner of the odor-generating source to take actions that would reduce impacts to less than significant. The Valley Air District provided a record of all odor complaints within the Plan Area from 2018 through 2021 for known sources of odors. No significant odor complaints have been received in the Plan Area or in the vicinity of the proposed project in recent years.

In addition to the existing regulatory programs described above, mitigation required as part of the General Plan PEIR includes MM AIR-4.1, which requires developers of projects with the potential to generate significant odor to prepare an odor impact assessment and to implement odor control measures. Compliance with this mitigation measure required by the General Plan would further reduce potential impacts of objectionable odors to below a level of significance. Additionally, implementation of the proposed project's policies would help to minimize the effects of growth and development on air quality. No further mitigation is required.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in Section 3.3.2, Regulatory Framework, the following mitigation measures from the General Plan PEIR are applicable to the project.

MM AIR-4.1 Require developers of projects with the potential to generate significant odor impacts as determined through review of SJVAPCD odor complaint history for similar facilities and consultation with the SJVAPCD, to prepare an odor impact assessment and to implement odor control measures recommended by the SJVAPCD or the City

as needed to reduce the impact to a level deemed acceptable by the SJVAPCD. The City's Planning and Development Department shall verify that all odor control measures have been incorporated into the project design specifications prior to issuing a permit to operate.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

3.3.5 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for Air Quality is the SJVAB. This analysis evaluates whether impacts of the Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to air quality emissions. This analysis then considers whether incremental contribution of the impacts associated with implementation of the Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to the level of significance.

In accordance with the Valley Air District's methodology, any project that produces a significant project-level regional air quality impact in an area that is in nonattainment contributes to the cumulative impact. Because of the extent of the area potentially impacted from cumulative project emissions (i.e., the SJVAB); the Valley Air District considers a project cumulatively significant when project-related emissions exceed the regional emissions thresholds, as discussed in Impact AIR-2 and Impact AIR-3. No significant cumulative impacts were identified with regard to CO hotspots.

Criteria Pollutants

The SJVAB is designated nonattainment for ozone and $PM_{2.5}$, under the California and national AAQS and nonattainment for PM_{10} under the California AAQS. Construction of cumulative projects will further degrade the regional and local air quality. Air quality will be temporarily impacted during construction activities. As discussed in Impact AIR-2, construction emissions associated with the proposed Plan would exceed the Valley Air District's regional construction emissions thresholds for VOC, NO_X, CO, $PM_{2.5}$, and PM_{10}. and NO_X. Thus, the proposed project's contribution to cumulative air quality impacts would be cumulatively considerable and therefore significant.

For operational air quality emissions, any project that does not exceed or can be mitigated to less than the daily regional threshold values is not considered by the Valley Air District to be a substantial source of air pollution and does not add significantly to a cumulative impact. As discussed, the Valley Air District Rules 9510 and 9410 would contribute to reducing emissions of NO_X and particulate matter associated with future individual projects accommodated under the proposed Specific Plan and may reduce impacts for these individual development projects to a less than significant level. In addition, the planned improvements, design guidelines, objectives, and policies under the proposed Specific Plan would generally support a more sustainable development pattern in the Plan Area. Creation of more complete neighborhoods, with high-density housing located in proximity to jobs

and amenities, in addition to improving the public transit, pedestrian, and bicycle networks and infrastructure would contribute to reducing per capita VMT. However, due to the amount of growth for the proposed Plan Area, operation of the cumulative projects accommodate under the proposed Plan would result in emissions in excess of the Valley Air District regional emissions thresholds for VOC, NO_X, CO, PM_{10}, and $PM_{2.5}$. Thus, the proposed Specific Plan's criteria air pollutant emissions would be cumulatively considerable and therefore significant.

Toxic Air Contaminants

The proposed project would permit residential, office, commercial and industrial land uses. Development of the land uses that are allowed under the proposed project may result in stationary sources of TAC emissions, including light industrial facilities, warehouses, dry cleaners, restaurants with charbroilers, or buildings with emergency generators and boilers. While mitigation included in this Draft PEIR would serve to reduce the potential health impacts of TAC emissions in the Plan Area, there is not enough information currently available to quantify the emissions of specific project development that may occur as a part of the proposed project to guarantee a less than significant finding. Furthermore, the construction and operation of multiple projects in the Plan Area may lead to a cumulatively considerable, and therefore significant, amount of TAC emissions.

Objectionable Odors Exposure

As discussed in Impact AIR-4, potential odor sources associated with the proposed project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities; however, construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the respective phase of construction and is thus considered less than significant. Although it is possible other construction activities could occur in proximity concurrent with construction of the proposed project, due to the short duration and intermittent nature of construction-related odors, impacts would be less-than-cumulatively considerable.

For long-term operation, the proposed project and other cumulative developments would be required to comply with SJVAPCD Rule 4102 to prevent occurrences of public nuisances, as well as General Plan Mitigation Measure AIR-4.1, which would require potential future odor-generating industrial projects to mitigate potential impacts. Therefore, odors associated with the proposed project operations would be less-than-cumulatively considerable.

Level of Cumulative Significance Before Mitigation

Potentially significant cumulative impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM AIR-2.1 through MM AIR-4.1.

Project Specific Mitigation Measures

Implementation of MM AIR-1a through MM AIR-1f.

Level of Cumulative Significance After Mitigation

Significant and unavoidable. As discussed above, while implementation of MM AIR-1a through MM AIR-1f, as well as General Plan PEIR Mitigation Measures, would serve to reduce criteria air pollutant and TAC emissions generated by the proposed project, there is currently not enough information to quantify emissions of specific project development that may occur under the proposed project. Without quantification to guarantee a less than significant finding, future development projects may still exceed the Valley Air District regional significance thresholds. Additionally, due to the size of the proposed project, there is not sufficient mitigation available to reduce the potential criteria pollutant emissions associated with the proposed project to levels that would not exceed the Valley Air District thresholds of significance. Therefore, cumulative impacts to air quality would be considered to remain significant and unavoidable.

3.4 - Biological Resources

3.4.1 - Introduction

This section describes the existing biological setting and potential effects from project implementation on the project site and the surrounding area. This section also identifies mitigation measures to reduce these potential effects to less than significant levels. Descriptions and analysis in this section are based, in part, on the Fresno General Plan (General Plan), the Fresno Southeast Development Area (SEDA) Specific Plan (Specific Plan), the Fresno Municipal Code (Municipal Code), aerial photographs and maps, existing reports relevant to the Specific Plan area (Plan Area), and the results of database searches. As further discussed in Chapter 1, Introduction, seven public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to the proposed project's potential biological resources impact:

- Requests that the Draft PEIR analyzes potential impacts on the special-status species identified in the comment letter and provides necessary mitigation measures to reduce impacts to a less than significant level.
- States that any construction within or near a stream will require a clearance from the California Department of Fish and Wildlife (CDFW) and Streambed Alternation Agreement if buildout would result in alternation or degradation.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.4.2 - Environmental Setting

Vegetation and Wildlife Habitat

City of Fresno

The City is mainly comprised of previously disturbed urban and developed areas and includes several types of vegetation communities, as further described below.

According to the Fresno General Plan Program Environmental Impact Report (General Plan PEIR), a total of 11 vegetation communities were identified within the City and its Sphere of Influence (SOI), including two that are considered special-status natural communities by the CDFW. Table 3.4-1,

below, describes the vegetation communities identified in the City and its SOI as well as their associated acreages and percentages of total area.[1]

Table 3.4-1: Vegetation Communities within the City

Vegetation Community Type	Total Acreage Within the City and SOI (Acres)	Approximate Percentage of the Total City and SOI
Urban	67,100	63%
Irrigated Row and Field Crops	19,500	18%
Deciduous Orchard	14,500	14%
Lacustrine	3,000	3%
Annual Grassland	1,000	1%
Valley Foothill Riparian	370	Less than 1%
Riverine	270	Less than 1%
Valley Oak Woodland	120	Less than 1%
Barren	106	Less than 1%
Pasture	60	Less than 1%
Northern Claypan Vernal Pool	1	Less than 1%

Notes:
SOI = Sphere of Influence
Source: City of Fresno 2020.

The City's developed land accounts for approximately 63 percent of the of the City and its SOI and is mostly comprised of commercial, residential, and industrial buildings. The City's developed areas also include roads and parking lots. Approximately 32 percent of the Plan Area contains previously disturbed agricultural lands, orchards, pasture, and row and field crops, located predominately along the outer boundaries of the City and its SOI. Undeveloped and undisturbed areas with native vegetation occur within the remaining 5 percent of the City and its SOI. Further descriptions of these types of vegetation communities, as described in the General Plan PEIR, are included in Table 3.4-2, below.[2]

Table 3.4-2: Vegetation Community Types and Description

Vegetation Community Type	Description
Urban	Urban (developed area) lands have been constructed upon or otherwise covered with a permanent, unnatural surface (e.g., concrete, asphalt, buildings, homes, etc.) or large amounts of debris or other materials.

[1] City of Fresno. 2020. Fresno General Plan Program Environmental Impact Report. Accessed July 5, 2022.
[2] Ibid.

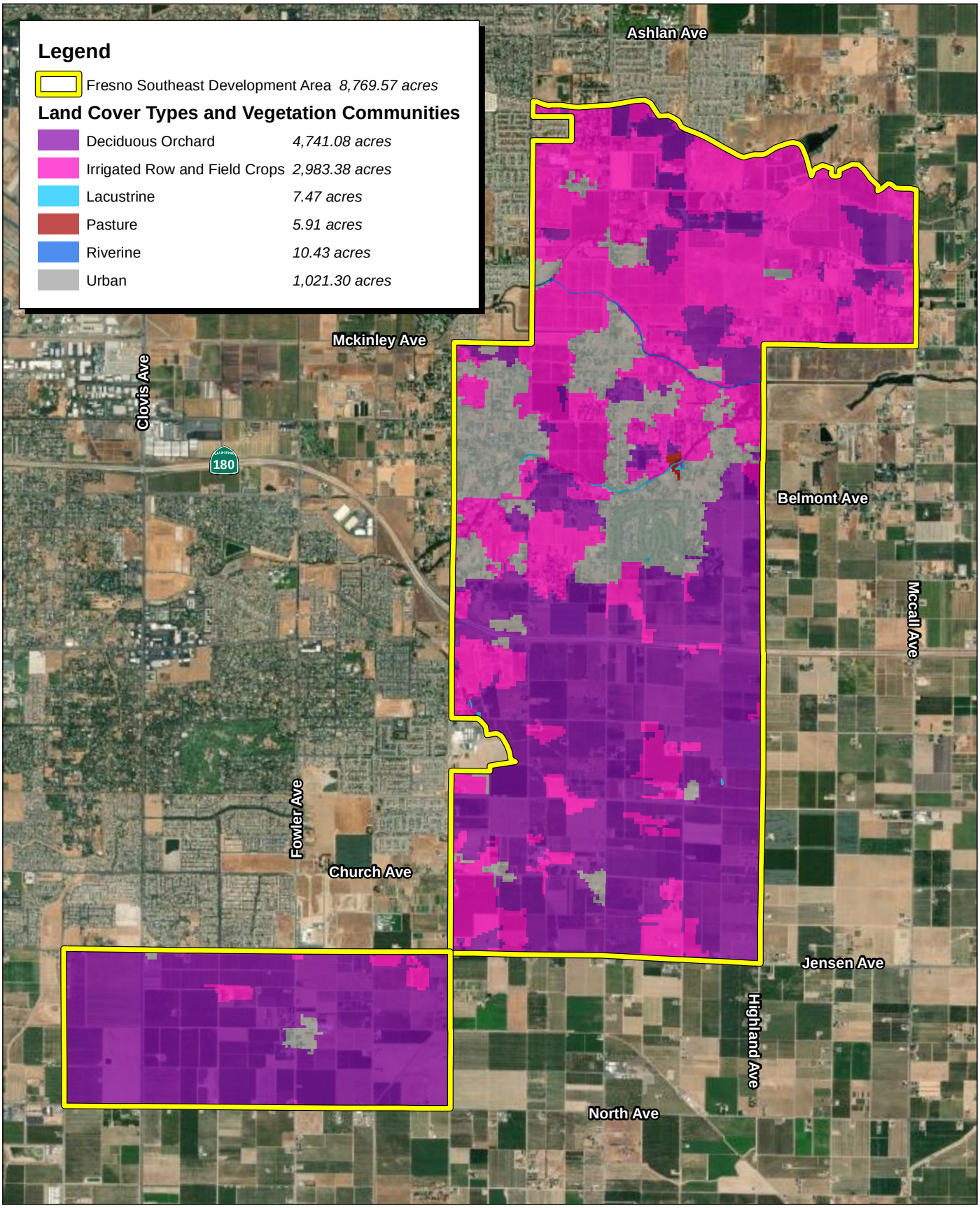
Vegetation Community Type	Description
Irrigated Row and Field Crops	Irrigated Row and Field Crops land occurs most frequently in n floodplains or upland areas with high soil quality. Irrigated row and field crows include annual and perennial crops, grown in rows, with open space between the rows. Row and field crops are artificially irrigated and feature a moderate disturbance rate by vehicle and pedestrian encroachment typically associated with farming activities. Species composition changes frequently, both by season and by year.
Deciduous Orchard	Deciduous orchard communities primarily occur where there are flat alluvial soils on valley floors, rolling foothills and relatively steep slopes. Orchard communities are typically comprised of artificially irrigated habitat dominated by one, sometimes several, tree or shrub species planted for cultivation. Trees are typically low and bushy, and the understory is open, with little groundcover. In the City and its SOI, deciduous orchards include a variety of fruit trees (e.g., apples, apricots, cherries, citrus, kiwi, peaches, nectarines, pears, persimmons, plums, pluots, pomegranates, etc.) and/or nut trees and shrubs (e.g., almonds, olives, pistachios, walnuts, etc.). Understory species generally consist of short native and non-native grasses and other herbaceous species.
Lacustrine	Lacustrine communities consist of standing/open waters in topographic depressions (i.e., lakes) or dammed river channels. Lacustrine communities lack persistent emergent vegetation but may have submerged or floating-leaved aquatic vegetation. Generally, lacustrine systems are surrounded by hydrophytic plants, grasses, and trees.
Annual Grassland	Annual grassland communities includes a mix of native and non-native, annual grasses, which often occur in association with ruderal herbs and occasional native annual forbs. The dominant plant species within the annual grassland vegetation community typically include black needlegrass (*Nasella sp.*), fescue (*Vulpia sp.*), brome (*Bromus sp.*), and wild oats (*Avena spp*), with mustard (*Brassica nigra*), dove weed *(Eremocarpus setigerus*), and poppy (*Eschscholzia sp.*). These grasses germinate with the fall rains, grow during the winter and spring, and wither in the early summer.
Valley Foothill Riparian	Valley Foothill Riparian communities within the City and its SOI occur primarily within mature riparian forests along the San Joaquin River corridor. They typically have a 20 to 80 percent canopy cover with trees that are winter deciduous. Wild grape (*Vitis californica*) often provides 30 to 50 percent ground cover. There is very little herbaceous understory with the exception of disturbed openings in the canopy cover. The understory typically consists of leaf-litter, fallen limbs, and is often impenetrable for smaller herbaceous plants. Tree canopy species within this community typically includes cottonwood (*Populus fremontii*), California sycamore (*Platanus racemosa*), and valley oak (*Quercus lobata*). Subcanopy species often includes white alder (*Alnus rhombifolia*), boxelder (*Acer negundo*), and Oregon ash (*Fraxinus latifolia*). Typical understory shrub layer plants include wild grape, California blackberry (*Rubus ursinus*), blue elderberry (*Sambucus caerulea*), poison oak (*Toxicodendron diversilobum*), and willows (*Salix sp.*).
Riverine	Riverine systems consist of linear aquatic communities of flowing, non-tidal waters with a distinct channel and little to no persistent emergent vegetation. Riverine systems may also include areas with abundant submerged or floating-leaved aquatic vegetation. Vegetation communities abutting riverine systems tend to be dominated by trees, shrubs, persistent emergent vegetation, and/or emergent mosses and lichens. This vegetation community occurs near or depends upon a nearby freshwater source or areas with fresh water flow during all or part of the year.
Valley Oak Woodland	Valley oak woodland communities vary from open-canopy savanna-like woodlands to partially closed canopy woodlands but mostly consist of winter deciduous, broad-leaved

Vegetation Community Type	Description
	species. Valley oak (*Quercus lobata*), a winter deciduous species and California's largest broad-leaved tree, is usually the only tree species present, although blue oak (*Q. douglasii*) may also be present. Mature valley oaks can reach heights of 50 to 100 feet (about 15 to 35 meters). Valley oak woodlands typically occur on deep, well-drained alluvial soils in valley bottoms that have a higher summer moisture content. This community intergrades with valley oak riparian near rivers and with blue oak woodlands on drier slopes. Characteristic understory species include creeping wild rye (*Elymus triticoides*), wild oats (*Avena sp.*), brome (*Bromus sp.*), barley (*Hordeum zp.*), needlegrass (*Nassella sp.*), and poison oak (*Toxicodendron diversilobum*).
Barren	Barren communities are areas in which the vegetative cover comprises less than 10 percent of the surface area (disregarding natural rock outcrops) and where there is evidence of soil surface disturbance and compaction from previous legal human activity, and/or areas in which the vegetative cover is greater than 10 percent, soils surface compaction is evident, and building foundations and debris are present (e.g., irrigation piping, fencing, old wells, abandoned farming or mining equipment) from legal activities (as opposed to illegal dumping). Vegetation within barren land has a high predominance of non-native or weedy species that are indicators of soil disturbance, including Russian thistle (*Salsola tragus*), telegraph weed (*Heterotheca grandiflora*), horehound (*Marrubium vulgare*), and sow thistle (*Sonchus oleraceus*), and a sub-dominance of non-native grasses. Barren land only provides moderately suitable habitat for one special-status species, California horned lark.
Pasture	Pasture lands form a dense habitat with nearly 100 percent cover; usually monoculture crops are planted in these areas, which are irrigated, artificially seeded, and frequently maintained. Characteristic species include non-native grasses such as oat (*Avena sp.*), bermuda grass (*Cynodon sp*.), barley (*Hordeum sp.*), Sorghum grass, as well as clover (*Medicago sp.*). Often times, this land contains significant areas of bare ground due to livestock grazing and movement across acres of this vegetation community.
Northern Claypan Vernal Pool	The northern claypan vernal pool community is located in an area that is surrounded by a lacustrine vegetation community in the northern portion of the City. Typically, these pools are located within the lower elevations of the main San Joaquin Valley. These areas are typically associated with a series of small mima mounds with interspersed pools. Typically, these pools have highly alkaline and may display whitish salt deposits in non-vegetated centers of dry pools. These vernal pools are dominated by a high percentage of non-native species.
Source: City of Fresno 2020.	

Plan Area

The Plan Area is located in the southeast portion of the City and its SOI and is composed of six of the 11 vegetation communities/land cover types present in the City and its SOI, as described above. Exhibit 3.4-1 includes a map of the vegetation communities' locations in the Plan Area, and Table 3.4-3, below, lists the vegetation communities, approximate acreage, approximate percentage of the total Plan Area, and suitability for special-status species.[3, 4]

[3] ESRI. 2022. Aerial Imagery of the City of Fresno. Accessed July 5, 2022.
[4] City of Fresno. 2020. Fresno General Plan Program Environmental Impact Report. Accessed July 5, 2022.



Source: ESRI Aerial Imagery.

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Exhibit 3.4-1
Land Cover Types and Vegetation Communities

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Table 3.4-3: Vegetation Communities within the Plan Area

Vegetation Community Type	Approximate Total Acreage Within the Plan Area	Approximate Percentage of the Total Plan Area	Suitability for Special-status Species
Deciduous Orchard	4,741	53%	This community is relatively disturbed, containing very little groundcover and planted trees that provide moderately suitable habitat for only one special-status species: California horned lark.
Irrigated Row and Field Crops	2,983	34%	This community contains active agriculture and is significantly disturbed with altered substrates. This vegetation community does not provide suitable habitat for any special-status plant species and limited habitat for special-status wildlife species: burrowing owl, California horned lark.
Urban	1,021	12%	This community provides poor quality habitat for any special-status species. Special-status species are unlikely to occur within this vegetation community.
Riverine	10	Less than 1%	This community provides a suitable habitat for aquatic species: western yellow-billed cuckoo, tricolored blackbird, hardhead, hoary bat, spotted bat, western pond turtle, and California satintail.
Lacustrine	7	Less than 1%	This community provides a suitable habitat for species that need standing/open waters: western spadefoot, tricolored blackbird, hoary bat, spotted bat, western pond turtle, dwarf downingia, and Sanford's arrowhead.
Pasture	6	Less than 1%	This community contains significant areas of bare ground due to livestock grazing and movement across acres of this vegetation community and is a limited habitat for special-status species: burrowing owl, California horned lark, San Joaquin kit fox, and Swainson's hawk.
Sources: ESRI Aerial Imagery 2022 and City of Fresno 2020.			

As described above, the majority of land cover in the Plan Area, approximately 87 percent, includes deciduous orchard and irrigated row and field crops. Generally, as shown in Exhibit 3.4-1, the majority of deciduous orchard communities in the Plan Area are concentrated in the southern portion of the Plan Area and irrigated row and field crops are concentrated in the northern portion of the Plan Area. Urban lands in the Plan Area are primarily concentrated south of McKinley Avenue and north of State Route (SR) 180.

Special-status Natural Communities

City of Fresno

The City and its SOI contain two special-status natural communities: the valley oak woodland vegetation community and the northern claypan vernal pool vegetation community. The General Plan PEIR also identifies three additional special-status natural communities located in the vicinity of the City and its SOI. These three special-status natural communities include the northern hardpan vernal pool, great valley mixed riparian forest, and sycamore alluvial woodland. Each of these additional three special-status natural communities are associated with stream courses, waterways, drainages, wetlands, and seasonal pools; however, these have not been recorded to occur within the City and its SOI and are, therefore, not likely to occur.[5]

Plan Area

As shown in Exhibit 3.4-1, the Plan Area does not contain any of the special-status natural communities identified in the City and its SOI.

Special-status Species

City of Fresno

The City and its SOI contain potentially suitable habitat for a total of 28 special-status species, which includes 12 plant species and 16 wildlife species. Each of the special-status species with potential to occur (or that are known to occur) within the City and its SOI is described in more detail below.[6]

Special-status Plant Species

According to the General Plan PEIR, six listed plant species have the potential to occur within the City and its SOI:

- California jewel flower (*Caulanthus californicus*)
- San Joaquin Valley orcutt grass (*Orcuttia inaequalis*)
- hairy orcutt grass (*Orcuttia pilosa*)
- Hartweg's golden sunburst (*Pseudobahia bahiifolia*)
- succulent owl's clover (*Castilleja campestris ssp. succulenta*)
- Greene's tuctoria (*Tuctoria greenei*)

In addition to the six listed plant species, there are six additional special-status plant species have the potential to occur in the City and its SOI, including:

- California satintail (*Imperata brevifolia*)
- Madera leptosiphon (*Leptosiphon serrulatus*)
- Sanford's arrowhead (*Sagittaria sanfordii*)
- caper-fruited tropidocarpum (*Tropidocarpum capparideum*)
- spiny-sepaled button-celery (*Eryngium spinosepalum*)
- dwarf downingia (*Downingia pusilla*)

[5] City of Fresno. 2020. Fresno General Plan Program Environmental Impact Report. Accessed July 5, 2022.
[6] Ibid.

Special-status Wildlife Species

According to the General Plan PEIR, a total of seven listed wildlife species have the potential to occur or are known to occur within the City and its SOI.[7]

- California tiger salamander (*Ambystoma californiense*)
- Fresno kangaroo rat (*Dipodomys nitratoides exilis*)
- San Joaquin kit fox (*Vulpes macrotis mutica*)
- Swainson's hawk (*Buteo swainsoni*)
- valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)
- vernal pool fairy shrimp (*Branchinecta lynchi*)
- western yellow-billed cuckoo (*Coccyzus americanus occidentalis*)

In addition to the seven listed wildlife species, there are nine additional special-status wildlife species that have the potential to occur or are known to occur within the City and its SOI,[8] including:

- American badger (*Taxidea taxus*)
- burrowing owl (*Athene cunicularia*)
- hardhead (*Mylopharodon conocephalus*)
- pallid bat (*Antrozous pallidus*)
- spotted bat (*Euderma maculatum*)
- tricolored blackbird (*Agelaius tricolor*)
- western mastiff bat (*Eumops perotis*)
- western pond turtle (*Emys marmorata*)
- western spadefoot (*Spea hammondii*)

Plan Area

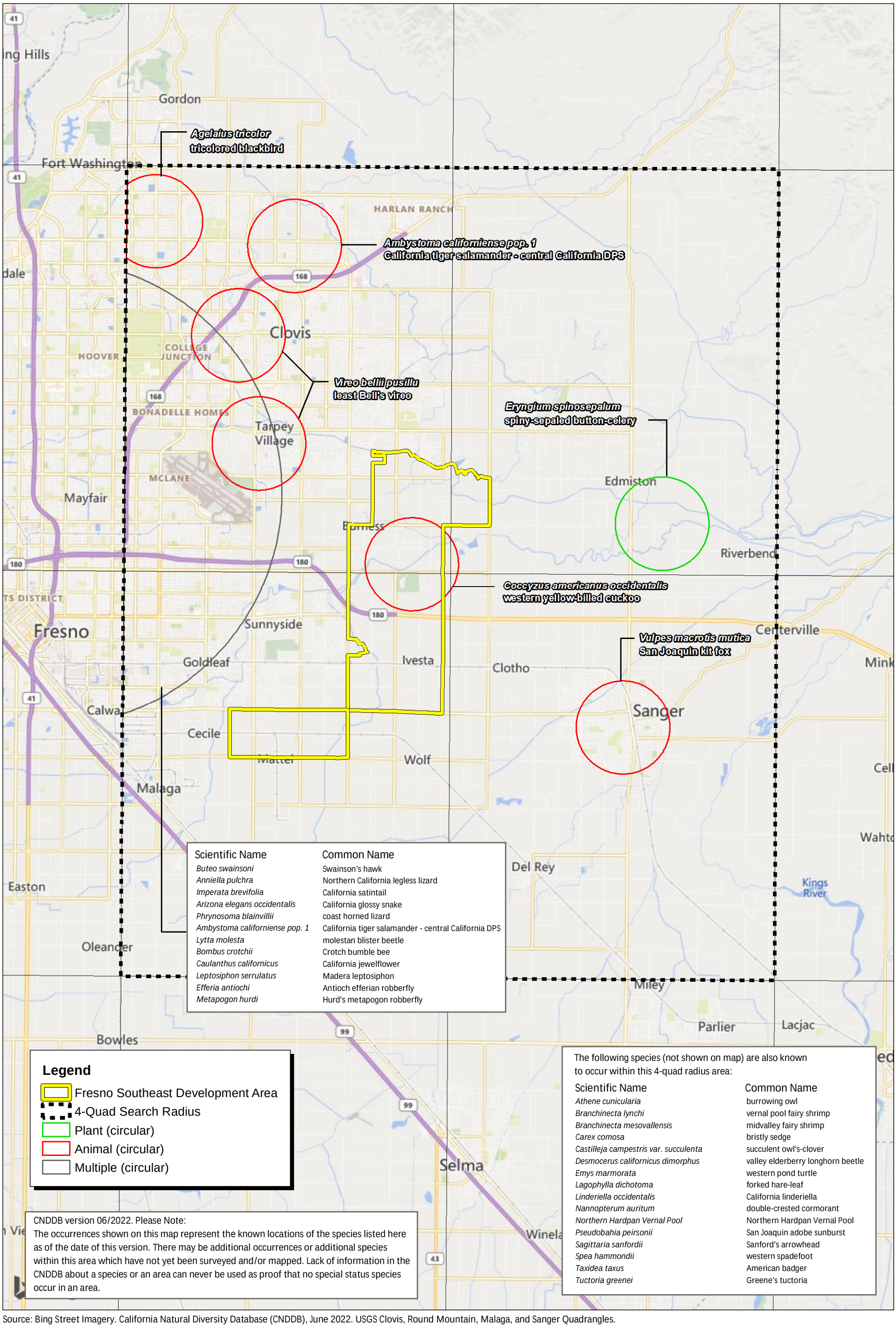
The potential for the Plan Area to support special-status plant and wildlife species is discussed below. The description and legal status of these species is presented in Table 3.4-4 and Table 3.4-5. Figure 3.4-2 shows the records for special-status plants and animals contained within the California Natural Diversity Database (CNDDB) as of June 2022 within a four quadrangle radius of the Plan Area.

Special-status Plant Species

According to the CNDDB, nine special-status plants have the potential to occur in the Plan Area. Table 3.4-4 describes the three special-status plant species listed for the Plan Area and their legal status as shown on Exhibit 3.4-2 as well as the six plant species and their legal status that are not shown on Exhibit 3.4-2 but are also known to occur within this 4-quad radius of the Plan Area.[9]

[7] City of Fresno. 2020. Fresno General Plan Program Environmental Impact Report. Accessed July 5, 2022.
[8] Ibid.
[9] California Native Plant Society (CNPS). 2022. Rare Plant Program. Rare Plant Inventory (online edition, v9-01 1.5). Website: https://www.rareplants.cnps.org. Accessed July 5, 2022.

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Scientific Name	Common Name
Buteo swainsoni	Swainson's hawk
Anniella pulchra	Northern California legless lizard
Imperata brevifolia	California satintail
Arizona elegans occidentalis	California glossy snake
Phrynosoma blainvillii	coast horned lizard
Ambystoma californiense pop. 1	California tiger salamander - central California DPS
Lytta molesta	molestan blister beetle
Bombus crotchii	Crotch bumble bee
Caulanthus californicus	California jewelflower
Leptosiphon serrulatus	Madera leptosiphon
Efferia antiochi	Antioch efferian robberfly
Metapogon hurdi	Hurd's metapogon robberfly

Legend

- Fresno Southeast Development Area
- 4-Quad Search Radius
- Plant (circular)
- Animal (circular)
- Multiple (circular)

CNDDB version 06/2022. Please Note:
The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDB about a species or an area can never be used as proof that no special status species occur in an area.

The following species (not shown on map) are also known to occur within this 4-quad radius area:

Scientific Name	Common Name
Athene cunicularia	burrowing owl
Branchinecta lynchi	vernal pool fairy shrimp
Branchinecta mesovallensis	midvalley fairy shrimp
Carex comosa	bristly sedge
Castilleja campestris var. succulenta	succulent owl's-clover
Desmocerus californicus dimorphus	valley elderberry longhorn beetle
Emys marmorata	western pond turtle
Lagophylla dichotoma	forked hare-leaf
Linderiella occidentalis	California linderiella
Nannopterum auritum	double-crested cormorant
Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool
Pseudobahia peirsonii	San Joaquin adobe sunburst
Sagittaria sanfordii	Sanford's arrowhead
Spea hammondii	western spadefoot
Taxidea taxus	American badger
Tuctoria greenei	Greene's tuctoria

Source: Bing Street Imagery. California Natural Diversity Database (CNDDB), June 2022. USGS Clovis, Round Mountain, Malaga, and Sanger Quadrangles.

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Exhibit 3.4-2
CNDDB Special-Status Species Occurrences

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Table 3.4-4: Special-status Plant Species within the Plan Area

Special-status Species Name	Federal Legal Status	State Legal Status	CNPS List and Threat
Shown on Exhibit 3.4-2			
California satintail (*Imperata brevifolia*)	None	None	CNPS 2B.1
California jewel flower (*Caulanthus californicus*)	FE	SE	CNPS 1B.1
Madera leptosiphon (*Leptosiphon serrulatus*)	None	None	CNPS 1B.2
Not Shown on Exhibit 3.4-2			
Bristly sedge (*Carex comosa*)	None	None	CNPS 2B.1
Succulent owl's clover (*Castilleja campestris ssp. succulenta*)	FT	SE	CNPS 1B.2
Forked hare-leaf (*Lagophylla dichotoma*)	None	None	CNPS 1B.1
San Joaquin adobe sunburst (*Pseudobahia peirsonii*)	FT	SE	CNPS 1B.1
Sanford's arrowhead (*Sagittaria sanfordii*)	None	None	CNPS 1B.2
Greene's tuctoria (*Tuctoria greenei*)	FE	SR	CNPS 1B.1

Notes:
Listing Status:
FE = Federally Listed Endangered
FT = Federally Listed Threatened
FC = Federal Species of Concern
SE = State Listed Endangered
ST = State Listed Threatened
SR = State Rare
SSC = California Species of Special Concern
SP = State Fully Protected Species

CNPS Lists:
1A = Plants presumed extinct in California
1B = Plants rare, threatened, or endangered in California and elsewhere
2 = Plants rare, threatened, or endangered in California, but more common elsewhere
3 = Plants about which more information is needed–a review list
4 = Plants of limited distribution–a watch list

CNPS Treat Code Extensions:
.1 = Seriously endangered in California
.2 = Fairly endangered in California
.3 = Not very endangered in California

Sources:
California Natural Diversity Database (CNDDB) 2022.
California Native Plant Society (CNPS) 2022.

Special-status Wildlife Species

According to the CNDDB, 18 special-status wildlife species have the potential to occur in the Plan Area. Table 3.4-5 describes the nine special-status wildlife species listed for the Plan Area and their

legal status as shown on Exhibit 3.4-2 as well as the nine special-status wildlife species and their legal status that are not shown on Exhibit 3.4-2 but are also known to occur within this 4-quad radius of the Plan Area.

Table 3.4-5: Special-status Wildlife Species within the Plan Area

Special-status Species Name	Federal Legal Status	State Legal Status
Shown on Exhibit 3.4-2		
Swainson's hawk *(Buteo swainsoni*)	None	ST
Northern California legless lizard (*Anniella pulchra*)	None	SSC
California glossy snake (*Arizona elegans occidentalis*)	None	SSC
Coast horned lizard (*Phrynosoma blainvillii*)	None	SSC
California tiger salamander–Central California DPS (*Ambystoma californiense pop. 1*)	FT	None
Molestan blister beetle (*lytta molesta*)	–	–
Crotch's bumble bee (*bombus crotchii*)	–	–
Antioch efferian robberfly (*Efferia antiochi*)	–	–
Hurd's metapogon robberfly (*Metapogon hurdi*)	–	–
Not Shown on Exhibit 3.4-2		
Burrowing owl (*Athene cunicularia*)	None	SSC
Vernal pool fairy shrimp (*Branchinecta lynchi*)	FT	None
Midvalley fairy shrimp (*Branchinecta mesovallensis*)	–	–
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	FT	None
Western pond turtle (*Emys marmorata*)	None	SSC
California linderiella (*Linderiella occidentalis*)	–	–
Double-crested cormorant (*Phalacrocorax auritus*)	–	–
Western spadefoot (*Spea hammondii*)	None	SSC
American badger (*Taxidea taxus*)	None	SSC

Notes:
Listing Status:
FE = Federally Listed Endangered
FT = Federally Listed Threatened
FC = Federal Species of Concern
SE = State Listed Endangered
ST = State Listed Threatened
SR = State Rare
SSC = California Species of Special Concern
SP = State Fully Protected Species

Special-status Species Name	Federal Legal Status	State Legal Status
CNPS Lists: 1A = Plants presumed extinct in California 1B = Plants rare, threatened, or endangered in California and elsewhere 2 = Plants rare, threatened, or endangered in California, but more common elsewhere 3 = Plants about which more information is needed–a review list 4 = Plants of limited distribution–a watch list **CNPS Treat Code Extensions:** .1 = Seriously endangered in California .2 = Fairly endangered in California .3 = Not very endangered in California Source: California Natural Diversity Database (CNDDB) 2022.		

Wetlands and Waters of the United States and the State

City of Fresno

The City and its SOI include a variety of rare plants and wildlife species, particularly along the San Joaquin River, which provides a concentrated riparian plant and animal sanctuary. This area of natural habitat is recognized as unique and scenic given its topographic variation in the characteristically flat San Joaquin Valley. It is a sensitive environment hosting a diversity of wildlife, fish, and plant species, and it contains the last remnants of a true riparian environment, due to the year–round presence of flowing water, which supports aquatic life. This riparian community provides nesting and roosting sites for raptors, herons, egrets, and other bird species (resident and migratory). It also contains special-status species, such as the valley elderberry long horn beetle as well as non-special-status vegetation, such as cottonwood and willow trees. In short, this segment of the river provides habitat diversity of great value to wildlife. Aside from the San Joaquin River, there are several canals that traverse the City and its SOI that provide opportunities for both vegetation and wildlife; however, such opportunities are limited.[10]

Plan Area

The Plan Area is traversed by several constructed drainage features and natural waterways: Gould Canal, Redbank Slough, Dry Creek Canal, Mill Ditch, Fancher Creek Canal, and Briggs Canal. Some canals in the Plan Area are mostly unvegetated and the banks are enforced with rock or broken asphalt and concrete, with some portions fully concrete-lined. In addition, there are several small ponds and numerous lateral irrigation ditches present that deliver water from the canals to agricultural fields. The Plan Area is not located near the San Joaquin River.

Several unnamed drainages and creeks exist within the Plan Area that may have hydrologic connectivity to a navigable or perennial surface water source or tributary. These may be subject to the jurisdiction of the United States Army Corps of Engineers (USACE) under provisions of Section 404 of the Clean Water Act (1972) and could be directly impacted by uncontrolled runoff or construction. Activities that require a permit under Section 404 of the Clean Water Act will require

[10] City of Fresno. 2014. Fresno General Plan. Accessed July 6, 2022.

State water quality certification from the Regional Water Quality Control Board (RWQCB) under Section 401 of the Clean Water Act. Formal wetland delineation is required to understand the limits and extents of such habitats before any construction begins. Many of these area types are generally disturbed, making certain special-status species' presence unlikely.

Wildlife Movement Corridors

The City is highly fragmented by roads and is dominated by several land uses, such as agriculture, residential, industrial, and commercial. Because of this fragmentation, it is unlikely to find corridors for wildlife movement or individual exchanges between populations. Native wildlife nursery sites are unlikely to be successful within the City. The urbanized area of the City provides little existing habitat value for native wildlife species in the agricultural, residential, industrial, and commercial land use areas, so land conversion would not be expected to substantially degrade the existing conditions for native resident or migratory fish or wildlife species, wildlife corridors, or nursery sites. Additionally, the City provides habitats for several species of mammal, the most common of which are raccoons, squirrels, opossums, rats, and bats. The riparian communities within the City provide nesting and roosting sites for raptors, herons, egrets, and other bird species (resident and migratory).

Regulated Trees

Implementation of the proposed project may result in the removal or alteration of existing trees within the boundaries of the Plan Area. Project development within the Plan Area has the potential to impact trees on public property; however, future development would be required to comply with Municipal Code Section13-305. Municipal Code Section 13-305 protects all public trees in the City, including but not limited to trees that are affecting surface improvements or underground facilities, or are diseased, or are located where construction is being considered or will occur. No person, except authorized City personnel, shall remove, destroy, deface, or injure any tree on public property by any means, including but not limited to: pouring material on or immediately adjacent to any tree, attaching any sign or notice to a tree without supervision of the Director of the City of Fresno Planning and Development Department, causing or encouraging fire around any tree, or covering the ground within a 4-foot radius around any tree with concrete or other unnatural surface. Any removal of trees shall be conducted only after an evaluation and inspection by the Director and written authorization.

3.4.3 - Regulatory Framework

Federal

Endangered Species Act

The United States Fish and Wildlife Service (USFWS) has jurisdiction over species listed as threatened or endangered under the federal Endangered Species Act of 1973. Section 9 of Endangered Species Act protects listed species from "take," which is broadly defined as actions taken to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct." The Endangered Species Act protects threatened and endangered plants and animals and their habitat. Additionally, the USFWS designates specific areas as "Critical Habitat" for species listed under the Endangered Species Act.

Candidate species are those proposed for listing; these species are usually treated by resource agencies as if they were actually listed during the environmental review process.

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) implements international treaties between the United States and other nations devised to protect migratory birds, their parts, eggs, and nests from activities such as hunting, pursuing, capturing, killing, selling, and shipping, unless expressly authorized in the regulations or by permit. All migratory birds and their nests are protected from take and other impacts under the MBTA (16 United States Code [USC] § 703, *et seq*.).

Bald and Golden Eagle Protection Act

The golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*) are afforded additional protection under the Eagle Protection Act, amended in 1973 (16 USC § 669, *et seq*.) and the Bald and Golden Eagle Protection Act (16 USC §§ 668–668d).

Clean Water Act

Section 404

The USACE administers Section 404 of the federal Clean Water Act (CWA), which regulates the discharge of dredge and fill material into waters of the United States.

As of the date of this report, the United States Environmental Protection Agency (EPA) and USACE (hereafter the agencies) are in receipt of the U.S. District Court for the District of Arizona's August 30, 2021, order vacating and remanding the Navigable Waters Protection Rule in the case of *Pascua Yaqui Tribe v. U.S. Environmental Protection Agency*. In light of this order, these agencies have halted implementation of the Navigable Waters Protection Rule and are interpreting "waters of the United States" consistent with the pre-2015 regulatory regime until further notice.[11]

Therefore, since the agencies are interpreting "waters of the United States" consistent with the pre-2015 regulatory regime until further notice, this analysis follows 40 Code of Federal Regulations 230.3(s), in effect under the pre-2015 regulatory regime, which defines "waters of the United States" as follows:

1. All waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide.
2. All interstate waters including interstate wetlands.
3. All other waters such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation or destruction of which could affect interstate or foreign commerce including any such waters:

[11] United States Environmental Protection Agency (EPA). 2021. Website: https://www.epa.gov/wotus/current-implementation-waters-united-states. Accessed September 9, 2021.

a) Which are or could be used by interstate or foreign travelers for recreational or other purposes; or
b) From which fish or shellfish are or could be taken and sold in interstate or foreign commerce; or
c) Which are used or could be used for industrial purposes by industries in interstate commerce.

4. All impoundments of waters otherwise defined as waters of the United States under this definition.
5. Tributaries of waters identified in paragraphs (s)(1) through (4) of this section.
6. The territorial sea.
7. Wetlands adjacent to waters (other than waters that are themselves wetlands) identified in paragraphs (s)(1) through (6) of this section; waste treatment systems, including treatment ponds or lagoons designed to meet the requirements of the CWA (other than cooling ponds as defined in 40 Code of Federal Regulations 423.11(m) which also meet the criteria of this definition) are not waters of the United States.

Waters of the United States do not include prior converted cropland. Notwithstanding the determination of an area's status as prior converted cropland by any other federal agency, for the purposes of the CWA, the final authority regarding CWA jurisdiction remains with the EPA and/or USACE.

"Wetland" refers to areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and seasonal wetlands. Wetlands are considered jurisdictional if they fall under one of the categories of waters of the United States defined above. The USACE jurisdiction typically extends up to the ordinary high water mark (OHWM).

In general, a USACE permit must be obtained before placing fill in wetlands or other waters of the United States. The type of permit depends on the impacted acreage, the purpose of the proposed fill, and other factors.

Section 401

As stated in Section 401 of the CWA, "any applicant for a federal permit for activities that involve a discharge to waters of the State, shall provide the federal permitting agency a certification from the State in which the discharge is proposed that states that the discharge will comply with the applicable provisions under the Federal Clean Water Act." Therefore, before the USACE will issue a Section 404 permit, applicants must apply for and receive a Section 401 Water Quality Certification from the RWQCB.

State

CEQA Guidelines

The California Environmental Quality Act (CEQA) requires public agencies to evaluate potential impacts to special-status species and their habitat. The following CEQA Guidelines Appendix G checklist questions serve as thresholds of significance when evaluating the potential impacts of a proposed project on biological resources. Impacts are considered significant if a project would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as being a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the CDFW or USFWS.
- Have a substantial adverse effect on federally and State-protected wetlands as defined by Section 404 of the CWA (including but not limited to marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State Habitat Conservation Plan.

California Fish and Game Code

Under the California Endangered Species Act (CESA), CDFW has the responsibility for maintaining a list of endangered and threatened species (Fish and Game Code [FGC] § 2070). Fish and Game Code Sections 2050 through 2098 outline the protection provided to California's rare, endangered, and threatened species. Fish and Game Code Section 2080 prohibits the taking of plants and animals listed under the CESA. Fish and Game Code Section 2081 established an incidental take permit program for State listed species. The CDFW maintains a list of "candidate species," which it formally notices as being under review for addition to the list of endangered or threatened species.

In addition, the Native Plant Protection Act of 1977 (NPPA) (FGC § 1900, *et seq*.) prohibits the taking, possessing, or sale within the State of any plants with a State designation of rare, threatened, or endangered (as defined by the CDFW). An exception to this prohibition in the NPPA allows landowners, under specified circumstances, to take listed plant species, provided that the owners first notify the CDFW and give the agency at least 10 days to retrieve (and presumably replant) the plants before they are plowed or otherwise destroyed. Fish and Game Code Section 1913 exempts from "take" prohibition "the removal of endangered or rare native plants from a canal, lateral ditch, building site, or road, or other right of way." Project impacts to these species are not considered significant unless the species are known to have a high potential to occur within the area of disturbance associated with construction of the proposed project.

In addition to formal listing under the Endangered Species Act and CESA, some species receive additional consideration by the CDFW and local lead agencies during the CEQA process. Species that may be considered for review are those listed as a "Species of Special Concern." The CDFW maintains lists of "Species of Special Concern" that serve as species "watch lists." Species with this status may have limited distributions or limited populations, and/or the extent of their habitats has been reduced substantially, such that their populations may be threatened. Thus, their populations are monitored, and they may receive special attention during environmental review. While they do not have statutory protection, they may be considered rare under CEQA and specific protection measures may be warranted. In addition to Species of Special Concern, the CDFW Special Animals List identifies animals that are tracked by the CNDDB and may be potentially vulnerable but warrant no federal interest and no legal protection.

Sensitive species that would qualify for listing but are not currently listed are afforded protection under CEQA. CEQA Guidelines Section 15065 (Mandatory Findings of Significance) requires that a substantial reduction in numbers of a rare or endangered species be considered a significant effect. CEQA Guidelines Section 15380 (Rare or Endangered Species) provides for the assessment of unlisted species as rare or endangered under CEQA if the species can be shown to meet the criteria for listing. Unlisted plant species on the California Native Plant Society (CNPS) List ranked 1A, 1B, and 2 would typically require evaluation under CEQA.

Fish and Game Code Sections 3500 to 5500 outline protection for fully protected species of mammals, birds, reptiles, amphibians, and fish. Species that are fully protected by these sections may not be taken or possessed at any time. The CDFW cannot issue permits or licenses that authorize the take of any fully protected species, except under certain circumstances such as scientific research and live capture and relocation of such species pursuant to a permit for the protection of livestock.

Under Fish and Game Code Section 3503.5, it is unlawful to take, possess, or destroy any birds in the orders of *Falconiformes* or *Strigiformes* (birds of prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto. To comply with the requirements of CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any State listed endangered or threatened species may be present in the project study area and determine whether the proposed project will have a potentially significant impact on such species. In addition, the CDFW encourages informal consultation on any proposed project that may impact a candidate species.

Project-related impacts to species on the CESA endangered or threatened list would be considered significant. State listed species are fully protected under the mandates of CESA. "Take" of protected species incidental to otherwise lawful management activities may be authorized under Fish and Game Code Section 206.591. Authorization from the CDFW would be in the form of an Incidental Take Permit.

Fish and Game Code Section 1602 requires any entity to notify the CDFW before beginning any activity that "may substantially divert or obstruct the natural flow of, or substantially change or use any material from the bed, channel, or bank of any river, stream, or lake" or "deposit debris, waste,

or other materials that could pass into any river, stream, or lake." "River, stream, or lake" includes waters that are episodic and perennial and ephemeral streams, desert washes, and watercourses with a subsurface flow. A Lake or Streambed Alteration Agreement will be required if the CDFW determines that project activities may substantially adversely affect fish or wildlife resources through alterations to a covered body of water. CDFW jurisdiction typically extends to the edge or "drip line" of the riparian habitat or top of bank.[12]

California Porter-Cologne Water Quality Control Act

The RWQCB regulates actions that would involve "discharging waste, or proposing to discharge waste, within any region that could affect the water of the State" (Water Code § 13260(a)), pursuant to provisions of the Porter-Cologne Water Quality Act. "Waters of the State" are defined as "any surface water or groundwater, including saline waters, within the boundaries of the State" (Water Code § 13050(e)). In 2019, the California State Water Resources Control Board (State Water Board) published the *State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State* (Procedures) to guide wetland/waters of the State determinations and the permitting process.[13]

California Native Plant Society

The CNPS maintains a rank of plant species that are native to California and that have low population numbers, limited distribution, or are otherwise threatened with extinction. This information is published in the Inventory of Rare and Endangered Vascular Plants of California. The following identifies the definitions of the CNPS ranks:

Rank 1A: Plants presumed extirpated in California and either rare or extinct elsewhere
Rank 1B: Plants rare, threatened, or endangered in California and elsewhere
Rank 2A: Plants presumed extirpated in California but common elsewhere
Rank 2B: Plants rare, threatened, or endangered in California but more numerous elsewhere
Rank 3: Plants about which more information is needed
Rank 4: Watch List: Plants of limited distribution

Potential impacts to populations of CNPS-ranked plants receive consideration under CEQA review. All plants appearing on the CNPS List ranked 1 or 2 are considered to meet the CEQA Guidelines Section 15380 criteria. Rank 3 and 4 plants do not automatically meet this definition. Rank 4 plants do not clearly meet CEQA standards and thresholds for impact considerations. Nevertheless, some level of CEQA review is justified for California Rare Plant Rank (CRPR) 4 taxa, and under some circumstances, a full impact analysis is warranted. Taxa that can be shown to meet the criteria for endangered, rare, or threatened status under CEQA Section 15380(d) or that can be shown to be regionally rare or unique as defined in CEQA Section 15125(c) must be fully analyzed in a CEQA document. Some circumstances, such as local rarity, having occurrences peripheral to the taxon's distribution, or having occurrences on unusual substrates or rare and declining habitats, provide justification for treating some CRPR 4 taxa occurrences as regionally rare or unique. One limitation to fully analyzing

[12] California Department of Fish and Wildlife (CDFW). 2020. California Natural Community List. Updated August 2021. Website: http://www.wildlife.ca.gov/Data/VegCAMP/Natural-Communities. Accessed January 17, 2022.

[13] California State Water Resources Control Board (State Water Board). 2019. State Wetland Definition and Procedures for Discharges of Dredged or Fill Material to Waters of the State. April 2, 2019.

impacts on CRPR 4 taxa is the difficulty in obtaining current data on the number and condition of the occurrences.[14]

Oak Woodlands Conservation Act

California SB 1334, the Oak Woodlands Conservation Act, became law on January 1, 2005, and was added to the CEQA statutes as 21083.4. This statute requires that a county must determine whether or not a project will result in a significant impact on oak woodlands and, if it is determined that a project may result in a significant impact on oak woodlands then the county shall require one or more of the following mitigation measures:

- Conserve oak woodlands through the use of conservation easements;
- Plant an appropriate number of trees, including maintenance of plantings and replacement of failed plantings;
- Contribute funds to the Oak Woodlands Conservation Fund for the purpose of purchasing oak woodlands conservation easements;
- Other mitigation measures developed by the county.

Local

Habitat Conservation Plan

The proposed project does not lie within the boundaries of any adopted Habitat Conservation Plan (HCP), Natural Community Conservation Plan (NCCP), or other approved local, regional, or State HCP.

Fresno General Plan

The General Plan outlines a long-range vision for the physical development of the City that reflects the community's vision to preserve the desirable qualities of the existing community while encouraging the aspirations of the community. The following objectives, policies, and programs are related to biological resources:

Open Space and Biological Resources Element:

Policy POSS-5-a **Habitat Area Acquisition**. Support federal, State, and local programs to acquire significant habitat areas for permanent protection and/or conjunctive educational and recreational use.

PolicyPOSS-5-b **Habitat Conservation Plans.** Participate in cooperative, multijurisdictional approaches for area-wide habitat conservation plans to preserve and protect rare, threatened, and endangered species.

Policy POSS-5-c **Buffers for Natural Areas.** Require development projects, where appropriate and warranted, to incorporate natural features (such as ponds, hedgerows, and wooded strips) to serve as buffers for adjacent natural areas with high ecological value.

[14] California Native Plant Society (CNPS). 2020. Considerations for Including CRPR 4 Plant Taxa in CEQA Biological. Resource Impact Analysis. Sacramento, CA. January 21, 2020.

Policy POSS-5-d **Guidelines for Habitat Conservation.** Establish guidelines for habitat conservation and mitigation programs, including:

- Protocols for the evaluation of a site's environmental setting and proposed design and operating parameters of proposed mitigation measures.
- Methodology for the analysis depiction of land to be acquired or set aside for mitigation activities.
- Parameters for specification of the types and sources of plant material used for any re-vegetation, irrigation requirements, and post-planting maintenance and other operational measures to ensure successful mitigation.
- Monitoring at an appropriate frequency by qualified personnel and reporting of data collected to permitting agencies.

Policy POSS-5-e Pursue development of conjunctive habitat and recreational trail uses in flood control and drainage projects.

Policy POSS-5-f **Regional Mitigation and Habitat Restoration.** Coordinate habitat restoration programs with responsible agencies to take advantage of opportunities for a coordinated regional mitigation program.

Policy POSS-5-g **Assistance in Valley Arboretum Master Planning.** Assist community organizations that have raised grant funds to pursue the preparation of a Valley Arboretum Master Plan and Implementation Program, including funding, to be coordinated with community groups, as well as related plans and policies for established neighborhoods and other areas with park deficiencies.

Objective POSS-6 Maintain and restore, where feasible, the ecological values of the San Joaquin River corridor.

Policy POSS-6-a **San Joaquin River Parkway Master Plan.** Support the San Joaquin River Conservancy in its efforts to update the San Joaquin River Parkway Master Plan by working with the other jurisdictions and the River Conservancy to create a comprehensive and feasible plan for preservation, conservation, and Parkway development.

Policy POSS-6-b **Effects of Stormwater Discharge.** Support efforts to identify and mitigate cumulative adverse effects on aquatic life from stormwater discharge to the San Joaquin River.

- Avoid discarge of runoff from urban uses to the San Joaquin River or other riparian corridors.
- Approve development on sites having drainage (directly or indirectly) to the San Joaquin River or other riparian areas only upon a finding that adequate measures for preventing pollution of natural bodies of water from their runoff will be implemented.

- Periodically monitor water quality and sediments near drainage outfalls to riparian areas. Institute remedial measures promptly if unacceptable levels of contaminant(s) occur.

Objective POSS-7 Support the San Joaquin River Conservancy in its collaborative, multiagency efforts to develop the San Joaquin River Parkway.

Policy POSS-7-a **Preserve Wildlife Corridors.** Acquire and expand natural reserves and wildlife corridors through purchase, easements, mitigation for proposed activities, or other mutually satisfactory transactions.

Policy POSS-7-b **Wildlife Corridor along San Joaquin River.** Create a wildlife corridor to provide continuous open space land and water areas parallel to the San Joaquin River within the jurisdiction of the City.

- Preserve a minimoum width of 200 feet of riparian vegetation on both sides of the river.
- Require the corridor to be wider when possible and/or necessary to protect additional areas of native plants and critical habitat (such as wildlife breeding areas). Re-establishment of a 200-foot or wider band of native plants is recommended in areas where 200 feet of riparian vegetation no longer exists along the river bank, to the maximum extent feasible from topologic and hydrologic standpoints.
- Allow exceptions where the minimum-width corridor is infeasible due to topography, hydrology, or other constraints. An offsetting expansion may be approved in those instances on the opposite side of the river. Incorporate the bluff face into the wildlife corridor where steep bluffs drop directly into or close to the river.

Policy POSS-7-c **Monitoring River Corridor Conditions.** Undertake periodic monitoring to determine the status of conditions and mitigation measures required for projects within, and in the vicinity of, the river corridor.

- Pursue a Memorandum of Understanding (MOU) or other agreement so that the San Joaquin River Conservancy can perform, or participate in, this monitoring program in order to furnish additional expertise, provide for cost efficiency, and to ensure consistency throughout the river corridor.
- Based on information obtained from monitoring, modifications in special permits, reclamation plans, and other documents, operating parameters for uses may be necessary to insure human health and safety and the well-being of riparian plants and wildlife.

Policy POSS-7-d **Buffer Zones near Intensive Uses.** Protect natural reserve areas and wildlife corridor areas in the San Joaquin River corridor whenever more intensive human uses exist

or are proposed on adjacent lands. Use buffer zones to allow multiple uses on parts of the parkway while still protecting wildlife and native plants.

- Require studies of appropriate buffer widths to be approved by State and federal wildlife agencies before variances from standard buffer zone widths are granted.
- Maintain natural riparian buffer zones with appropriate native plants (seed material and cuttings locally derived).
- Incorporate open space uses such as pasture, low-intensity agricultural activities, and the "rough" or marginal areas of golf courses, into buffer zones when they constitute and improvement in habitat over a previous use or degraded area. Evaluate and address the potential impacts of construction, cultural, and operational practices (such as grading, number of livestock per acre, lighting, and use pesticides, herbicides, and fertilizers) before these uses are be approved for buffering.
- For nearby areas of the San Joaquin River corridor outside fo the exclusive jurisdiction of the City, support efforts to work with other jurisdictions to achieve this policy.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to biological resources:

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.2 **Passive Open Space.** Support community farming and agriculture in appropriate locations within the open space network. See the Community Farming and Agriculture Chapter for details about the SEDA agricultural land typology.

- Pursue partnerships with local organizations to promote agricultural uses in the open space network.

Objective OS-5 Promote the preservation of sensitive natural environments.

Policy OS-5.2 **Habitat Corridors.** Establish contiguous areas of passive open space to provide habitat corridors for local wildlife, including but not limited to riparian and canal greenway corridors, greenway/trail corridors, and parks and flood control facilities throughout the SEDA Plan. Habitat preservation shall be consistent and coordinated

with the findings of the SEDA Environmental Impact Report and subsequent environmental studies and findings.

Fresno Municipal Code

Section 13-305–Tree Preservation

Section 13-305, Tree Preservation, of the Municipal Code establishes a policy to utilize whatever techniques, methods, and procedures are required to preserve, whenever feasible, all trees in the City.

Section 15-306–Special Tree List

Section 13-306, Special Tree List, authorizes the Director to develop and maintain a Special Tree List to give such trees special treatment and care to retain and protect them.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan PEIR contains the following mitigation measures that are applicable to the proposed project.

MM BIO-1.1 Construction of a proposed project shall avoid, where possible, vegetation communities that provide suitable habitat for a special-status species known to occur within the Planning Area. If construction within potentially suitable habitat must occur, the presence/absence of any special-status plant or wildlife species must be determined prior to construction, to determine whether the habitat supports any special-status species. If a special-status species are determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible. Specific mitigation measures for direct or incidental impacts to special-status species shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-1.2 Direct or incidental take of any State or federally listed species shall be avoided to the greatest extent feasible. If construction of a proposed project will result in the direct or incidental take of a listed species, consultation with the resources agencies and/or additional permitting may be required. Agency consultation through the CDFW 2081 and USFWS Section 7 or Section 10 permitting processes shall take place prior to any action that may result in the direct or incidental take of a listed species. Specific mitigation measures for direct or incidental impacts to special-status species shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-1.3 Development within the Planning Area shall avoid, where possible, special-status natural communities and vegetation communities that provide suitable habitat for

special-status species. If a proposed project will result in the loss of a special-status natural community or suitable habitat for special-status species, compensatory habitat-based mitigation is required under CEQA and CESA. Mitigation shall consist of preserving on-site habitat, restoring similar habitat or purchasing off-site credits from an approved mitigation bank. Compensatory mitigation shall be determined through consultation with the City and/or resource agencies. An appropriate mitigation strategy and ratio shall be agreed upon by the developer and lead agency to reduce project impacts to special-status natural communities to a less than significant level. Agreed-upon mitigation ratios shall depend on the quality of the habitat and presence/absence of a special-status species. Specific mitigation measures for direct or incidental impacts to special-status natural communities and vegetation communities shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-1.4 Proposed projects within the Planning Area should avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA), if it is determined that suitable nesting habitat occurs on a project site. If construction cannot avoid the nesting season, a pre-construction clearance survey shall be conducted by a qualified Biologist to determine whether any nesting birds or nesting activity is observed on or within 500-feet of a project site. If an active nest is observed during the survey, a biological monitor shall be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer shall be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities may continue in the vicinity of the nest only at the discretion of the biological monitor. Prior to commencement of grading activities and issuance of any building permits, the Director of the City of Fresno Planning and Development Department, or designee, shall verify that all proposed project grading and construction plans include specific documentation regarding the requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503, that preconstruction surveys have been completed and the results reviewed by staff, and that the appropriate buffers (if needed) are noted on the plans and established in the field. Specific mitigation measures for direct or incidental impacts to avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA) shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-2.1 A pre-construction clearance survey, following current CDFW protocols, shall be conducted by a qualified Biologist to determine whether a proposed project will result in the removal or impact to any riparian habitat and/or a special-status natural

community with potential to occur in the Planning Area, compensatory habitat-based mitigation shall be required to reduce project impacts. Compensatory mitigation must involve the preservation or restoration or the purchase of off-site mitigation credits for impacts to riparian habitat and/or a special-status natural community. Mitigation must be conducted in-kind or within an approved mitigation bank in the region. The specific mitigation ratio for habitat-based mitigation shall be determined through consultation with the appropriate agency (i.e., CDFW or USFWS) on a case-by-case basis. The project applicant/developer for a proposed project shall develop and implement appropriate mitigation regarding impacts on their respective jurisdictions.

MM BIO-2.2 A pre-construction clearance survey, following current CDFW protocols, shall be conducted by a qualified Biologist to determine whether a proposed project will result in significant impacts to streambeds or waterways protected under Section 1600 of Fish and Wildlife Code and Section 404 of the CWA. The project applicant/developer for a proposed project shall consult with partner agencies such as CDFW and/or USACE to develop and implement appropriate mitigation regarding impacts on their respective jurisdictions, determination of mitigation strategy, and regulatory permitting to reduce impacts, as required for projects that remove riparian habitat and/or alter a streambed or waterway. The project applicant/developer shall implement mitigation as directed by the agency with jurisdiction over the particular impact identified.

MM BIO-2.3 Prior to project approval, a pre-construction clearance survey, following current CDFW protocols, shall be conducted by a qualified Biologist to determine whether a proposed project will result in project-related impacts to riparian habitat or a special-status natural community or if it may result in direct or incidental impacts to special-status species associated with riparian or wetland habitats. The project applicant/developer for a proposed project shall be obligated to address project-specific impacts to special-status species associated with riparian habitat through agency consultation, development of a mitigation strategy, and/or issuing incidental take permits for the specific special-status species, as determined by the CDFW and/or USFWS.

MM BIO-3.1 If a proposed project will result in the significant alteration or fill of a federally protected wetland, a formal wetland delineation conducted according to USACE accepted methodology is required for each project to determine the extent of wetlands on a project site. The delineation shall be used to determine whether federal permitting and mitigation strategy are required to reduce project impacts. Acquisition of permits from USACE for the fill of wetlands and USACE approval of a wetland mitigation plan would ensure a “no net loss” of wetland habitat within the Planning Area. Appropriate wetland mitigation/creation shall be implemented in a ratio according to the size of the impacted wetland.

MM BIO-3.2 In addition to regulatory agency permitting, Best Management Practices identified from a list provided by the USACE shall be incorporated into the design and construction phase of the project to ensure that no pollutants or siltation drain into a federally protected wetland. Project design features such as fencing, appropriate drainage and incorporating detention basins shall assist in ensuring project-related impacts to wetland habitat are minimized to the greatest extent feasible.

3.4.4 - Methodology

Literature Review

Existing Documentation

FirstCarbon Solutions (FCS) Biologists reviewed existing environmental documentation for the Plan Area and immediate vicinity. This documentation included the City of Fresno General Plan and Municipal Code, noted above, literature pertaining to the habitat requirements of special-status species potentially occurring on or near the planning area, and federal Endangered Species Act listings, protocols, and species data provided by the USFWS and CDFW.

Elevation and Drainage

An FCS Biologist reviewed current United States Geological Survey (USGS) 7.5-minute topographic quadrangle map(s)and aerial photographs as a preliminary analysis of the existing conditions within the project site and immediate vicinity.[15] Information obtained from the topographic maps included elevation, general watershed information, and potential drainage feature locations using Google Earth in conjunction with the EPA Watershed Assessment, Tracking, and Environmental Results System (WATERS).[16] Aerial photographs provided a perspective of the current site conditions relative to on-site and off-site land use, plant community locations, and potential locations of wildlife movement corridors.

Soil

The United States Department of Agriculture (USDA) has published soil surveys that describe the soil series (i.e., group of soils with similar profiles) occurring within a particular area.[17] These profiles include major horizons with similar thickness, arrangement, and other important characteristics. These series are further subdivided into soil mapping units that provide specific information regarding soil characteristics. Many special-status plant species have a limited distribution based exclusively on soil type. Therefore, pertinent USDA soil survey maps were reviewed to determine the existing soil mapping units within the project site and to inform whether the soil conditions on-site are potentially suitable for any special-status plant species. However, Natural Resources

[15] United States Geological Survey (USGS). 2022. National Geospatial Program. Website: https://www.usgs.gov/core-science-systems/national-geospatial-program/us-topo-maps-america?qt-science_support_page_related_con=4#qt-science_support_page_related_con. Accessed December 28, 2022.

[16] United States Environmental Protection Agency (EPA). 2022. Watershed Assessment, Tracking and Environmental Results System (WATERS). Website: https://www.epa.gov/waterdata/waters-watershed-assessment-tracking-environmental-results-system. Accessed December 28, 2022.

[17] Natural Resources Conservation Service (NRCS). 2022. Web Soil Survey (WSS). United States Department of Agriculture (USDA). Website: https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx. Accessed December 28, 2022.

Conservation Service (NRCS) soil maps utilize an approximately 1.4-acre minimum mapping unit and line placement may not be accurate on a large (i.e., parcel-level) scale.

Special-status Wildlife and Plant Species

An FCS Biologist compiled a list of threatened, endangered, and otherwise special-status species previously recorded within the project vicinity based on a search of the USFWS Information for Planning and Consultation (IPaC) database,[18] the CNDDB and the CNPS Electronic Inventory (CNPSEI) of Rare and Endangered Vascular Plants of California for the *Malaga, Sanger, Round Mountain, and Clovis, California* USGS 7.5-minute Topographic Quadrangle Maps.[19, 20] The CNDDB Biogeographic Information and Observation System (BIOS 5) was used to determine the distance between the known occurrences of special-status species and the Plan Area.[21] The database search results can be found in Appendix C.

Jurisdictional Waters and Wetlands

Regulated Trees

Prior to conducting the reconnaissance-level field survey, an FCS Biologist reviewed City ordinances pertaining to tree preservation and protection and ascertained whether tree replacement measures or permits for the removal of protected trees are required.

Vegetation

Taxonomic nomenclature used in this study follows The Jepson Manual: Vascular Plants of California.[22] Common plant names, when not available from The Jepson Manual, were taken from other regionally specific references.

Sensitive Natural Communities

Sensitive natural communities are vegetation communities or special wildlife habitats that are rare or occur in limited distributions or provide specific habitat requirements for special-status plant or wildlife species. The CDFW maintains a list of natural communities which attempts to classify vegetation types found within the State of California and rank them based on rarity. Communities ranked S1-S3 are considered sensitive natural communities.[23] Riparian vegetation communities are generally considered sensitive.

Wildlife Movement Corridors

Wildlife movement corridors link areas of suitable wildlife habitat that are otherwise separated by natural and anthropogenic dispersal barriers, including rugged terrain, changes in vegetation,

[18] United States Fish and Wildlife Service (USFWS). 2022. Information for Planning and Consultation (IPaC). Website: https://ecos.fws.gov/ipac/. Accessed December 28, 2022.

[19] California Department of Fish and Wildlife (CDFW). 2022. California Natural Diversity Database (CNDDB) Maps and Data, RareFind 5 internet application. Website: https://wildlife.ca.gov/Data/CNDDB/Maps-and-Data . Accessed December 28, 2022.

[20] California Native Plant Society (CNPS). 2022. California Native Plant Society Rare and Endangered Plant Inventory. Website: http://www.rareplants.cnps.org/. Accessed December 28, 2022.

[21] California Department of Fish and Wildlife (CDFW). 2022. Biogeographic Information and Observation System (BIOS 5). Website: https://wildlife.ca.gov/Data/BIOS. Accessed December 28, 2022.

[22] Baldwin, B. et al. 2012. The Jepson Manual: Vascular Plants of California. Berkeley: University of California Press. County of San Bernardino (Bernardino). 2007 (amended 2015).

[23] California Department of Fish and Wildlife (CDFW). 2022. Sensitive Natural Communities List, Sacramento: California Department of Fish and Wildlife. https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities. Accessed December 28, 2022.

development, or human disturbance. Urbanization and the resulting fragmentation of open space areas create isolated "islands" of wildlife habitat, forming separated populations. Corridors act as an effective link between populations. Online resources such as eBird and California Herps were consulted, as necessary. [24,25]

Approach to Analysis

Impacts on biological resources were evaluated based on the likelihood that special-status species, sensitive habitats, wildlife corridors, and protected trees are present within the Plan Area and the likely effects of construction or operation on these resources. For the purposes of this EIR, the word "substantial" as used in the significance thresholds above is defined by the following three principal components:

- Magnitude and duration of the impact (e.g., substantial/not substantial),
- Uniqueness of the affected resource (rarity), and
- Susceptibility of the affected resource to disturbance.

In this Biological Resources Analysis, the project site (Plan Area) is defined as all areas directly affected by project development.

3.4.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts to biological resources are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would be considered significant if the project would:

a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.

[24] eBird. 2022. Online bird occurrence database. Website: http://ebird.org/content/ebird/. Accessed August 28, 2022.
[25] California Herps. 2022. A Guide to the Amphibians and Reptiles of California. Website: http://www.californiaherps.com/. Accessed December 28, 2022.

b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.

c) Have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites.

e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State Habitat Conservation Plan.

3.4.6 - Impact Analysis, Mitigation Measures, and Level of Significance After Mitigation

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Special-status Species

Impact BIO-1:	**The proposed project would have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.**

Development under the proposed project would result in additional residential and nonresidential development throughout the Plan Area. Additionally, the proposed project may result in other private and public improvements throughout the Plan Area with the potential for environmental effects related to biological resources. Thus, subsequent development under the proposed project could result in the direct/indirect loss of natural vegetation communities that provide suitable habitat for 27 special-status plant and wildlife species that have the potential to occur or are known to occur within the Plan Area. The vegetation communities within the Plan Area boundary that provide suitable habitat for listed and other special-status species are described above, under Section 3.4.2. Development within the Plan Area could result in the loss or degradation of natural habitats such as lacustrine, riverine, and pasture, which may support special-status plant and wildlife species. Project-related impacts to any of these habitat types may result in a substantial adverse effect, if it is determined that a special-status species would be impacted, either directly or through habitat modifications.

Special-status Plant Species

A special-status plant species is defined as any plant species which is listed, or proposed for listing, as threatened or endangered by the USFWS under the provisions of the Endangered Species Act.[26] This includes any species designated by USFWS as a "candidate" or "species of concern" or species identified on California Native Plant Societty's Lists 1A, 1B, or 2, implying potential danger or extinction.

A significant impact would occur if future development under the proposed project would have a substantial adverse effect, either directlly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

Special-status and rare plant surveys were not conducted within the Plan Area. However, as shown on Exhibit 3.4-2, a database search was conducted to identify where rare plants occurences are located within the Plan Area. The results of that search determined that nine special-species plants have limited protential to occur in the Plan Area, as shown in Table 3.4-4. If individuals of these species are present in the Plan Area, plants could be adversely impacted from development (e.g., soil compaction, trampling, or earthmoving activities) of the Plan Area.

Special-status Wildlife Species

A special-status wildlife species is defined as any wildlife species which is listed, or proposed for listing, as threatened or endangered by the USFWS or National Marine Fisheries Service under the provisions of the Endangered Species Act.[27] It also includes any species designated by the CDFW as a "candidate" or "species of concern."

A significant impact would occur if future development under the proposed project would have a substantial adverse effect, either directlly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

Special-status wildlife surveys were not conducted within the Plan Area. However, as shown on Exhibit 3.4-2, a database search was conducted to identify where special-status wildlife is located within the Plan Area. The results of that search determined that 18 special-species wildlife have limited potential to occur in the Plan Area, as shown in Table 3.4-5.

Direct project impacts to species listed as a candidate, sensitive, or special-status species by local, State, and federal agencies should be avoided to the greatest extent feasible; however, it is acknowledged it may not be feasible for future projects to avoid these species. Project-related impacts that result in the direct take of a special-status species may be considered a significant impact. The presence/absence of a special-status species on a project site and the potential to impact a special- status species must be determined prior to project construction. If development

[26] City of Fresno. 2014. Fresno General Plan. December 18 Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2019/07/ConsolidatedGP6182020.pdf. Accessed July 7, 2022.

[27] City of Fresno. 2014. Fresno General Plan. December 18 Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2019/07/ConsolidatedGP6182020.pdf. Accessed July 7, 2022.

within the Plan Area results in the direct take or loss of suitable habitat for any of the 27 special-status species that have the potential to occur in the Plan Area, project-level site-specific mitigation would be required to reduce the potential impacts to less than significant levels. Project impacts to special-status species listed as threatened or endangered by CDFW and/or USFWS may also require agency consultation and/or take permits. However, future development in the Plan Area would be required to comply with the following General Plan policies pertaining to biological resources, specifically within the Parks, Open Space, and Schools Element (POSS), as outlined above. Project-level implementation of the General Plan Policies POSS-5-a through POSS-5-f would reduce potential project impacts to special-status species and their associated habitats. Furthermore, incorporation of the General Plan Mitigation Measures (MM) BIO-1.1 to BIO-1.4 into the conditions of approval would ensure that if one or more of these special-status species occur in the Plan Area, their presence would be detected, the risk of mortality would be avoided to the maximum extent feasible.

Additionally, all future development in the Plan Area would be required to comply with the proposed Specific Plan policies pertaining to biological resources, including Policy OS-2.2, which protects passive open space, and Policy OS-5.2, which protects habitat corridors.

The Municipal Code also includes policies pertaining to biological resources that relate to future development within the Plan Area, such as Section 12-4.1302 and 12-4.1303 that prevent infill developments from occurring within habitats that can be used for endangered, rare, or threatened species.

Implementation of the City's relevant General Plan policies pertaining to biological resources (POSS-5-a through POSS-5-f); General Plan mitigation measures (MM BIO-1.1 to MM BIO-1.4); Specific Plan Policies (OS-2.2 and OS-5.2); Sections 12-4.1302 and 12-4.1303 of the Municipal Code would reduce impacts to special-status species to a less than significant level.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.4, the following mitigation measures from the General Plan PEIR are applicable to the proposed project.

MM BIO-1.1 Construction of a proposed project shall avoid, where possible, vegetation communities that provide suitable habitat for a special-status species known to occur within the Planning Area. If construction within potentially suitable habitat must occur, the presence/absence of any special-status plant or wildlife species must be determined prior to construction, to determine whether the habitat supports any special-status species. If a special-status species are determined to occupy any portion of a project site, avoidance and minimization measures shall be incorporated into the construction phase of a project to avoid direct or incidental take of a listed species to the greatest extent feasible. Specific mitigation measures for direct or incidental impacts to special-status species shall be determined on a case-by-case basis through agency consultation during the review process for discretionary

projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-1.2 Direct or incidental take of any State or federally listed species shall be avoided to the greatest extent feasible. If construction of a proposed project will result in the direct or incidental take of a listed species, consultation with the resources agencies and/or additional permitting may be required. Agency consultation through the CDFW 2081 and USFWS Section 7 or Section 10 permitting processes shall take place prior to any action that may result in the direct or incidental take of a listed species. Specific mitigation measures for direct or incidental impacts to special-status species shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-1.3 Development within the Planning Area shall avoid, where possible, special-status natural communities and vegetation communities that provide suitable habitat for special-status species. If a proposed project will result in the loss of a special-status natural community or suitable habitat for special-status species, compensatory habitat-based mitigation is required under CEQA and CESA. Mitigation shall consist of preserving on-site habitat, restoring similar habitat or purchasing off-site credits from an approved mitigation bank. Compensatory mitigation shall be determined through consultation with the City and/or resource agencies. An appropriate mitigation strategy and ratio shall be agreed upon by the developer and lead agency to reduce project impacts to special-status natural communities to a less than significant level. Agreed-upon mitigation ratios shall depend on the quality of the habitat and presence/absence of a special-status species. Specific mitigation measures for direct or incidental impacts to special-status natural communities and vegetation communities shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

MM BIO-1.4 **P**roposed projects within the Planning Area should avoid, if possible, construction within the general nesting season of February through August for avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA), if it is determined that suitable nesting habitat occurs on a project site. If construction cannot avoid the nesting season, a pre-construction clearance survey shall be conducted by a qualified Biologist to determine whether any nesting birds or nesting activity is observed on or within 500-feet of a project site. If an active nest is observed during the survey, a biological monitor shall be on site to ensure that no proposed project activities would impact the active nest. A suitable buffer shall be established around the active nest until the nestlings have fledged and the nest is no longer active. Project activities may continue in the vicinity of the nest only at the discretion of the biological monitor. Prior to commencement of grading activities

and issuance of any building permits, the Director of the City of Fresno Planning and Development Department, or designee, shall verify that all proposed project grading and construction plans include specific documentation regarding the requirements of the Migratory Bird Treaty Act (MBTA) and California Fish and Game Code Section 3503, that preconstruction surveys have been completed and the results reviewed by staff, and that the appropriate buffers (if needed) are noted on the plans and established in the field. Specific mitigation measures for direct or incidental impacts to avian species protected under Fish and Game Code 3500 and the Migratory Bird Treaty Act (MBTA) shall be determined on a case-by-case basis through agency consultation during the review process for discretionary projects, and shall be consistent with survey protocols and mitigations measures recommended by the agency at the time of consultation.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Sensitive Natural Communities or Riparian Habitat

Impact BIO-2:	**The proposed project would have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, and regulations, or by the California Department of Fish and Wildlife or United States Fish and Wildlife Service.**

Sensitive natural communities are vegetation communities or special wildlife habitats that are rare or occur in limited distributions or provide specific habitat requirements for special-status plant or wildlife species. The CDFW maintains a list of natural communities which attempts to classify vegetation types found within the State of California and rank them based on rarity. Communities ranked S1-S3 are considered sensitive natural communities.[28] Riparian habitat is defined as any habitat with characteristic vegetation relating to or located on the bank of a natural watercourse often described as riparian corridors.

A significant impact would occur if the proposed project would have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional habitat or other sensitive natural community identified in local or regional plans, policies, and regulations or by the CDFW or USFW.

The Plan Area contains natural communities, primarily along existing creeks and streams. Less than 1 percent of the Plan Area includes riparian habitats (riverine and lacustrine communities), which provide suitable habitat for a number of special-status plant and wildlife species known to occur in

[28] California Department of Fish and Wildlife (CDFW). 2022. Natural Communities List, Sacramento: California Department of Fish and Wildlife. https://wildlife.ca.gov/Data/VegCAMP/Natural-Communities. Accessed July 6, 2022.

the region. The vast majority of future development within the Plan Area is limited to existing disturbed and developed land and within areas that are unlikely to support special-status species.

However, the presence of riparian habitat and/or a sensitive natural community on a project site must be evaluated prior to project approval. Any project-related impacts to riparian habitat and/or a sensitive natural community are considered a significant impact and require mitigation. Project-level implementation of the approved General Plan Objective (POSS-6) and Policies (POSS-6-a and POSS-6-b), and Objective (POSS-7) and Policies (POSS-7-a through POSS-7-d) will reduce potential project impacts to riparian habitats. Further, incorporation of the General Plan mitigation measures (MM BIO-2.1 to MM BIO-2.3) into the conditions of approval would ensure that sensitive natural communities and/or riparian habitats are not significantly impacted. Thus, impacts would be reduced to a less than significant level.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.4, the following mitigation measures from the General Plan PEIR are applicable to the proposed project.

MM BIO-2.1 A pre-construction clearance survey, following current CDFW protocols, shall be conducted by a qualified Biologist to determine whether a proposed project will result in the removal or impact to any riparian habitat and/or a special-status natural community with potential to occur in the Planning Area, compensatory habitat-based mitigation shall be required to reduce project impacts. Compensatory mitigation must involve the preservation or restoration or the purchase of off-site mitigation credits for impacts to riparian habitat and/or a special-status natural community. Mitigation must be conducted in-kind or within an approved mitigation bank in the region. The specific mitigation ratio for habitat-based mitigation shall be determined through consultation with the appropriate agency (i.e., CDFW or USFWS) on a case-by-case basis. The project applicant/developer for a proposed project shall develop and implement appropriate mitigation regarding impacts on their respective jurisdictions.

MM BIO-2.2 A pre-construction clearance survey, following current CDFW protocols, shall be conducted by a qualified Biologist to determine whether a proposed project will result in significant impacts to streambeds or waterways protected under Section 1600 of Fish and Wildlife Code and Section 404 of the CWA. The project applicant/developer for a proposed project shall consult with partner agencies such as CDFW and/or USACE to develop and implement appropriate mitigation regarding impacts on their respective jurisdictions, determination of mitigation strategy, and regulatory permitting to reduce impacts, as required for projects that remove riparian habitat and/or alter a streambed or waterway. The project applicant/developer shall implement mitigation as directed by the agency with jurisdiction over the particular impact identified.

MM BIO-2.3 Prior to project approval, a pre-construction clearance survey, following current CDFW protocols, shall be conducted by a qualified Biologist to determine whether a proposed project will result in project-related impacts to riparian habitat or a special-status natural community or if it may result in direct or incidental impacts to special-status species associated with riparian or wetland habitats. The project applicant/developer for a proposed project shall be obligated to address project-specific impacts to special-status species associated with riparian habitat through agency consultation, development of a mitigation strategy, and/or issuing incidental take permits for the specific special-status species, as determined by the CDFW and/or USFWS.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Wetlands and Jurisdictional Features

Impact BIO-3: The proposed project would have a substantial adverse effect on State or federally protected wetlands (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.

Wetlands are defined as areas that are permanently wet or periodically covered with shallow water, such as saltwater and freshwater marshes, open or closed brackish marshes, swamps, mud flats, and fens.[29] A significant impact would occur if the construction or operations of the proposed project produced a substantial adverse effect on State or federally protected wetlands including marshes, vernal pools, coastal, etc., through direct removal, filling hydrological interruption, or other means.

Development within the Plan Area, particularly in undeveloped areas with the potential to support wetland habitat (e.g., pasture/grassland), could result in the loss of jurisdictional wetland habitat, which includes vernal pool habitats, seasonal wetlands and waters of the U.S. or intermittent/permanent water bodies. Any project-related impacts that result in the significant alteration or fill of a State or federally protected wetland is considered a significant impact.

Additionally, special-status species associated with wetlands and vernal pool habitats, such as vernal pool fairy shrimp, may be impacted as a result of project impacts to protected wetlands. Project-specific agency (i.e., CDFW, RWQCB, and/or USACE) coordination and/or regulatory permitting would be required to reduce potential project impacts to wetland habitat. The implementation of Policies (POSS-6-a through POSS-7-d) would reduce potential project impacts to wetlands and wetland habitat. Further, incorporation of the General Plan mitigation measures (MM BIO-3.1 and MM BIO-

[29] City of Fresno. 2014. Fresno General Plan. December 18 Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2019/07/ConsolidatedGP6182020.pdf. Accessed July 7, 2022.

3.2) into the conditions of approval would ensure that wetlands are not significantly impacted. Thus, impacts would be reduced to a less than significant level.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in the regulatory discussion, Section 3.4, the following mitigation measures from the General Plan PEIR are applicable to the proposed project.

MM BIO-3.1 If a proposed project will result in the significant alteration or fill of a federally protected wetland, a formal wetland delineation conducted according to USACE accepted methodology is required for each project to determine the extent of wetlands on a project site. The delineation shall be used to determine whether federal permitting and mitigation strategy are required to reduce project impacts. Acquisition of permits from USACE for the fill of wetlands and USACE approval of a wetland mitigation plan would ensure a "no net loss" of wetland habitat within the Planning Area. Appropriate wetland mitigation/creation shall be implemented in a ratio according to the size of the impacted wetland.

MM BIO-3.2 In addition to regulatory agency permitting, Best Management Practices identified from a list provided by the USACE shall be incorporated into the design and construction phase of the project to ensure that no pollutants or siltation drain into a federally protected wetland. Project design features such as fencing, appropriate drainage and incorporating detention basins shall assist in ensuring project-related impacts to wetland habitat are minimized to the greatest extent feasible.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Fish and Wildlife Movement Corridors

Impact BIO-4:	**The proposed project would interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of wildlife nursery sites.**

A wildlife corridor is defined as a natural corridor, such as an undeveloped ravine, that is frequently used by wildlife to travel from one area to another.[30] A significant impact would occur if any construction or operations of the proposed project would interfere substantially with the movement

[30] City of Fresno. 2014. Fresno General Plan. December 18 Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2019/07/ConsolidatedGP6182020.pdf. Accessed July 7, 2022.

of any native resident or migratory fish or wildlife species or with an established native resident or migratory wildlife corridors or impede the use of wildlife nursery sites.

As previously discussed, the majority of the Plan Area includes disturbed and agricultural land. These areas are mainly surrounded by existing development and disturbed habitat areas resulting in habitat fragmentation. Because of the isolation of these areas, there are not many substantive linkages to consider them as part of a wildlife movement corridor. Regardless, all future development would be required to comply with the approved General Plan, including Policies (POSS-6-a through POSS-7-d) that would reduce impacts to wildlife movement corridors by providing buffer zones, control stormwater runoff, and providing periodic monitoring of the biological resource conditions. These policies would reduce potential impacts to wildlife movement corridors to a less than significant level.

The Municipal Code also includes policies pertaining to fish and wildlife movement corridors that relate to future development within the Plan Area such as Section 12-5.510 also dictates that all practical and reasonable measures should be taken to protect fish and wildlife and preserve wildlife corridors during any operations that require mining related processes.

Additionally, all future development in the Plan Area resulting from the proposed project must comply with the proposed Specific Plan policies pertaining to biological resources, including Policy OS-2.2, which protects passive open space, and Policy OS-5.2, which protects habitat corridors. As such, impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Local Policies or Ordinances

Impact BIO-5:	**The proposed project would conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.**

A significant impact would occur if any construction or operation within the proposed project would conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Future development projects must meet restrictions mandated by Section 13-305 of the Municipal Code which defines “Protected Trees” and sets forth the requirements for mitigating impacts to protect trees.

Project development within the Plan Area may result in the removal or alteration of existing street and public trees within the boundaries of the Plan Area. Existing preserved trees and landscaped

trees within public property, including parkways, must be preserved in order to beautify the City, purify its air, and provide shade for its inhabitants.

Project development within the Plan Area could have the potential to impact trees on public property; however, future development would be required to comply with Article 3 of Chapter 13 of the Municipal Code, as discussed above, which provides for plans and establishes regulations governing the preservation of trees in public property. Compliance with the Municipal Code would reduce any impacts related to conflicts with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. Therefore, potential impacts to the City's public tree ordinance would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Local, Regional, or State Habitat Conservation Plan

Impact BIO-6:	**The proposed project would not conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or State Habitat Conservation Plan.**

A significant impact would occur if construction or operations within the proposed project would conflict with the provisions of an adopted HCP, NCCP, or other approved local, regional, or State HCP.

As discussed above, the Plan Area is not located within the boundaries of any approved or draft HCP, NCCP, or other adopted local, regional or State HCP. Therefore, development within the Plan Area would not result in any impacts to an adopted HCP or NCCP. As such, impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.4.7 - Cumulative Impacts

The geographical scope of the cumulative impact analysis for Biological Resources is the Plan Area as well as the surrounding cities and communities of Clovis, Sanger, Lone Star, and Las Palmas. This analysis evaluates whether the impacts of the proposed project, together with the impacts of cumulative development, would result in a cumulatively significant impact on special-status species; wetlands and other waters of the United States and/or State; or other biological resources protected by federal, State, or local regulations or policies. This analysis then considers whether incremental contribution to cumulative impacts associated with the implementation of the proposed project would be significant. Both conditions must apply for a project's cumulative effects to rise to the level of significance.

As discussed above, the most direct and indirect impacts would result from construction-related disturbances and residential, industrial, and commercial development. However, the incremental effect of the proposed project, when combined with the effects created by other past and reasonably foreseeable projects, would not be cumulatively considerable or significant because future projects under implementation of the proposed project would be required to obtain regulatory approvals, comply with the proposed Specific Plan policies and General Plan policies, and implement the existing mitigation measures included in the General Plan PEIR, including MM BIO-1.1 to MM BIO-1.4, MM BIO-2.1 to MM BIO-2.3, MM BIO-3.1, and MM BIO-3.2. The applicable policies and mitigation measures would ensure protection of existing habitat, special-status plant and animal species, and potential wetlands, and ensure there are no conflicts with existing policies and regulations related to the protection of biological resources within the Plan Area. Also, because it would be speculative to assume the exact location and extent of development that would occur during implementation of the proposed project, future projects would be subject to project-level CEQA analysis which would further identify project-specific impacts and mitigation measures at that time to ensure protection of biological resources. Therefore, because future projects would be subject to similar policies, mitigation, and regulations as the proposed Plan, for the protection of biological resources, as well as future CEQA analysis, a less than significant cumulative impact would occur.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.5 - Cultural Resources and Tribal Cultural Resources

3.5.1 - Introduction

This section describes the existing cultural and tribal cultural resources setting and potential effects from project implementation on the site and its surrounding area. Descriptions and analysis in this section are based on the Fresno General Plan, the Fresno Municipal Code, the Office of Historic Preservation Directory of Properties in the Historic Property Data File for Fresno County, the Southern San Joaquin Valley Information Center (SSJVIC) records search for the Plan Area, the National Register of Historic Places (NRHP), the California Register of Historical Resources (CRHR), the California Built Environment Resource Directory (BERD) for Fresno County, and the California Points of Historical Interest List.

As further discussed in Chapter 1, Introduction, seven public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to potential impacts to the proposed project's Cultural Resources and Tribal Cultural Resources.

- Request to be notified of all future development under the proposed project that may have impacts on cultural and tribal cultural resources.
- Expressed concern that the Plan Area may contain houses and structures of historical interest (in excess of 100 years of age) with an outside possibility of Yokuts artifacts present.
- Request that the preparation of the Draft PEIR and Specific Plan adhere to Assembly Bill (AB) 52 and Senate Bill (SB) 18.
- Suggest that the City contact the following Tribes to inquire if they are aware of any historical and/or cultural resources in the Plan Area: Table Mountain Ranch, Big Sandy, and Traditional Transundi Tribe.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Plan Area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as SB 743.

3.5.2 - Environmental Setting

Cultural Resources Components

The term "cultural resources" encompasses historic resources, archaeological resources, Tribal Cultural Resources (TCRs) and Burial Sites, which are generally defined as follows:

- **Historic Resources:** Historic resources are associated with the recent past. In California, historic resources are typically associated with the Spanish, Mexican, and American periods in the State's history and are generally less than 200 years old. Historic resources often take the form of buildings, structures, and other elements of the built environment.
- **Archaeological Resources:** Archaeology is the study of artifacts and material culture with the aim of understanding human activities and cultures in the past. Archaeological resources may be associated with precontact indigenous cultures as well as later historic periods.
- **Tribal Cultural Resources:** TCRs include sites, features, places, or objects that are of cultural value to one or more California Native American tribe.
- **Burial Sites and Cemeteries:** Burial sites and cemeteries are formal or informal locations where human remains have been interred. Burial sites may be associated with precontact indigenous cultures as well as later historic periods.

More specifically, cultural resources may be understood as resources that have been formally recognized by a lead agency and/or are listed or determined eligible for listing on the CRHR (Public Resources Code [PRC] § 5024.1, Title 14 California Code of Regulations [CCR] § 4852). It is notable that the fact that a resource is not yet identified as a historical resource or found eligible for the CRHR does not preclude a lead agency from determining that said resource is a historical resource pursuant to Public Resources Code Sections 5020.1(j) or 5024.1. Under the California Environmental Quality Act (CEQA), a substantial adverse change in the significance of a historical resource would constitute a significant effect on the environment.

Cultural Resources Setting

Following is an overview of the prehistory, ethnography, and historic background, providing a context in which to understand the background and relevance of sites and structures found in the Plan Area. This section is not intended to be a comprehensive review of the current resources available; rather, it serves as a general overview. Further details can be found in ethnographic studies, mission records, and major published sources.[1,2,3,4,5,6]

General Prehistoric Setting

In North America, radiocarbon dates from existing samples of archaeological materials demonstrate human presence as early as 15,000 years Before Present (BP).[7] The lithics from the earliest (14,000 to 15,000 BP) documented sites in North America include cores, flakes, and flake tools (e.g., five blades, 14 bladelets, 12 bifaces, one discoidal flake core, 23 edge-modified tools that includes

[1] Kroeber, A.L. 1925. Handbook of the Indians of California. Bulletin 78. Bureau of American Ethnology. Washington, D.C.: Smithsonian Institution.
[2] Beardsley, R.K. 1948. "Cultural Sequences in Central California Archaeology." American Antiquity.
[3] Bennyhoff, J. 1950. Californian Fish Spears and Harpoons. Berkeley: University of California Anthropological Records.
[4] Chartkoff J.L. and K.K. Chartkoff. 1984. The Archaeology of California. Menlo Park: Stanford University Press.
[5] Moratto, M.J. 1984. California Archaeology. San Diego: Academic Press.
[6] Jones, T.L. and Kathryn A. Klar. 2007. California Prehistory. Lanham: AltaMira Press; Rowman and Littlefield Publishers, Inc.
[7] Waters, M. R., J. L. Keene, S. L. Forman, E. R. Prewitt, D. L. Carlson, J. E. Wiederhold. 2018. Pre-Clovis projectile points at the Debra L. Friedkin site, Texas-Implications for the Late Pleistocene peopling of the Americas. Science Advances.

scrapers and gravers from the Debra L. Friedkin site in, Texas) with an absence of projectile points.[8] The first known projectile points in North America are from 13,000 years BP, with lanceolate fluted points (Clovis Complex) in sites from central and eastern North America, and stemmed projectile points from sites in areas of western North America that were not glaciated.[9,10] The oldest California radiocarbon date as of 2007 from archaeological materials confirms a human presence in the northeastern part of the State (from site CA-SIS-218) as early as 13,500 years BP.[11] The radiocarbon date corresponds to the period of fluted points and fluted points have been found throughout California, although projectile points and other chronologically and culturally informative materials are absent from the SIS-218 sample.[12,13]

Archaeological sites from the Early Period (12,000 BP to 8,000 BP) are not very well represented in the southern San Joaquin Valley, partially due to periodic episodes of erosion and deposition that have removed or buried large segments of the Early Period landscape. Currently, the earliest evidence of human occupation in the region comes from fluted and basally thinned projectile points in the Tulare Lake basin at the Witt site (KIN-32). Hundreds of Late Pleistocene concave base points have been discovered from human occupation along the remnant shoreline of Tulare Lake in southern Kings County. Artifacts from this site include Clovis-like projectile points made of chert, chipped crescents, various scrapers, and other stone tools associated with the Fluted Point and/or Western Pluvial Lakes tradition. The Witt site also contained faunal bones from horse, bison, ground sloth, and the tusk of a mammoth or mastodon.[14] The bones, including some human bone, has been radiocarbon dated to 11,000 to 13,000 BP. [15]

The Middle Horizon (8,000 BP to 2,500 BP) is characterized by an increase in groundstone tools, including metates and manos. Middle Horizon site deposits include an abundance of expedient cobble-based pounding, chopping, scraping, and mulling tools, which reflect an increased dependence on vegetative foods that require processing. Archaeobotanical assemblages from foothill sites confirm that acorn and pine nuts were targeted food plants.[16,17] However, the lithic technology remained relatively unchanged from the Early Period, in which stone tools were very

[8] Waters, M. R., J. L. Keene, S. L. Forman, E. R. Prewitt, D. L. Carlson, J. E. Wiederhold. 2018. Pre-Clovis projectile points at the Debra L. Friedkin site, Texas-Implications for the Late Pleistocene peopling of the Americas. Science Advances.

[9] Jenkins, D. L., L. G. Davis, T. W. Stafford Jr., P. F. Campos, B. Hockett, G. T. Jones, L. S. Cummings, C. Yost, T. J. Connolly, R. M. Yohe II, S. C. Gibbons, M. Raghavan, M. Rasmussen, J. L. A. Paijmans, M. Hofreiter, B. M. Kemp, J. L. Barta, C. Monroe, M. T. P. Gilbert, E. Willerslev. 2012. Clovis Age Western Stemmed Projectile Points and Human Coprolites at the Paisley Caves. Science 337.

[10] Beck, C. and G. T. Jones. 2010. Clovis and Western Stemmed: Population migration and the meeting of two technologies in the Intermountain West. American Antiquity.

[11] Jones, Terry L. and Kathryn A. Klar. 2007. California Prehistory: Colonization, Culture, and Complexity, In California Prehistory, Edited by, Terry L. Jones and Kathryn A. Klar. Altimira Press, New York. Kroeber, A.L. 1925. Handbook of the Indians of California. Bulletin 78. Bureau of American Ethnology. Washington, DC. Smithsonian Institution.

[12] Rondeau, Michael F. 2009. Fluted Points of the Far West. Proceedings of the Society for California Archaeology 21:265–274

[13] Rondeau, Michael L., Jim Cassidy, and Terry L. Jones. 2007. Colonization Technologies: Fluted Projectile Points and the San Clemente Island Woodworking/Microblade Complex, In California Prehistory, Edited by, Terry L. Jones and Kathryn A. Klar. Altimira Press, New York.

[14] Greenwood and Associates. 2012. Cultural Resources Existing Conditions Report. Fresno Central Southeast Area Specific Plan

[15] Rosenthal, Jeffrey S., Gregory G. White, and Mark Q. Sutton. 2007. The Central Valley: A View from the Catbird's Seat. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Kla. Lanham, Maryland: AltaMira Press.

[16] Jones, Terry L. and Kathryn A. Klar. 2007. California Prehistory: Colonization, Culture, and Complexity, In California Prehistory, Edited by, Terry L. Jones and Kathryn A. Klar. Altimira Press, New York. Kroeber, A.L. 1925. Handbook of the Indians of California. Bulletin 78. Bureau of American Ethnology. Washington, DC. Smithsonian Institution

[17] Rondeau, Michael L., Jim Cassidy, and Terry L. Jones. 2007. Colonization Technologies: Fluted Projectile Points and the San Clemente Island Woodworking/Microblade Complex, In California Prehistory, Edited by, Terry L. Jones and Kathryn A. Klar. Altimira Press, New York.

similar to the Western Pluvial Lakes Tradition.[18] Late Period (2,500 BP to Ethnohistoric Present) The beginning of the Late Period corresponds with the onset of the Late Holocene environmental conditions, marked by an abrupt turn to cooler, wetter, and a more stable climate. Lakes that had dried or diminished during the later parts of the Middle Period returned to higher levels. Cultural diversity was more pronounced marked by artifact styles, contrasting burial positions, and other elements of material culture. People were buried in flexed positions more frequently, and burial goods were more numerous than those from the Middle Period.[19] Both the Olivella shell bead and bow-and-arrow technology made their first appearance in the area. There was also a greater reliance on groundstone tools, indicating an increased dependence on nuts, seeds, and acorns. Villages and smaller residential communities developed along the many streams of the foothills and along the river channels and sloughs of the valley bottom. Occupation sites were also larger, reflecting semi-sedentism.[20]

Native American Background

Southern Valley Yokuts

At the time of European contact, most of the San Joaquin Valley and the foothills of the western slope of the Sierra Nevada were occupied by 40 or so groups classified together as the Yokuts with a Foothills division and a Valley division of language dialects.[21] The Yokuts were recognized as having three major subgroups: the Northern Valley, the Foothill, and the Southern Valley. Each of these ethnolinguistic groups was composed of autonomous, culturally, and linguistically related tribes or tribelets. Ethnographic evidence suggests the City of Fresno is located in part of the Southern Valley Yokuts territory. The Southern Valley Yokuts were divided into true tribes, with individual tribelets having their own name, dialect, and territory and there is no evidence to suggest that they practiced any formal religion.[22]

Alfred Kroeber divided a Yokuts classification system into Valley Divisions and Foothill Divisions based on ethnographic lines, geographic habitat, and dialect.[23] Here, the Foothill Division's worldview and economy were influenced more by their Shoshonean neighbors than the Valley Division Yokuts. Later, William Wallace divided the Yokuts into three subgroups, Southern Valley, Northern Valley, and Foothill, and shifted the known tribelets among these divisions. The following is a review of ethnographic information associated with the Southern Valley Yokuts. The Southern Valley Yokuts occupied a rich environment with abundant water resources from the nearby sloughs, lake basins, and river systems. Swamps and tule marshes surrounded the waterways and teemed with wildlife, including aquatic mammals, fish, and waterfowl. Adjacent grasslands provided food for herds of elk, antelope, and (in the winter) deer. The regional flora was equally, if not more, diverse and was used as a main staple of the Yokuts diet. The Southern Valley Yokuts dietary base relied on a mixed strategy of fishing, waterfowl hunting, shellfish, and plant collecting, with less emphasis on large-game hunting. Important vegetal resources included cattail roots, grasses, nuts, seeds, tule, and

[18] Greenwood and Associates. 2012. Cultural Resources Existing Conditions Report. Fresno Central Southeast Area Specific Plan.
[19] Rosenthal, Jeffrey S., Gregory G. White, and Mark Q. Sutton. 2007. The Central Valley: A View from the Catbird's Seat. In California Prehistory: Colonization, Culture, and Complexity, edited by Terry L. Jones and Kathryn A. Klar. Lanham, Maryland: AltaMira Press.
[20] Greenwood and Associates. 2012. Cultural Resources Existing Conditions Report. Fresno Central Southeast Area Specific Plan
[21] Silverstein, M., 1978. Yokuts: Introduction Handbook of North American Indians California.
[22] Gayton, A.H, et al. 1948. Yokuts and Western Mono Ethnography. University of California Press. Berkeley and Los Angeles.
[23] Krober, A.L. 1963. Yokuts Dialect Survey. University of California Press. Berkeley and Los Angeles.

bulbs. The resource-rich environment allowed for permanent village sites, which typically were occupied throughout the year.[24]

The Western Mono

The Western Mono, also called the Monache, consisted of six independent tribes: the Northfork Mono, the Wobonuch, the Entimbich, the Michahay, the Waksachi and the Patwisha, that were connected by a common language, Numic. Traditionally, the Western Mono resided in the Pine Belt of the western side of the south-central Sierra Nevada Mountain range and were bordered by the Sierra Miwok to the north, Southern Valley Yokuts to the west, Owens Valley Paiute and Tubatulabal to the south and maintained a close relationship with all of their neighbors, with several of the tribes speaking more than two languages, which served in assisting in trade relations, traveling, and intertribal relations. The Monache were seasonal hunters and gatherers, migrating to different areas and elevations of the Sierra Nevada's in the pursuit of food. Depending on the season and location, the Monache diet generally consisted of deer, bears, rabbit, squirrel, fish and a verity of nuts and fruits. A variety of materials were used for hunting, gathering, and processing food, as well as for shelter, clothing, and luxury items. The primary material for hunting was obsidian knives, arrow points and scrapers which was openly traded among the neighboring tribes. Feather fire fans made from hawk or vulture tails were used to smoke out smaller animals from their underground holes. Soaproot brushes were pivotal in grinding food on mortars. Men were commonly seen with tumpline used to carry materials and food during their hunting and gathering excursions. Twine, made from sinew, milkweed fiber, and bark, were used for crafting cradles, seed beaters, trays, and storage baskets. The Western Mono did not have a primary village, and settlement locations were determined by the seasons, elevation, and water availability. The Monache relied on three different types of homes that were primarily determined by elevation. The Conical House had an excavated floor and was typically 6-12 feet in diameter. The Oval House was ground level and used at lower elevations, ranged from 10 to 15 feet by 17 to 20 feet and was equipped with a ridgepole. The Conical Bark Covered house was ground level and used at higher elevations.[25]

The Western Mono were organized along patrilineal lines, with each lineage associated with a totem that was considered the family's pet. The Northfolk Mono were the only tribe known to use moieties associated with social responsibilities within the tribe assigning the Eagle moiety with the Chief, and the Roadrunner or Dove moiety with the messenger. Prior to European contact, the Monache population was estimated to be close to 5,000 people, making the Monache tribe one of the most populous of the Central Valley; however, following European contact, population numbers fell dramatically, with some sources putting the surviving population between 6 to 9 percent. Presently, the surviving Western Mono reside in the upper foothills of the Sierra Nevada's, Madera County and Fresno County.[26]

[24] Wallace, William J. 1978. Northern Valley Yokuts. In Handbook of North American Indians. Vol. 8, California, edited by Robert F. Heizer. Washington, D.C: Smithsonian Institution.

[25] Spier, R.F., 1978. Monache. Handbook of North American Indians.

[26] Loether, C. 1990. Ceremony as Performance: The Western Mono Cry-Dance. Journal of California and Great Basin Anthropology. Website: http://www.jstor.org/stable/27825423. Accessed July 11, 2022.

Historic Background

The Spanish Period (1769-1821)

The formalization of Spanish routes in California were established by Father Junipero Serra and Gaspar de Portola in 1769, in what was known as the Portola Expedition. Although the Portola party were not the first Europeans nor the first people to pass through the region, it was their observations and discoveries that formalized the routes and locations of the Mission System and facilitate trade and travel through California.[27] The route used by Portola was further explored in detail by Lieutenant Colonel Juan Bautista de Anza and Father Pedro Font during the Anza Expedition that lasted from 1775-1776. The Anza Expedition was considered pivotal as it helped establish practical relationships with the natives, who at the time were revolting in San Diego, and help further explore and map Monterey and the San Francisco Bay Area.[28] The region that would become San Joaquin Valley was periodically visited by Franciscan friars, scouting the area for mission sites, but it was a military expedition led by Gabriel Moraga in September and October of 1806 that first visited the area. The expedition started in San Juan Bautista and to the San Joaquin Plain. Once there, Moraga traversed the several tributaries that fed of the San Joaquin River, discovering and naming the Merced River, and coming upon the Tuolumne, Stanislaus and Mokelumne River. Moraga's expedition took him from the foot of the Sierras and the Rancherias between Kings River and Kern River. In 1808, Moraga traveled to Stockton and headed east to scouting sites for future missions. Moraga's discoveries and mapping of the region contributed to the knowledge of the geography and ethnography of the area. This information served pivotal to Father Narciso Duran, Father Ramón Abella and Lieutenant Luis Antonio Argüello, who followed the San Joaquin River at least as far as the Stockton Channel in 1817, meticulously mapping the area for future mission establishments.[29] The diary kept by Father Duran helped illustrate how the region appeared prior to colonization as well as initial contact with the Yokut people.[30]

The Mexican Period (1821-1848)

In 1821, Mexico overthrew Spanish rule and the monopoly that the missions had in the area began to decline. By 1833, the Mexican government passed the Secularization Act and the missions were reorganized as parish churches and lost their vast land holdings. Following the Secularization Act, the Mexican government initially planned on redistributing the land holdings to the Native Americans; however, they were instead redistributed to prominent citizens. The last of the mission land holdings were relinquished in 1845, which led the way for the large ranchos common to California in the mid-1800s. California experienced a period of success with the establishment of the Ranchos, adopting the Spanish ranching traditions and focusing on the herding of cattle as well as adapting to the market trends of the time that included the trade of fur and pelts; however, the constant threat of Russian invasion, the illegal squatting of American immigrants, and a growing threat of rebellion from the mission Indians prevented the region from achieving socio-political stability.[31] [32] The

[27] Farquhar, F.P., 1928. Spanish discovery of the Sierra Nevada. San Francisco, California: Sierra Club, Bulletin, XIII.
[28] Hyslop, S.G., 2019. Contest for California: From Spanish Colonization to the American Conquest (Vol. 2). University of Oklahoma Press.
[29] Kyle, D.E., Rensch, H.E., Rensch, E.G., Hoover, M.B. and Abeloe, W. 2002. Historic spots in California. Stanford University Press
[30] Farquhar, F.P., 1928. Spanish discovery of the Sierra Nevada. San Francisco, California: Sierra Club, Bulletin, XIII.
[31] Beck, W.A. and Williams, D.A., 1972. California: A history of the Golden State. Doubleday Books.
[32] Branch, L.C., 1881. History of Stanislaus County, California: With Illustrations Descriptive of Its Scenery, Farms, Residences, Public Buildings with Biographical Sketches of Prominent Citizens. Elliott Moore.

growing tensions between Mexicans and American settlers led to the Bear Flag Revolt of 1846 led by U.S. Army Captain John C. Fremont and Ezekiel Merritt against Mexican General Mariano Vallejo who was attempting to bring aid to the Mexican governor of California in an attempt to suppress the growing wave of support for an American coup of California.[33] The rebellion concluded with the takeover of Sonoma, thus weakening the little control that Mexico had over Alta California and paving the way for the United States to seize control of the Pacific Coast shortly thereafter. By 1846, on the eve of the U.S.-Mexican War (1846 to 1848), the estimated population of California was 8,000 non-natives and 10,000 Native Americans. However, these estimates have been debated. Cook suggests the Native American population was 100,000 in 1850; the U.S. Census of 1880 reports the Native American population as 20,385.[34]

Local History

Fresno County

Fresno County, located in Central California, was established in 1856 from parts of Mariposa, Merced and Tulare Counties and the first county seat was located in the small township of Millerton. Fresno is named after Fresno Creek and the ash trees that surrounded the valley.[35] The Fresno community began to grow from small mining settlements along the Fresno River and Kings River, however, its official creation is credited to Moses J. Church, who is called the "Father of Irrigation" and is credited as the organizer of the newly established community.[36] Church began to build an irrigation system that diverted water from the Kings River and onto the region using canals and tributaries. The ease of access to water and the affordable land was a primary attraction to people looking for new opportunities. The growing population necessitated a need for the transportation of people and goods and in 1872, the first railroad depot was constructed by Southern Pacific Railroad. This was followed by a larger depot, built in 1889 making the railroad depot a trading center for the whole of the county. Fresno County is home to the cities of Clovis, Coalinga, Firebaugh, Fowler, Fresno, Huron, Kerman, Kingsburg, Mendota, Orange Cove, Parlier, Reedley, Sanger, San Joaquin and Selma, in addition to several unincorporated communities.[37] As of January 2022, Fresno County has a population of 1,011,273 and growing.[38] Fresno County lies in the heart of the nation's largest agricultural center, making agricultural business the main source of economic stimulus in the region.[39]

3.5.3 - Regulatory Framework

Federal

National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA), as amended, established the NRHP, which contains an inventory of the nation's significant prehistoric and historic properties. Under 36 Code of

[33] National Park Service (NPS). 2015. Website: https://www.nps.gov/index.htm. Accessed July 15, 2022.
[34] Cook, S.F., 1976. The population of the California Indians, 1769-1970. University of California Press.
[35] California State Association of Counties. 2014. California State Association of Counties. Website: https://www.counties.org/county-profile/fresno-county. Accessed July 15, 2022.
[36] Thickens, V.E., 1946. Pioneer agricultural colonies of Fresno County. California Historical Society Quarterly.
[37] National Park Service (NPS). 2015. Website: https://www.nps.gov/index.htm. Accessed July 15, 2022.
[38] California Department of Finance. Population Estimates for Cities, Counties, and the State – January 1, 2021, and 2022. Website: https://dof.ca.gov/forecasting/demographics/estimates-e1/. Accessed July 5, 2022.
[39] Fresno County. 2021. Website: https://www.co.fresno.ca.us/. Accessed July 5, 2022.

Federal Regulations 60, a property is recommended for possible inclusion on the NRHP if it is at least 50 years old, has integrity, and meets one of the following criteria:

- It is associated with significant events in history, or broad patterns of events;
- It is associated with significant people in the past;
- It embodies the distinctive characteristics of an architectural type, period, or method of construction; or it is the work of a master or possesses high artistic value; or it represents a significant and distinguishable entity whose components may lack individual distinction; or
- It has yielded, or may yield, information important in history or prehistory.

Certain types of properties are usually excluded from consideration for listing in the NRHP, but they can be considered if they meet special requirements in addition to meeting the criteria listed above. Such properties include religious sites, relocated properties, graves and cemeteries, reconstructed properties, commemorative properties, and properties that have achieved significance within the past 50 years.

Archaeological Resources Protection Act

The Archaeological Resources Protection Act (ARPA) amended the Antiquities Act of 1906 (16 United States Code [USC] §§ 431–433) and set a broad policy that archaeological resources are important to the nation and should be protected and required special permits before the excavation or removal of archaeological resources from public or Native American lands. The purpose of the ARPA was to secure, for the present and future benefit of the American people, the protection of archaeological resources and sites that are on public lands and Indian lands, and to foster increased cooperation and exchange of information between governmental authorities, the professional archaeological community, and private individuals having collections of archaeological resources and data that were obtained before October 31, 1979.

American Indian Religious Freedom Act

The American Indian Religious Freedom Act (AIRFA) established federal policy to protect and preserve the inherent rights of freedom for Native American groups to believe, express, and exercise their traditional religions. These rights include but are not limited to access to sites, use and possession of sacred objects, and freedom to worship through ceremonials and traditional rites.

Native American Graves Protection and Repatriation Act

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 sets provisions for the intentional removal and inadvertent discovery of human remains and other cultural items from federal and tribal lands. It clarifies the ownership of human remains and sets forth a process for repatriation of human remains and associated funerary objects and sacred religious objects to the Native American groups claiming to be lineal descendants or culturally affiliated with the remains or objects. It requires any federally funded institution housing Native American remains or artifacts to compile an inventory of all cultural items within the museum or with its agency and to provide a summary to any Native American tribe claiming affiliation.

State

CEQA Guidelines Section 15064.5(a)—CEQA Definition of Historical Resources

CEQA Guidelines Section 15064.5(a), in Title 14 of the California Code of Regulations, defines a "historical resource" as:

1. A resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the California Register of Historical Resources.
2. A resource included in a local register of historical resources, as defined in Section 5020.1(k) of the Public Resources Code, or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code, shall be presumed to be historically or culturally significant. Public agencies must treat any such resource as significant unless the preponderance of evidence demonstrates that it is not historically or culturally significant.
3. Any object, building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered to be a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a resource shall be considered by the lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources.
4. The fact that a resource is not listed in, or determined to be eligible for listing in the California Register of Historical Resources, not included in a local register of historical resources (pursuant to Section 5020.1(k) of the Public Resources Code), or identified in n historical resources survey (meeting the criteria in Section 5024.1(g) of the Public Resources Code) does not preclude a lead agency from determining that the resource may be a historical resource as defined in Public Resources Code Sections 5020.1(j) or 5024.1.

Therefore, under the CEQA Guidelines, even if a resource is not included on any local, State, or federal register, or identified in a qualifying historical resources survey, a lead agency may still determine that any resource is a historical resource for the purposes of CEQA if there is substantial evidence supporting such a determination. A lead agency must consider a resource to be historically significant if it finds that the resource meets the criteria for listing in the CRHR. Archaeological and historical sites are protected pursuant to a wide variety of State policies and regulations, as enumerated in the Public Resources Code. Cultural resources are recognized as nonrenewable resources and receive additional protection under the Public Resources Code and CEQA.

CEQA Guidelines Section 15064.5(a)(3)—California Register of Historical Resources Criteria

As defined by CEQA Guidelines, Section 15064.5(a)(3)(A-D), a resource shall be considered historically significant if the resource meets the criteria for listing on the CRHR. The CRHR and many local preservation ordinances have employed the criteria for eligibility to the NRHP as a model (see criteria described above under the description of the NHPA), since the NHPA provides the highest standard for evaluating the significance of historic resources. A resource that meets NRHP criteria is

clearly significant. In addition, a resource that does not meet NRHP standards may still be considered historically significant at a local or State level.

California Public Resources Code Section 5024.1—California Register of Historical Resources

Section 5024.1 of the Public Resources Code states that the CRHR is a guide to be used by State and local agencies, private groups, and citizens to identify the State's historical resources and to indicate what properties are to be protected from substantial adverse change. Administration of the CRHR is to be overseen by the Native American Heritage Commission (NAHC). Section 5024.1 indicates that the register shall include historical resources determined by the NAHC, according to adopted procedures, to be significant and to meet the criteria in subdivision (c).

CEQA Guidelines 15064.5(c)—Effects on Archaeological Resources

CEQA Guidelines state that a resource need not be listed on any register to be found historically significant. CEQA Guidelines direct lead agencies to evaluate archaeological sites to determine whether they meet the criteria for listing in the CRHR. If an archaeological site is a historical resource, in that it is listed or eligible for listing in the CRHR, potential adverse impacts to it must be considered. If an archaeological site is considered not to be a historical resource but meets the definition of a "unique archaeological resource" as defined in Public Resources Code Section 21083.2, then it would be treated in accordance with the provisions of that section.

CEQA Guidelines Section 15064.5(d)—Effects on Human Remains

Native American human remains and associated burial items may be significant to descendant communities and/or may be scientifically important for their informational value. They may be significant to descendant communities for patrimonial, cultural, lineage, and religious reasons. Human remains may also be important to the scientific community, such as prehistorians, epidemiologists, and physical anthropologists. The specific stake of some descendant groups in ancestral burials is a matter of law for some groups, such as Native Americans (CEQA Guidelines § 15064.5(d); PRC § 5097.98). CEQA and other State regulations regarding Native American human remains provide the following procedural requirements to assist in avoiding potential adverse effects on human remains within the contexts of their value to both descendant communities and the scientific community:

- When an initial study identifies the existence or probable likelihood that a project would affect Native American human remains, the lead agency is to contact and work with the appropriate Native American representatives identified through the NAHC to develop an agreement for the treatment and disposal of the human remains and any associated burial items (CEQA Guidelines § 15064.5(d); PRC § 5097.98).
- If human remains are accidentally discovered, the County Coroner must be contacted. If the County Coroner determines that the human remains are Native American, the Coroner must contact the NAHC within 24 hours. The NAHC must identify the Most Likely Descendant (MLD) to provide the opportunity to make recommendations for the treatment and disposal of human remains and associated burial items.
- If the MLD fails to make recommendations within 24 hours of notification or the project applicant rejects the recommendations of the MLD, the Native American human remains and

associated burial items must be reburied in a location not subject to future disturbance within the project site (PRC § 5097.98).

- If potentially affected human remains or a burial site may have scientific significance, whether or not it has significance to Native Americans or other descendant communities, then under CEQA, the appropriate mitigation of effect may require the recovery of the scientific information of the remains/burial through identification, evaluation, data recovery, analysis, and interpretation (CEQA Guidelines § 15064.5(c)(2)).

California Public Resources Code Section 5097.91—Native American Heritage Commission

Section 5097.91 of the Public Resources Code established the NAHC, whose duties include the inventory of places of religious or social significance to Native Americans and the identification of known graves and cemeteries of Native Americans on private lands. Under Section 5097.91 of the Public Resources Code, a State policy of noninterference with the free expression or exercise of Native American religion was articulated along with a prohibition of severe or irreparable damage to Native American sanctified cemeteries, places of worship, religious or ceremonial sites or sacred shrines located on public property. Section 5097.98 of the Public Resources Code specifies a protocol to be followed when the NAHC receives notification of a discovery of Native American human remains from a County Coroner. Section 5097.5 defines as a misdemeanor the unauthorized disturbance or removal of archaeological, historic, or paleontological resources located on public lands.

California Senate Bill 18—Protection of Tribal Cultural Places

SB 18 (Government Code § 65352.3) incorporates the protection of California traditional tribal cultural places into land use planning for cities, counties, and agencies by establishing responsibilities for local governments to contact, refer plans to, and consult with California Native American tribes as part of the adoption or amendment of any general or specific plan proposed on or after March 1, 2005. SB 18 requires public notice to be sent to tribes listed on the NAHC SB 18 Tribal Consultation list within the geographical areas affected by the proposed changes. Tribes must respond to a local government notice within 90 days (unless a shorter time frame has been agreed upon by the tribe), indicating whether they want to consult with the local government. Consultations are for the purpose of preserving or mitigating impacts to places, features, and objects described in Sections 5097.9 and 5097.993 of the Public Resources Code that may be affected by the proposed adoption or amendment to a general or specific plan.

California Assembly Bill 52—Effects on Tribal Cultural Resources

AB 52 was signed into law on September 25, 2014, and provides that any public or private "project with an effect that may cause a substantial adverse change in the significance of a TCR is a project that may have a significant effect on the environment." TCRs include "[s]ites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are eligible for inclusion in the CR or included in a local register of historical resources." Under prior law, TCRs were typically addressed under the umbrella of "cultural resources," as discussed above. AB 52 formally added the category of "tribal cultural resources" to CEQA and

extends the consultation and confidentiality requirements to all projects, rather than just projects subject to SB 18 as discussed above.

The parties must consult in good faith, and consultation is deemed concluded when either: (1) the parties agree to measures to mitigate or avoid a significant effect on a TCR (if such a significant effect exists); or (2) when a party concludes that mutual agreement cannot be reached. Mitigation measures agreed upon during consultation must be recommended for inclusion in the environmental document. AB 52 also identifies mitigation measures that may be considered to avoid significant impacts if there is no agreement on appropriate mitigation. Recommended measures include:

- Preservation in place
- Protecting the cultural character and integrity of the resource
- Protecting the traditional use of the resource
- Protecting the confidentiality of the resource
- Permanent conservation easements with culturally appropriate management criteria

California Public Resources Code Section 21074—Effects on Tribal Cultural Resources

AB 52 amended the CEQA statute to identify an additional category of resource to be considered under CEQA, called "tribal cultural resources," and added Public Resources Code Section 21074, which defines "tribal cultural resources" as follows:

(a) "Tribal cultural resources" are either of the following:
  (1) Sites, features, places, cultural landscapes, sacred places, and objects with cultural value to a California Native American tribe that are either of the following:
    A) Included or determined to be eligible for inclusion in the CRHR.
    B) Included in a local register of historical resources as defined in subdivision (k) of Section 5020.1.
  (2) A resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Section 5024.1. In applying the criteria set forth in subdivision (c) of Section 5024.1 for the purposes of this paragraph, the lead agency shall consider the significance of the resource to a California Native American tribe.

(b) A cultural landscape that meets the criteria of subdivision (a) is a tribal cultural resource to the extent that the landscape is geographically defined in terms of the size and scope of the landscape.

(c) A historical resource described in Section 21084.1, a unique archaeological resource as defined in subdivision (g) of Section 21083.2, or a "nonunique archaeological resource" as defined in subdivision (h) of Section 21083.2 may also be a tribal cultural resource if it conforms with the criteria of subdivision (a).

Health and Safety Code Section 7050.5 (Treatment of Human Remains)

Section 7050.5 of the California Health and Safety Code sets forth provisions related to the treatment of human remains. As the Code states, "every person who knowingly mutilates or disinters, wantonly disturbs, or willfully removes any human remains in or from any location other than a dedicated cemetery without authority of law is guilty of a misdemeanor" §§except under circumstances as provided in Section 5097.99 of the Public Resources Code. The regulations also provide guidelines for the treatment of human remains found in locations other than a dedicated cemetery, including responsibilities of the Coroner.

Public Resources Code Section 5097.98 (Discovery of Human Remains)

Section 5097.98 provides protocol for the discovery of human remains. It states that "when the commission receives notification of a discovery of Native American human remains from a County Coroner pursuant to subdivision (c) of Section 7050.5 of the Health and Safety Code, it shall immediately notify persons believed to be most likely descended from the deceased Native American." It also sets forth provisions for descendants' preferences for treatment of the human remains and what should be done if the commission is unable to identify a descendant.

Local

Fresno General Plan

The General Plan outlines a long-range vision for the physical development of the City that reflects the community's vision to preserve the desirable qualities of the existing community while encouraging the aspirations of the community. The General Plan includes the following objectives and policies related to cultural and tribal cultural resources:

Historic and Cultural Resources Element

Objective HCR-1 Maintain a comprehensive, citywide preservation program to identify, protect and assist in the preservation of Fresno's historic and cultural resources.

Policy HCR-1-a **Certified Local Government.** Maintain the City's status as a Certified Local Government (CLG), and use CLG practices as the key components of the City's preservation program.

Policy HCR-1-b **Preservation Office, Commission and Program.** Maintain the Preservation Office, Historic Preservation Commission, and preservation program to administer the City's preservation functions and programs.

Policy HCR-1-c **Historic Preservation Ordinance.** Maintain the provisions of the City's Historic Preservation Ordinance, as may be amended, and enforce the provisions as appropriate.

Objective HCR-2 Identify and preserve Fresno's historic and cultural resources that reflect important cultural, social, economic, and architectural features so that residents will have a foundation upon which to measure and direct physical change.

Policy HCR-2-a **Identification and Designation of Historic Properties.** Work to identify and evaluate potential historic resources and districts and prepare nomination forms for Fresno's Local Register of Historic Resources and California and National registries, as appropriate.

Policy HCR-2-b **Historic Surveys.** Prepare historic surveys according to California Office of Historic Preservation protocols and City priorities as funding is available.

Policy HCR-2-c **Project Development.** Prior to project approval, continue to require a project site and its Area of Potential Effects (APE), without benefit of a prior historic survey, to be evaluated and reviewed for the potential for historic and/or cultural resources by a professional who meets the Secretary of Interior's Qualifications. Survey costs shall be the responsibility of the project developer. Council may, but is not required, to adopt an ordinance to implement this policy.

Policy HCR-2-d **Native American Sites.** Work with local Native American tribes to protect recorded and unrecorded cultural and sacred sites, as required by State law, and educate developers and the community-at-large about the connections between Native American history and the environmental features that characterize the local landscape.

Policy HCR-2-g **Demolition Review.** Review all demolition permits to determine whether the resource scheduled for demolition is potentially eligible for listing on the Local Register of Historic Resources. Consistent with the Historic Preservation Ordinance, refer potentially eligible resources to the Historic Preservation Commission and as appropriate to the City Council.

Policy HCR-2-h **Minimum Maintenance Standards.** Continue to support enforcement of the minimum maintenance provisions of the Historic Preservation Ordinance, as may be amended, and enforce the provisions as appropriate.

Policy HCR-2-I **Preservation Mitigation Fund.** Consider creating a Preservation Mitigation Fund to help support efforts to preserve and maintain historic and cultural resources.

Policy HCR-2-j **Window Replacement.** City staff will evaluate potential opportunities for identification of window replacements to ensure historic integrity is maintained while encouraging sustainability. In addition, City staff will evaluate window replacements in federally funded housing projects on a project-by-project basis with consideration for health, safety, historic values, sustainability, and financial feasibility.

Policy HCR-2-k **City-Owned Resources.** Maintain all City-owned historic and cultural resources in a manner that is consistent with the U.S. Secretary of the Interior's Standards for the Treatment of Historic Properties, as appropriate.

Policy HCR-2-m **Local Register Listing.** Recommend that property owners, who receive funds from the City of Fresno for rehabilitation of a property, consent to listing it on the Local Register of Historic Resources if the property meets the criteria for age, significance, and integrity. Publicly funded rehabilitation properties which may meet Local Register criteria will be presented to the City's Historic Preservation Commission for review.

Policy HCR-2-n **Property Database and Informational System.** Identify all historic resources within the City designated on the Local, State, or National register, and potential significant resources (building, structure, object or site) in existence for at least 45 years, and provide this information on the City's website.

Objective HCR-3 Promote a "New City Beautiful" ethos by linking historic preservation, public art, and planning principles for Complete Neighborhoods with green building and technology.

Policy HCR-3-a **Adaptive Reuse.** Promote the adaptive reuse and integration of older buildings into new projects as part of the City's commitment to nurturing a sustainable Fresno.

Policy HCR-3-b **Public Art.** Collaborate with the arts community to promote the integration of public art into historic buildings and established neighborhoods. Link arts activities (such as Art Hop) with preservation activities.

Policy HCR-3-c **Context Sensitive Design.** Work with architects, developers, business owners, local residents and the historic preservation community to ensure that infill development is context-sensitive in its design, massing, setbacks, color, and architectural detailing.

Objective HCR-4 Foster an appreciation of Fresno's history and cultural resources.

Policy HCR-4-d **Public Archives.** Maintain public archives that include information on all designated historic properties, as well as historic surveys, preservation bulletins, and general local history reference materials. Post survey reports, Historic Preservation Commission minutes and agendas, and other information of public interest on the historic preservation page of the City's website.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to cultural and tribal cultural resources:

Cultural and Historic Policies Element

Objective CR-1 Preserve the region's culturally significant landscapes outside the Southeast Development Area by reducing development pressure on those landscapes.

Policy CR-1.2 **Conversion of Non-Urban Uses.** Limit the conversion of culturally significant rural areas outside the current Fresno SOI.

Objective CR-3 Identify and protect significant structures, sites and landscapes within the Southeast Development Area.

Policy CR-3.1 **Cultural Resource Surveys.** Conduct surveys for cultural resources. For all activities in the SEDA meeting the California Environmental Quality Act (CEQA) definition of a "project," the City of Fresno shall ensure that a qualified professional Archaeologist; and historian or architectural historian as appropriate based on-site conditions has conducted focused surveys of the project site before issuing grading permits. If cultural resources (prehistoric or historic) are identified as a result of the survey, a qualified professional Archaeologist/historian shall evaluate the significance of the finds and recommend appropriate mitigation measures for significant resources. The City shall ensure the project applicant or designee implements these mitigation measures. Mitigation may include, but shall not necessarily be limited to, the avoidance of significant and potentially significant resources through changes in project design and/or subsurface testing and data recovery. Such efforts, particularly those involving testing and excavation, shall be conducted in consultation with appropriate Native American representatives identified by the Native American Heritage Commission (NAHC).

Policy CR-3.2 **Discovery of Cultural Resources.** Protect cultural resources discovered during construction. If previously undocumented cultural materials such as historic building or structure remains; historic artifact deposits or scatters; or prehistoric artifacts such as stone tool flaking debitage, mortars, pestles, shell, or bone are encountered during construction in the SEDA, all ground-disturbing activity shall be suspended temporarily within a 100-foot radius of the find or a distance determined by a qualified professional Archaeologist to be appropriate based on the potential for disturbance of additional resource-bearing soils. A qualified professional Archaeologist shall identify the materials, determine their possible significance, and formulate appropriate mitigation measures. Appropriate mitigation may include no action, avoidance of the resource, and potential data recovery. Ground disturbance in the zone of suspended activity shall not recommence without authorization from the Archaeologist.

Policy CR-3.3 **Discovery of Remains.** Appropriately address human remains that could be found during construction. If human remains are uncovered during construction in the SEDA, all ground-disturbing activities shall immediately be suspended within a 100-foot radius of the find or a distance determined by a qualified professional

Archaeologist to be appropriate based on the potential for disturbance of additional remains.

Policy CR-3.4 **State Resources.** Identify any resource listed in, or eligible for listing in, the California Register of Historical Resources, including archaeological sites, during the Environmental Impact Report.

Policy CR-3.5 **Locally Significant Resources.** The City of Fresno shall identify additional cultural resources in road, utility, and other agency and public rights-of-way in the SEDA significant to the San Joaquin Valley and Fresno, such as historic canals and tree-lined boulevards. The City shall convey information on these resources, and appropriate protection measures, to developers, utility companies, and other implementing agencies or stakeholders that might affect these resources.

Policy CR-3.6 **Resource Protection.** Incorporate historic sites, infrastructure and landscape features into new developments in order to conserve resources and preserve the area's vernacular landscape and "sense of place."

Policy CR-3.7 **Resource Relocation.** The relocation of historic structures should be considered as a last resort for preservation and only when retention in place is infeasible. Moved properties should adhere to the Secretary of Interior's recommendations.

Policy CR-3.8 **Alternate Public Improvement Standards**. Develop Alternate Public Improvement Standards (APIs) for historic landscaped roads, if appropriate, to preserve the historic context of the SEDA area.

Objective CR-4 Develop new mixed-use communities that reflect and establish a regional identity in the design of new buildings and complexes.

Policy CR-4.1 **Wayside Exhibits.** Incorporate wayside exhibits within new developments that depict the history of the site or region through photographs and text.

Fresno Municipal Code

Article 16 of the Municipal Code is the Historic Preservation Ordinance of the City of Fresno, which seeks to preserve, promote, and improve the historic resources and districts of the City of Fresno for educational, cultural, economic and general welfare of the public; to continue to protect and review changes to these resources and districts which have a distinctive character or a special historic, architectural, aesthetic or cultural value to the City, State, and nation; to continue to safeguard the heritage of the City by preserving and regulating its historic buildings, structures, objects, sites and districts which reflect elements of the City's historic, cultural, social, economic, political and architectural history; to continue to preserve and enhance the environmental quality and safety of

these landmarks and districts; to continue to establish, stabilize and improve property values and to foster economic development.[40]

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan PEIR contains the following mitigation measures that are applicable to the proposed project.

MM CUL-1.1 If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance. If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds.

No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

MM CUL-1.2 Prior to approval of any discretionary project that could result in an adverse change to a potential historic and/or cultural resource, the City shall require a site-specific evaluation of historic and/or cultural resources by a professional who meets the Secretary of Interior's Qualifications. The evaluation shall provide recommendations to mitigate potential impacts to historic and/or cultural resources and shall be approved by the Director of Planning and Development.

MM CUL-2 Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for prehistoric archaeological resources shall be conducted. The following procedures shall be followed.

- If prehistoric resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that buried prehistoric archaeological resources are discovered during excavation

[40] City of Fresno. 2023. Municipal Code and Charter of the City of Fresno, California. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH12IMFEHIREOTMITO_ART16HIPROR. Accessed March 22, 2023.

and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified Archaeologist shall be consulted to determine whether the resource requires further study. The qualified Archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines. If the resources are determined to be unique prehistoric archaeological resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

- If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If the resources are found to be significant, measures shall be identified by the qualified Archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified Archaeologist. If additional prehistoric archaeological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed.

MM CUL-3 In the event that human remains are unearthed during excavation and grading activities of any future development project, all activity shall cease immediately. Pursuant to Health and Safety Code (HSC) Section 7050.5, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98(a). If the remains are determined to be of Native American descent, the Coroner shall within 24 hours notify the Native American Heritage Commission (NAHC). The NAHC shall then contact the most likely descendant of the deceased Native American, who shall then serve as the consultant on how to proceed with the remains. Pursuant to Public Resources Code Section 5097.98(b), upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native

American human remains are located is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment.

3.5.4 - Methodology

Records Searches and Pedestrian Survey to Identify Existing Cultural Resources

Northwest Information Center

On April 13, 2022, a records search for the project site and a 0.5-mile radius beyond the Plan Area boundaries, was conducted at the SSJVIC located at California State University, Bakersfield. To identify additional historic properties or resources, the current inventories of the NRHP, the CRHR, the California Historical Landmarks list, the California Points of Historical Interest List, and the BERD for Fresno County were reviewed to determine the existence of previously documented local historical resources. Ethnographic resources were also reviewed for information regarding reported Native American village sites located within the City. It should be noted that the local Fresno Record of Historic Resources does not currently include any sites within the SEDA Specific Plan Area, as it is not yet within the jurisdiction of the City.

Results from the records search indicate 23 resources (one prehistoric and 22 historic-era resources) have been recorded within a 0.5-mile radius of the Plan Area. Eleven of those historic-era resources are located within the Plan Area (Table 3.5-1). In addition, 49 previous studies are on file with the SSJVIC within a 0.5-mile radius of the Plan Area, 26 of which address locations within the Plan Area itself (Table 3.5-2).

Table 3.5-1: Cultural Resources Recorded Within the Plan Area

Resource No.	Resource Description	Date Recorded
P-10-003930	Southern Pacific Railroad, Historic AH07 (Roads/trails/railroad grades), HP11 (Engineering structure)	1998, 1999, 2001, 2002, 2004, 2009, 2010, 2013, 2014, 2015, 2016, 2018
P-10-004675	Burlington Northern Santa Fe Railway, Historic, HP19 (Bridge); HP37 (Highway/trail)–Rail Road	2000, 2019
P-10-004724	7E–Hansen Canal, Historic, HP20 (Canal/aqueduct)	1991, 2001
P-10-005464	8175 Kings Canyon Road Barn and Residence, Historic, HP33 (Farm/ranch)	2005
P-10-006048	Map Reference #119; Arkelian Sahag Life Estate Property, Historic, HP02 (Single-family property); HP04 (Ancillary building)	2002
P-10-006091	Map Reference #14; Fowler Avenue and Harvey Palm Trees, Historic, HP29 (Landscape architecture)	2002

Resource No.	Resource Description	Date Recorded
P-10-006092	Map Reference #53; James Call Property, Historic, HP02 (Single-family property); HP04 (Ancillary building)	2002
P-10-006093	Map Reference #50; State of California Property, Historic, HP02 (Single-family property); HP04 (Ancillary building)	2002
P-10-006094	Map Reference #46; William R. Slaton Property, Historic, HP02 (Single-family property)	2002
P-10-006126	2629 S. Clovis Avenue, Historic, HP06 (1-3 story commercial building); HP33 (Farm/ranch)	2010
P-10-007030	Gould Canal, Historic, HP20 (Canal/aqueduct)	2016
Source: Southern San Joaquin Valley Information Center (SSJVIC) Records Search. April 18, 2022.		

Table 3.5-2: Previous Investigations Within the Plan Area

Resource No.	Report Title	Author	Date
FR-00118	Cultural Resources Survey for Rural Residential Development of Tract #4249 in Fresno County	Bissonnette, Linda Dick	1991
FR-00257	Historic Property Survey Report Route 180 Chestnut Avenue to Highland Avenue; 06-FRE-180, R60.9/R6736 06250–342400		1990
FR-00448	An Archaeological Assessment of Six Acres Southeast of Clovis, Fresno County, California	Sutton, Mark Q.	1991
FR-00501	Negative Archaeological Survey Report for the Proposed Subdivision of a Parcel of Land on Belmont Avenue in Fresno County, California	Kus, James	1994
FR-00535	Archaeological Survey Report for a Proposed Upgrade of Rural Route 180 Between Fowler and Cove Avenues, Fresno County, California	McGuire, Kelly R. and Wohlgemuth, Eric	1992
FR-00548	Redbank and Fancher Creeks Intensive Cultural Resources Survey, Fresno County, California	Meighan, Clement, Dillon, Brian, Verano, John, and Indermill, Roc	1987
FR-00578	Archaeological Survey Report for Proposed Channelization on Route 180 at Temperance Avenue, Fresno County, California	O'Connor, Denise	1981
FR-01114	An Archaeological Survey of a Proposed Ponding Basin, Locan Avenue, Fresno County, California	Wren, Donald G.	1995
FR-01115	An Archaeological Survey of the Qualls Property, Fresno County, California–EA 4101	Wren, Donald G.	1995
FR-01130	Archaeological Reconnaissance of the Redbank and Fancher Creek Investigation Area	Wren, Donald G. and Crist, Michael	1975

Resource No.	Report Title	Author	Date
FR-01608	A Cultural Resources Survey for the Fancher Creek Basin Fill Project, Fresno County, California	Roper, Kristina	1998
FR-01627	Shields/Leonard Fill Site Expansion–Redband Creek Channel Restoration Project Cultural/Historical Resource Report	Wren, Donald G.	1999
FR-01661	A Cultural Resource Study: Stormwater Retention Basin BG Fresno County, California	Wren, Donald G.	2000
FR-01748	A Cultural Resource Study Fresno Metropolitan Flood Control District Fill Site E. Shields and Leonard Avenue	Wren, Donald	2001
FR-01797	A Cultural Resource Study for the Clovis Southeast Specific Plan, Clovis, California	Wren, Donald G.	2002
FR-02044	A Cultural Resource Study of the Mathias Property, Fresno County, California	Varner, Dudley M.	2004
FR-02059	Request for SHPO Review of FCC Undertaking (Ivesta/CA-1663D)	Billat, Scott	2005
FR-02223	Second Supplemental Historical Architectural Survey Report for the State Route 180, Chestnut Avenue to Highland Avenue, Fresno County, California	Brady, Jon L.	2002
FR-02356	Cultural Resource Study for a Two Creeks South Project (DeWolf and Leonard) in the City of Clovis, Fresno County, California	Varner, Dudley M.	2010
FR-02439	Results of Architectural History Survey for Verizon Cellular Communications Tower Site–Clovis and Jensen, 2629 S. Clovis Avenue (APN: 316-051-02), Fresno, California 93725	Brian, Hatoff	2010
FR-02453	Second Supplemental Historic Property Survey Report 180 East Rural Expressway Reevaluation–Fowler Avenue to Cove Avenue Fresno County, California	Unknown	2002
FR-02507	Historic Architectural Survey Report for the Rural Highway 180 Project Fowler Avenue to Cove Avenue, Fresno County, California	Mikesell, Stephen D. and Wee, Stephen R.	1992
FR-02579	Cultural Resources Investigation for AT&T Mobility CV2714 "Jensen and Clovis" 5608 East Jensen Avenue, Fresno, California 93725	Losee, Carolyn	2013
FR-02629	Archaeological Sensitivity Assessment Ensite #11227 (250035)/Temperance 7101 E. McKinley Avenue, Fresno, Fresno County, California	Travers, Aniela	2012
FR-02705	Cultural Resources Survey for S Armstrong/Ensite #17742 (263944) 7125 East Kings Canyon Road, Fresno City and County, California	Greenberg, Gregory	2014
FR-02751	Cultural Resources Survey S Armstrong/Ensite #17742 (263944) 7125 East Kings Canyon Road, Fresno, Fresno County, California	Perez, Don C.	2015
Source: Southern San Joaquin Valley Information Center (SSJVIC) Records Search. April 18, 2022.			

Native American Heritage Commission Record Search

On April 13, 2022, FCS sent a request to the NAHC in an effort to determine whether any sacred sites are listed on its Sacred Lands File for the project site. A response was received on June 23, 2022, indicating that the Sacred Lands File was positive for the presence of Native American cultural resources in the Plan Area. The NAHC included a list of 12 tribal representatives available for consultation who may have additional knowledge of the Plan Area. To ensure that all Native American knowledge and concerns over potential TCRs that may be affected by the proposed project are addressed, a letter containing project information requesting any additional information was sent by FCS to each tribal representative on June 30, 2022. No responses have been received to date. Correspondence related to the NAHC letters and tribal representatives can be found in Appendix C.

3.5.5 - Thresholds of Significance

The lead agency utilizes the criteria in CEQA Guidelines Appendix G Environmental Checklist to determine whether cultural resources impacts resulting from the implementation of the proposed project would be considered significant if the project would:

a) Cause a substantial adverse change in the significance of a historical resource as pursuant to Section 15064.5?

b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5?

c) Disturb any human remains, including those interred outside of formal cemeteries?

d) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k)?

e) Cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1?

3.5.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Historic Resources

Impact CUL-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource pursuant to Section 15064.5.

Impact Analysis

A substantial adverse change in the significance of a historical resource is defined at Section 15064.5(b)(1) of the CEQA Guidelines as the "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of a historical resource would be materially impaired." Known historic structures are located throughout the Plan Area as described in the preceding sections.

Development under the proposed project would result in additional residential and nonresidential development throughout the Plan Area. Additionally, the proposed project may result in other private and public improvements throughout the Plan Area that could have significant environmental impacts related to historic resources (see Chapter 2, Project Description). Therefore, subsequent development under the proposed project could affect known historic resources or previously unidentified or undesignated resources.

The General Plan includes policies intended to conserve and reduce impacts to historical resources. For example, Policy HCR-2-g requires that the City review all demolition permits to determine whether buildings scheduled for demolition are potentially eligible for listing on the Local Register of Historic Resources and refer potentially eligible resources to the Historic Preservation Commission.

The SEDA Specific Plan includes policies specifically designed to address the conservation and protection of historical buildings and resources. Policy CR-3.1 requires that surveys for cultural resources are conducted for all projects in the SEDA by a qualified professional Archaeologist and Historian or Architectural Historian as appropriate and that appropriate mitigation measures are implemented. Individual development projects which propose to alter a building or structure greater than 45 years of age at the time an application is deemed complete would also be required to undergo project-specific environmental review in compliance with CEQA Guidelines Section 15064.5, in order for the City to determine whether the building or structure may be a historic resource, and take appropriate action such as requiring additional site-specific or project-specific measures to reduce any potential impacts. The proposed project would also be required to comply with the City's Historic Preservation Ordinance, which is incorporated as Article 16 in the City's Municipal Code.

As the City receives development applications for subsequent development under the proposed project, those applications will be reviewed by the City for compliance with the objectives and policies in the General Plan and the SEDA Specific Plan related to the protection of historical resources. The City's Municipal Code and Zoning Ordinance, which implement the City's General Plan would be reviewed when development applications are received.

In conclusion, development envisioned by the proposed project could result in an increase in new residential and nonresidential development, as well as other public improvements, that could affect known historic resources or previously unidentified or undesignated historic resources within the

Plan Area. However, compliance with General Plan and SEDA Specific Plan objectives and policies would ensure that future development projects are appropriately reviewed in terms of potential impacts to historic resources. Future development under the proposed project would therefore not result in significant adverse effects to historical resources and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

MM CUL-1.1 If previously unknown resources are encountered before or during grading activities, construction shall stop in the immediate vicinity of the find and a qualified historical resources specialist shall be consulted to determine whether the resource requires further study. The qualified historical resources specialist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines and the City's Historic Preservation Ordinance. If the resources are determined to be unique historical resources as defined under Section 15064.5 of the CEQA Guidelines, measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds.

No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any historical artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.

MM CUL-1.2 Prior to approval of any discretionary project that could result in an adverse change to a potential historic and/or cultural resource, the City shall require a site-specific evaluation of historic and/or cultural resources by a professional who meets the Secretary of Interior's Qualifications. The evaluation shall provide recommendations to mitigate potential impacts to historic and/or cultural resources and shall be approved by the Director of Planning and Development.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Archaeological Resources

Impact CUL-2: The proposed project would not cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.

Impact Analysis

Based on a review of information available at the SSJVIC, portions of the Plan Area have been previously surveyed for archaeological resources. While no known archaeological resource sites have been recorded within the Plan Area, archaeological sites have been recorded within 0.5 mile and the possibility exists that additional undiscovered archaeological sites could be present within the Plan Area.

Development under the proposed project would result in additional residential and nonresidential development throughout the Plan Area. Additionally, the SEDA Specific Plan may result in other private and public improvements throughout the Plan Area that could have significant environmental impacts related to archaeological resources. Therefore, subsequent development under the proposed project could affect known archaeological resources or previously unidentified or undesignated archaeological resources.

The potential for additional archaeological sites to be present within the Plan Area exists but varies by location. Prehistoric habitation sites tend to be situated in proximity to creeks and other areas with a reliable water supply. Task-specific sites or resource procurement sites can be situated in almost any environment conducive to human activity. Buried prehistoric archaeological sites tend to be found on Holocene-era landforms, particularly alluvial fans, floodplains, and areas along rivers and streams. As such, within the Plan Area, the areas around Redbank Creek and Dog Creek have increased potential for buried prehistoric archaeological resources to be present.

Policy CR-3.1 requires that surveys for cultural resources are conducted for all projects in the SEDA Specific Plan Area by a qualified professional Archaeologist as appropriate and that appropriate mitigation measures are implemented should archaeological resources be discovered. Policy CR-3.2 requires that, if any previously undocumented cultural materials discovered during construction of a project in the SEDA Specific Plan Area all ground-disturbing activity shall be suspended temporarily within a 100-foot radius of the find or a distance determined by a qualified professional Archaeologist. The Archaeologist shall determine potential significance and appropriate mitigation measures. The proposed project would also be required to comply with the City's Historic Preservation Ordinance, which is incorporated as Article 16 in the City's Municipal Code.

As the City receives development applications for subsequent development under the proposed project, those applications would be reviewed by the City for compliance with the policies of the General Plan, the SEDA Specific Plan as well as the regulations of the Historic Preservation Ordinance related to archaeological resources. In particular, proposed new developments in the Plan Area would be required to conduct updated records search with the SSJVIC to determine the archaeological sensitivity of the site, as well as be referred to the NAHC and local Native American tribes. If required, an archaeological survey of the site would be conducted and/or accidental discovery procedures for archaeological resources would be required.

In conclusion, development envisioned by the proposed project could result in new residential and nonresidential development, as well as other public improvements, that could affect known or previously unidentified archaeological resources within the Plan Area. However, compliance with General Plan and SEDA Specific Plan policies as well as the regulations of the Historic Preservation Ordinance would ensure that future development projects are appropriately reviewed and designed in terms of potential impacts to archaeological resources. Consistent with General Plan and SEDA Specific Plan, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts and would ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM CUL-1.1

MM CUL-2 Subsequent to a preliminary City review of the project grading plans, if there is evidence that a project will include excavation or construction activities within previously undisturbed soils, a field survey and literature search for prehistoric archaeological resources shall be conducted. The following procedures shall be followed.

- If prehistoric resources are not found during either the field survey or literature search, excavation and/or construction activities can commence. In the event that buried prehistoric archaeological resources are discovered during excavation and/or construction activities, construction shall stop in the immediate vicinity of the find and a qualified Archaeologist shall be consulted to determine whether the resource requires further study. The qualified Archaeologist shall make recommendations to the City on the measures that shall be implemented to protect the discovered resources, including but not limited to excavation of the finds and evaluation of the finds in accordance with Section 15064.5 of the CEQA Guidelines. If the resources are determined to be unique prehistoric archaeological resources as defined under Section 15064.5 of the CEQA Guidelines, mitigation measures shall be identified by the monitor and recommended to the Lead Agency. Appropriate measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. No further grading shall occur in the area of the discovery until the Lead Agency approves the measures to protect these resources. Any prehistoric archaeological artifacts recovered as a result of mitigation shall be provided to a City-approved institution or person who is capable of providing long-term preservation to allow future scientific study.
- If prehistoric resources are found during the field survey or literature review, the resources shall be inventoried using appropriate State record forms and submit

the forms to the Southern San Joaquin Valley Information Center. The resources shall be evaluated for significance. If the resources are found to be significant, measures shall be identified by the qualified Archaeologist. Similar to above, appropriate mitigation measures for significant resources could include avoidance or capping, incorporation of the site in green space, parks, or open space, or data recovery excavations of the finds. In addition, appropriate mitigation for excavation and construction activities in the vicinity of the resources found during the field survey or literature review shall include an archaeological monitor. The monitoring period shall be determined by the qualified Archaeologist. If additional prehistoric archaeological resources are found during excavation and/or construction activities, the procedure identified above for the discovery of unknown resources shall be followed.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Human Remains

Impact CUL-3: The proposed project would not disturb human remains, including those interred outside of formal cemeteries.

Impact Analysis

Excavation and construction activities allowed under the proposed project may uncover human remains that may not be marked in formal burial locations. Therefore, as future development and infrastructure projects are reviewed by the City, each project would be evaluated for conformance with the General Plan, the SEDA Specific Plan, and the Historic Preservation Ordinance, and other applicable State regulations. Under CEQA, human remains are protected under the definition of archaeological materials as being "any evidence of human activity."

Public Resources Code Section 5097 has specific stop-work and notification procedures to follow when Native American human remains are inadvertently discovered during excavation and construction activities. Section 7050.5 of the California Health and Safety Code sets forth provisions related to the treatment of human remains, including the treatment of human remains found in locations other than a dedicated cemetery and the responsibilities of the Coroner. These requirements apply to all construction projects within the Plan Area.

The SEDA Specific Plan includes policies intended to conserve and reduce impacts to archaeological resources, including human remains. Policy CR-3.1 requires that surveys for cultural resources are conducted for all projects in the SEDA Specific Plan Area by a qualified professional Archaeologist as appropriate and that appropriate mitigation measures are implemented should archaeological resources be discovered. Policy CR-3.3 requires that, if human remains are uncovered during construction in the SEDA Specific Plan Area, all ground-disturbing activities shall immediately be

suspended within a 100-foot radius of the find or a distance determined by a qualified Archaeologist to be appropriate based on the potential for disturbance of additional remains.

Implementation of policies in the SEDA Specific Plan, as well as compliance with adopted State, federal and local regulations for the protection of archaeological resources and human remains, would ensure that future development under the proposed project would not result in significant adverse effects to human remains. Therefore, impacts would be considered less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

MM CUL-3 In the event that human remains are unearthed during excavation and grading activities of any future development project, all activity shall cease immediately. Pursuant to Health and Safety Code (HSC) Section 7050.5, no further disturbance shall occur until the County Coroner has made the necessary findings as to origin and disposition pursuant to Public Resources Code Section 5097.98(a). If the remains are determined to be of Native American descent, the Coroner shall within 24 hours notify the Native American Heritage Commission (NAHC). The NAHC shall then contact the most likely descendant of the deceased Native American, who shall then serve as the consultant on how to proceed with the remains. Pursuant to Public Resources Code Section 5097.98(b), upon the discovery of Native American remains, the landowner shall ensure that the immediate vicinity, according to generally accepted cultural or archaeological standards or practices, where the Native American human remains are located is not damaged or disturbed by further development activity until the landowner has discussed and conferred with the most likely descendants regarding their recommendations, if applicable, taking into account the possibility of multiple human remains. The landowner shall discuss and confer with the descendants all reasonable options regarding the descendants' preferences for treatment.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Listed or Eligible Tribal Cultural Resources

Impact CUL-4: **The proposed project would not cause a substantial adverse change in the significance of a Tribal Cultural Resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is listed or eligible for listing in the California Register of Historical Resources, or in a local register of historical resources as defined in Public Resources Code Section 5020.1(k).**

Impact Analysis

On April 13, 2022, a letter was sent to the NAHC to determine whether any sacred sites are listed on its Sacred Lands File for the Plan Area. A response was received on June 23, 2022, indicating the search returned positive results for TCRs in the Plan Area (see Appendix C). Furthermore, it is always possible that subsurface excavation activities may encounter previously undiscovered TCRs that may meet the eligibility requirements for listing in the CRHR. Therefore, any unidentified TCRs could be adversely affected by development under the proposed project and create a potentially significant impact.

While the proposed project does not directly propose any adverse changes to any recorded TCRs, future development allowed under the proposed project could affect known or previously unidentified TCRs. In addition, the potential for additional undiscovered eligible TCRs to be present within the Plan Area exists but varies by location. As with prehistoric archaeological resources, the areas around Redbank Creek and Dog Creek have increased potential for buried TCRs to be present.

The General Plan includes policies intended to conserve and reduce impacts to TCRs. Policy HCR-2-d requires that the City works with local Native American tribes to protect recorded and unrecorded cultural and sacred sites, as required by State law.

The SEDA Specific Plan includes policies intended to conserve and reduce impacts to TCRs and archaeological resources, which may include TCRs. Policy CR-3.1 requires that surveys for cultural resources are conducted for all projects in the SEDA Specific Plan Area by a qualified professional Archaeologist as appropriate and that appropriate mitigation measures are implemented should archaeological resources be discovered. Policy CR-3.2 requires that, if any previously undocumented cultural materials discovered during construction of a project in the SEDA Specific Plan Area all ground-disturbing activity shall be suspended temporarily within a 100-foot radius of the find or a distance determined by a qualified professional Archaeologist. The Archaeologist shall determine potential significance and appropriate mitigation measures. Policy CR-3.3 requires that, if human remains are uncovered during construction in the SEDA Specific Plan Area, all ground-disturbing activities shall immediately be suspended within a 100-foot radius of the find or a distance determined by a qualified Archaeologist to be appropriate based on the potential for disturbance of additional remains. The proposed project would also be required to comply with the City's Historic Preservation Ordinance, which is incorporated as Article 16 in the City's Municipal Code.

By adhering to the policies and actions in the General Plan, SEDA Specific Plan, and the City's Historic Preservation Ordinance as well as the provisions under State and federal law, potential impacts to existing or undiscovered eligible TCRs within the Plan Area would be reduced to less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM CUL-1.1, MM CUL-1.2, and MM CUL-3.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Lead Agency Determined Tribal Cultural Resources

Impact CUL-5: The proposed project would not cause a substantial adverse change in the significance of a tribal cultural resource, defined in Public Resources Code Section 21074 as either a site, feature, place, cultural landscape that is geographically defined in terms of the size and scope of the landscape, sacred place, or object with cultural value to a California Native American tribe, and that is a resource determined by the lead agency, in its discretion and supported by substantial evidence, to be significant pursuant to criteria set forth in subdivision (c) of Public Resources Code Section 5024.1.

Impact Analysis

On April 13, 2022, a letter was sent to the NAHC to determine whether any sacred sites are listed on its Sacred Lands File for the Plan Area. A response was received on June 23, 2022, indicating the search returned positive results for TCRs in the Plan Area, and recommended contacting tribal representatives from 12 tribes for additional information. A letter containing project information requesting any additional information was sent by FCS to each tribal representative on June 30, 2022. No responses have been received to date. (See Appendix C).

At this time, the City, in its capacity as lead agency, has not identified any TCRs meeting the criteria set forth in subdivision (c) of Public Resources Code Section 5024.1 that would be adversely impacted by the proposed project. Nonetheless, as described under Impact CUL-4, future development allowed under the proposed project could affect previously unidentified TCRs.

As discussed under Impact CUL-4, the SEDA Specific Plan includes policies to conserve and reduce impacts to TCRs, such as Policy CR-3.1, Policy CR-3.2, and Policy CR-3.3. By adhering to the policies and actions in the General Plan Update, as well as the provisions under State and federal law, potential impacts to existing or undiscovered eligible TCRs within the Plan Area would be reduced to less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM CUL-1.1, MM CUL-1.2, and MM CUL-3.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

3.5.7 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for cultural and TCRs is the SEDA Specific Plan Area as well as the City of Fresno, adjacent communities in the City of Clovis, and unincorporated Fresno County. This analysis evaluates whether the impacts of the proposed project, together with the impacts of cumulative development, would result in a cumulatively significant impact on cultural resources and TCRs. This analysis then considers whether incremental contribution to cumulative impacts associated with the implementation of the proposed project would be significant. Both conditions must apply for a project's cumulative effects to rise to the level of significance.

Future development within the cumulative geographic scope could have significant cumulative impacts on known or previously unidentified cultural resources and TCRs. However, development within the cumulative geographic context would be required to comply with federal, State, and local laws and policies that protect cultural and TCRs, including the provisions of SB 18 and AB 52, Section 15064.5 of the CEQA Guidelines, Section 7050.5 of the California Health and Safety Code, and Sections 5024.1 and 5097 of the Public Resources Code. Compliance with these policies may also require development projects to prepare site-specific project-level analysis to fulfill CEQA requirements, which also would include additional consultation that could lead to the identification of potential site-specific cultural and TCRs. Accordingly, because cumulative development would be required to comply with long-term planning documents, and regulatory agency policies (including, but not limited to, evaluation requirements and inadvertent discovery procedures) that reduce impacts to potential cultural and TCRs, cumulative impacts would be less than significant.

Moreover, the proposed project's incremental contribution to these less than significant cumulative impacts would not be significant with implementation of the policies and actions proposed in the SEDA Specific Plan. As analyzed above, Policy CR-3.1 requires that surveys for cultural resources are conducted for all projects in the SEDA Specific Plan Area by a qualified professional Archaeologist as appropriate and that appropriate mitigation measures are implemented should archaeological resources be discovered. Policy CR-3.2 requires that, if any previously undocumented cultural materials discovered during construction of a project in the SEDA Specific Plan Area all ground-disturbing activity shall be suspended temporarily within a 100-foot radius of the find or a distance determined by a qualified professional Archaeologist. The Archaeologist shall determine potential

significance and appropriate mitigation measures. Policy CR-3.3 requires that, if human remains are uncovered during construction in the SEDA Specific Plan Area, all ground-disturbing activities shall immediately be suspended within a 100-foot radius of the find or a distance determined by a qualified Archaeologist to be appropriate based on the potential for disturbance of additional remains. The proposed project would also be required to comply with the City's Historic Preservation Ordinance, which is incorporated as Article 16 in the City's Municipal Code.

As discussed under Impacts CUL-1 through CUL-5, as the City receives development applications for subsequent development under the proposed project, those applications would be reviewed by the City for compliance with the policies of the General Plan, the SEDA Specific Plan, the provisions of SB 18 and AB 52, the Historic Preservation Ordinance, and other relevant federal, State, and local regulations that protect cultural and TCRs, including Section 15064.5 of the CEQA Guidelines and Sections 5024.1 and 5097 of the Public Resources Code.

Other municipalities within the cumulative geographic context have adopted similar policies to preserve and protect known or previously unidentified cultural and TCRs. Therefore, cumulative impacts from implementation of the proposed project would not result in a considerable incremental contribution to cumulative impacts to cultural and TCRs. In addition, the SEDA Specific Plan contains policies to protect cultural and TCRs, and future development within the cumulative geographic context would be required to comply with regulations set forth by local, State, and federal agencies to protect cultural and TCRs. Therefore, the proposed project's contribution to cumulative impacts would be less than significant.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Cumulative Mitigation Measures

Implementation of MM CUL-1.1, MM CUL-1.2, MM CUL-2, and MM CUL-3.

Project Specific Cumulative Mitigation Measures

None.

Level of Cumulative Significance After Mitigation

Less than significant impact.

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3.6 - Energy

3.6.1 - Introduction

This section describes the existing energy setting in the project area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to energy that could result from implementation of the project. Information in this section is based, in part, on project-specific energy calculation outputs included in Appendix E. No public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to energy.

3.6.2 - Existing Setting

Energy Basics

Energy is generally transmitted either in the form of electricity, measured in kilowatts (kW)[1] or megawatts (MW),[2] or natural gas measured in British Thermal Units (BTU), or cubic feet.[3] Fuel, such as gasoline or diesel, is measured in gallons or liters.

Electricity

Electricity is used primarily for lighting, appliances, and other uses associated with the project.

Natural Gas

Natural gas is used primarily for heating, water heating, and cooking purposes and is typically associated with commercial and residential uses.

Fuel

Fuel is used primarily for powering off-road equipment, trucks, and passenger vehicles. The typical fuel types used are diesel and gasoline.

Electricity Generation, Distribution, and Use

State of California

The State of California generates approximately 206,336 gigawatt-hours (GWh) of electricity. Approximately 43.0 percent of the energy generation is sourced from natural gas, 32.1 percent from renewable sources (i.e., solar, wind, and geothermal), 16.5 percent from large hydroelectric sources, and the remaining 8.4 percent is sourced from coal, nuclear, oil, and other nonrenewable sources.[4]

In 2021, California was the nation's top producer of electricity from solar, geothermal, and biomass energy. The State was fourth in the nation in conventional hydroelectric power generation, down from second in 2019, in part because of drought and increased water demand. In 2021, California

[1] 1 kW = 1.000 watts; A watt is a derived unit of power that measure rate of energy conversion. 1 watt is equivalent to work being done at a rate of 1 joule of energy per second. In electrical terms, 1 watt is the power dissipated by a current of 1 ampere flowing across a resistance of 1 volt.

[2] 1 MW = 1 million watts

[3] A unit for quantity of heat that equals 100,000 British Thermal Units (BTUs). BTU is the quantity of heat required to raise the temperature of 1 pound of liquid water 1°F (degree Fahrenheit) at a constant pressure of 1 atmosphere.

[4] California Energy Commission (CEC). 2022. 2019 Total System Electric Generation. Website: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2020-total-system-electric-generation/2019. Accessed June 30, 2022.

was the fourth-largest electricity producer in the nation. In 2019, California was the second largest total energy consumer among the states, but its per capita energy consumption was less than in all other states except Rhode Island, due in part to its mild climate and its energy efficiency programs.

Electricity and natural gas are distributed through the various electric load-serving entities (LSEs) in California. These entities include investor-owned utilities (IOUs), publicly owned LSEs, rural electric cooperatives, community choice aggregators, and electric service providers.[5]

Fresno County

End-use electricity and gas customers in Fresno County are served solely by Pacific Gas and Electric Company (PG&E) to meet electrical power demands. As of 2019, PG&E's portfolio contains 30 percent electricity generated from renewable sources.[6]

The smallest scale at which electricity consumption information is readily available is the county level. Therefore, electricity consumption in Fresno County is used herein to generally characterize the City's existing electricity consumption. Fresno County includes several incorporated cities and a large unincorporated area. According to the California Energy Commission (CEC), Fresno County consumed approximately 7,444.9 GWh in 2019.[7] Note that year 2019 was used over reporting year 2020 to present a pre-COVID-19 pandemic level of energy usage.

Project Site

The project site contains open space and natural features, as well as existing development, such as residential, commercial, light industrial, and agricultural uses, that currently use electricity from existing utilities.

Natural Gas Generation, Distribution, and Use

State of California

Natural gas is used for everything from generating electricity to cooking and space heating to an alternative transportation fuel. In 2020, total natural gas demand in California for residential, commercial, industrial, vehicle fuel, and electric power generation was 2,019 billion cubic feet per year (BCF/year), up from 2,108 BCF/year in 2016. Demand in all sectors except vehicle fuel has remained relatively flat but demand for vehicle fuel rose 33 percent between 2016 and 2021.[8]

Natural gas-fired generation has become the dominant source of electricity in California; it fuels about 43 percent of electricity consumption, followed by hydroelectric power. Because natural gas is a resource that provides load when the availability of hydroelectric power generation and/or other sources decrease, use varies greatly from year to year. The availability of hydroelectric resources, the

[5] California Energy Commission (CEC). 2019. Electric Load-Serving Entities (LSEs) in California. Website: https://www.energy.ca.gov/almanac/electricity_data/utilities.html. Accessed June 24, 2022.
[6] Pacific Gas and Electric Company (PG&E). 2020. Corporate Responsibility and Sustainability Report.
[7] California Energy Commission (CEC). 2020. "Electricity Consumption by County." Website: https://ecdms.energy.ca.gov/elecbycounty.aspx. Accessed June 24, 2022.
[8] United States Energy Information Administration (EIA). 2022. Natural Gas Consumption by End Use. Website: https://www.eia.gov/dnav/ng/NG_CONS_SUM_DCU_SCA_A.htm. Accessed June 30, 2022.

emergence of renewable resources for electricity generation, and overall consumer demand are the variables that shape natural gas use in electric generation.[9]

Fresno County

The City of Fresno is served solely by PG&E to meet natural gas demands. PG&E has detailed information regarding a commitment to use renewable gas sources in the future but has not provided a current figure for renewable gas in their portfolio.

The smallest scale at which natural gas consumption information is readily available is at the county level; therefore, natural gas consumption in Fresno County is used herein to also characterize the City's existing natural gas consumption. According to the CEC, Fresno County consumed approximately 352.2 million U.S. therms of natural gas in 2019, or approximately 35,220 billion BTU.[10] Note that year 2019 was used over reporting year 2020 to present a pre-COVID-19 pandemic level of energy usage.

Project Site

The project site contains existing development such as residential, commercial, and agricultural uses, that currently use natural gas from existing utilities.

Fuel Use

State of California

The main category of fuel use in California is transportation fuel, especially refined petroleum products. California is the second largest consumer of refined petroleum products, after Texas, consuming approximately 524 million barrels of petroleum and accounting for approximately 7.9 percent of U.S. consumption in 2020. The transportation sector uses approximately 85 percent of the petroleum consumed in the State. Natural gas is the second largest transportation fuel used in California. California is the second largest consumer of natural gas after Texas, and the transportation sector's consumption of compressed natural gas vehicle fuel consumed 1 percent of California's total consumption.[11]

Project Site

The project site contains existing development, such as residential, commercial, and agricultural uses, that currently use generate vehicle trips and subsequent fuel use.

[9] California Energy Commission (CEC). 2022. Supply and Demand of Natural Gas in California. Website: https://www.energy.ca.gov/data-reports/energy-almanac/californias-natural-gas-market/supply-and-demand-natural-gas-california. Accessed June 30, 2022.

[10] California Energy Commission (CEC). 2020. Gas Consumption by County. Website: https://ecdms.energy.ca.gov/gasbycounty.aspx. Accessed June 24, 2022.

[11] United States Energy Information Administration (EIA). 2022. California State Energy Profile. Website: https://www.eia.gov/state/print.php?sid=CA. Accessed June 29, 2022.

3.6.3 - Regulatory Framework

Federal

Energy Independence and Security Act

The Energy Policy Act of 2005 created the Renewable Fuel Standard program. The Energy Independence and Security Act of 2007 expanded this program by:

- Expanding the Renewable Fuel Standard program to include diesel in addition to gasoline;
- Increasing the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022;
- Establishing new categories of renewable fuel and setting separate volume requirements for each one; and
- Requiring the United States Environmental Protection Agency (EPA) to apply lifecycle greenhouse gas (GHG) performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

This expanded Renewable Fuel Standard program lays the foundation for achieving substantial reductions of GHG emissions from the use of renewable fuels, reducing the use of imported petroleum, and encouraging the development and expansion of the nation's renewable fuels sector.

Signed on December 19, 2007, the Energy Independence and Security Act (EISA) of 2007 aims to:

- Move the United States toward greater energy independence and security.
- Increase the production of clean renewable fuels.
- Protect consumers.
- Increase the efficiency of products, buildings, and vehicles.
- Promote research on and deploy GHG capture and storage options.
- Improve the energy performance of the federal government.
- Increase U.S. energy security, develop renewable fuel production, and improve vehicle fuel economy.

EISA reinforces the energy reduction goals for federal agencies put forth in Executive Order 13423, which strengthens federal environmental, energy, and transportation management. It also introduces more aggressive requirements. The three key provisions enacted are the Corporate Average Fuel Economy Standards, the Renewable Fuel Standard, and the appliance/lighting efficiency standards.

EPA is committed to developing, implementing, and revising both regulations and voluntary programs under the following subtitles in EISA, among others:

- Increased Corporate Average Fuel Economy Standards
- Federal Vehicle Fleets
- Renewable Fuel Standard
- Biofuels Infrastructure

- Carbon Capture and Sequestration[12]

EPA and National Highway Traffic Safety Administration Light-Duty Vehicle GHG Emission Standards and Corporate Average Fuel Economy Standards Final Rule

Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light-duty trucks. The law has become more stringent over time. On May 19, 2009, the President put in motion a new national policy to increase fuel economy for all new cars and trucks sold in the United States. On April 1, 2010, the EPA and the United States Department of Transportation (USDOT) National Highway Traffic Safety Administration (NHTSA) announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the United States.

The first phase of the national program would apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles, covering model years 2012 through 2016. They required these vehicles to meet an estimated combined average emissions level of 250 grams of CO_2 per mile, equivalent to 35.5 miles per gallon if the automobile industry were to meet this CO_2 level solely through fuel economy improvements. Together, these standards would cut CO_2 emissions by an estimated 960 million metric tons and 1.8 billion barrels of oil over the lifetime of the vehicles sold under the program (model years 2012-2016).

The EPA and the NHTSA issued final rules on a second phase joint rulemaking, establishing national standards for light-duty vehicles for model years 2017 through 2025 in August 2012.[13] The new standards for model years 2017 through 2025 apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles. The final standards are projected to result in an average industry fleet wide level of 163 grams/mile of CO_2 in model year 2025, which is equivalent to 54.5 miles per gallon (mpg) if achieved exclusively through fuel economy improvements.

The EPA and NHTSA issued final rules for the first national standards to reduce GHG emissions and improve fuel efficiency of heavy-duty trucks and buses on September 15, 2011, which became effective November 14, 2011. For combination tractors, the agencies proposed engine and vehicle standards that began in the 2014 model year and achieve up to a 20 percent reduction in CO_2 emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies proposed separate gasoline and diesel truck standards, which phased in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles and a 15 percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10 percent reduction in fuel consumption and CO_2 emissions from the 2014 to 2018 model years.

The State of California has received a waiver from the EPA to have separate, stricter Corporate Average Fuel Economy Standards. Although global climate change did not become an international

[12] United States Environment Protection Agency (EPA). 2022. Summary of the Energy Independence and Security Act. Website: https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act. Accessed June 24, 2022.

[13] United States Environmental Protection Agency (EPA). 2012. EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks.

concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the incidental reduction of GHG emissions. In order to manage the State's energy needs and promote energy efficiency, Assembly Bill (AB) 1575 created the CEC in 1975.

California AB 1493: Pavley Regulations and Fuel Efficiency Standards

California AB 1493, enacted on July 22, 2002, required the California Air Resources Board (ARB) to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the by the U.S. District Court for the District of Columbia in 2011.[14]

The standards were phased in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards would result in an approximately 22 percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards would result in about a 30 percent reduction.

The second phase of the implementation for the Pavley Bill was incorporated into Amendments to the Low-Emission Vehicle (LEV) Program referred to as LEV III or the Advanced Clean Cars program. The Advanced Clean Car program combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2017 through 2025. The regulation will reduce GHGs from new cars by 34 percent from 2016 levels by 2025. The new rules will reduce pollutants from gasoline and diesel-powered cars, and deliver increasing numbers of zero-emission technologies, such as full battery electric cars, newly emerging plug-in hybrid electric vehicles and hydrogen fuel cell cars. The regulations will also ensure adequate fueling infrastructure is available for the increasing numbers of hydrogen fuel cell vehicles planned for deployment in California.[15]

California Code of Regulations Title 13: Motor Vehicles

California Code of Regulations, Title 13: Division 3, Chapter 10, Article 1, Section 2485: Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling[16] seeks to reduce public exposure to diesel particulate matter (DPM) and other air contaminants by establishing idling restrictions, emission standards, and other requirements for heavy-duty diesel engines and alternative idle reduction technologies to limit the idling of diesel-fueled commercial motor vehicles. Any person that owns, operates, or causes to operate any diesel-fueled commercial motor vehicle must not allow a vehicle to idle for more than 5 consecutive minutes at any location or operate a diesel-fueled auxiliary power system for greater than 5 minutes at any location when within 100 feet of a restricted area.

[14] California Air Resources Board (ARB). 2013. Clean Car Standards—Pavley, Assembly Bill 1493. Website: https://ww2.arb.ca.gov/californias-greenhouse-gas-vehicle-emission-standards-under-assembly-bill-1493-2002-pavley. Accessed June 24, 2022.

[15] California Air Resources Board (ARB). 2011. Status of Scoping Plan Recommended Measures.

[16] California Air Resources Board (ARB). 2004. Final Regulation Order, Airborne Toxic Control Measure to Limit Diesel-Fueled Commercial Motor Vehicle Idling.

California Code of Regulations, Title 13: Division 3, Chapter 9, Article 4.8, Section 2449: General Requirements for In-Use Off-Road Diesel-Fueled Fleets.

This measure regulates oxides of nitrogen (NO_X), DPM, and other criteria pollutant emissions from in-use off-road diesel-fueled vehicles. This measure also requires each fleet to meet fleet average requirements or demonstrate that it has met Best Available Control Technology (BACT) requirements. Additionally, this measure requires medium and large fleets to have a written idling policy that is made available to operators of the vehicles informing them that idling is limited to 5 consecutive minutes or less.

California Senate Bill 1078: Renewable Electricity Standards

On September 12, 2002, Governor Gray Davis signed Senate Bill (SB) 1078, requiring California to generate 20 percent of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a Renewable Portfolio Standard target for California requiring that all retail sellers of electricity serve 33 percent of their load with renewable energy by 2020. Governor Schwarzenegger also directed the ARB (Executive Order S-21-09) to adopt a regulation by July 31, 2010, requiring the State's LSEs to meet a 33 percent renewable energy target by 2020. The ARB Board approved the Renewable Electricity Standard on September 23, 2010, by Resolution 10-23.

California S 350: Clean Energy and Pollution Reduction Act

In 2015, the State legislature approved and the Governor signed SB 350 which reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the Renewables Portfolio Standard (RPS), higher energy efficiency requirements for buildings, initial strategies toward a regional electricity grid, and improved infrastructure for electric vehicle (EV) charging stations. Provisions for a 50 percent reduction in the use of petroleum statewide were removed from the Bill due to opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce Statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030, with interim targets of 40 percent by 2024, and 25 percent by 2027.
- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission, the CEC, and local publicly owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States.[17]

California Code of Regulations Title 24

Part 6 (Energy Efficiency Standards for Residential and Nonresidential Buildings)

California Code of Regulations, Title 24, Part 6 (California's Energy Efficiency Standards for Residential and Nonresidential Buildings), was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow

[17] California Legislative Information (California LegInfo). 2015. Senate Bill 350 Clean Energy and Pollution Reduction Act of 2015. Website: https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB350. Accessed June 24, 2022.

consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The latest 2019 Building Energy Efficiency Standards went into effect on January 1, 2020, and the newly updated 2022 Building Energy Efficiency Standards will go into effect on January 1, 2023.[18]

Part 11 (California Green Building Standards Code)

California Code of Regulations Title 24, Part 11, is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect January 1, 2011. The Code is updated on a regular basis, with the most recent update consisting of the 2022 California Green Building Standards Code (CALGreen) that became effective January 1, 2023.[19] Local jurisdictions are permitted to adopt more stringent requirements, as State law provides methods for local enhancements. CALGreen recognizes that many jurisdictions have developed existing construction and demolition ordinances and defers to them as the ruling guidance provided they provide a minimum 50 percent diversion requirement. CALGreen also provides exemptions for areas not served by construction and demolition recycling infrastructure. California State Building Code provides the minimum standard that buildings need to meet in order to be certified for occupancy, which is generally enforced by the local building official.

California Public Utilities Code

The California Public Utilities Commission (CPUC) regulates privately owned telecommunication, electric, natural gas, water, railroad, rail transit, and passenger transportation companies. It is the responsibility of the CPUC to (1) assure California utility customers safe, reliable utility service at reasonable rates; (2) protect utility customers from fraud; and (3) promote a healthy California economy. The Public Utilities Code, adopted by the legislature, defines the jurisdiction of the CPUC.

Local

Fresno General Plan

The Fresno General Plan (General Plan) was adopted in 2014 and contains the following goals and policies related to energy:

Resource Conservation and Resiliency Element

Objective RC-2 Promote land uses that conserve resources.

Policy RC-2-a **Link Land Use to Transportation.** Promote mixed-use, higher density infill development in multi-modal corridors. Support land use patterns that make more efficient use of the transportation system and plan future transportation investments in areas of higher-intensity development. Discourage investment in infrastructure that would not meet these criteria.

[18] California Energy Commission (CEC). 2022. 2022 Building Energy Efficiency Standards.
[19] California Building Standards Commission (CBSC). 2016. Green Building Standards.

Policy RC-5-f **Toolkit.** Provide residents and project applicants with a "toolkit" of feasible measures that can be used to reduce GHG emissions, including educational materials on energy-efficient and "climate-friendly" products.

Policy RC-6-d **Recycled Water.** Prepare, Adopt, and implement a City of Fresno Recycled Water Master Plan.

Objective RC-7 Promote water conservation through standards, incentives, and capital investments.

Policy RC-7-a **Water Conservation Program Target.** Maintain a comprehensive conservation program to help reduce per capita water usage in the City's water service area to 243 gallons per capita per day (GPCD) by 2020 and 190 GPCD by 2035, by adopting conservation standards and implementing a program of incentives, design and operation standards, and user fees:

- Support programs that result in decreased water demand, such as landscaping standards that require drought-tolerant plants, rebates for water conserving devices and systems, turf replacement, xeriscape landscape for new homes, irrigation controllers, commercial/industrial/institutional water conserving programs, prioritized leak detection program, complete water system audit, landscape water audit and budget program, and retrofit upon resale ordinance.
- Implement the US Bureau of Reclamation Best Management Practices for water consideration as necessary to maintain the City's surface water entitlements.
- Adopt and implement policies in the event that an artificial lake is proposed for development.
- Work cooperatively toward effective uniform water conservation measures that would apply throughout the Plan Area.
- Expand efforts to educate the public about water supply issues and water conservation techniques.

Policy RC-7-b **Water Pricing and Metering.** Develop a tiered water cost structure for both residential and commercial users that will properly price water based on its true cost; require all new development to be metered for water use; and charge all customers the true, full cost of their water supply, including costs of acquisition, initial treatment, conveyance, wastewater treatment, operations, maintenance, and remediation.

Policy RC-7-c **Best Practices for Conservation.** Require all City facilities and all new private development to follow US Bureau of Reclamation Best Management Practices for water conservation, as warranted and appropriate.

Policy RC-7-d **Update Standards for New Development.** Continue to refine water saving and conservation standards for new development.

Policy RC-7-h **Landscape Water Conservation Standards.** Refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance and other State regulations:

- Evaluate and apply, as appropriate, augmented xeriscape, "water wise," and "green gardening" practices to be implemented in public and private landscaping design and maintenance.
- Facilitate implementation of the State's Water Efficient Landscape Ordinance by developing alternative compliance measures that are easy to understand and observe.

Objective RC-8 Reduce the consumption of nonrenewable energy resources by requiring and encouraging conservation measures and the use of alternative energy sources.

Policy RC-8-a **Existing Standards and Programs.** Continue existing beneficial energy conservation programs, including adhering to the California Energy Code in new construction and major renovations.

Policy RC-8-b **Energy Reduction Targets.** Strive to reduce per capita residential electricity use to 1,800 kWh per year and nonresidential electricity use to 2,700 kWh per year per capita by developing and implementing incentives, design and operation standards, promoting alternative energy sources, and cost-effective savings.

Policy RC-8-c **Energy Conservation in New Development.** Consider providing an incentive program for new buildings that exceed California Energy Code requirements by 15 percent.

Policy RC-8-d **Incentives.** Establish an incentive program for residential developers who commit to building all of their homes to ENERGY STAR performance guidelines.

Policy RC-8-e **Energy Use Disclosure.** Promote compliance with State law mandating disclosure of a building's energy data and rating of the previous year to prospective buyers and lessees of the entire building or lenders financing the entire building.

Policy RC-8-f **City Heating and Cooling.** Reduce energy use at City facilities by updating heating and cooling equipment and installing "smart lighting" where feasible and economically viable.

Policy RC-8-g **Resolving Energy Fund.** Create a City Energy Fund which uses first year savings and rebates from completed City-owned energy efficiency projects to provide resources for additional energy projects. Dedicate this revolving fund to the sole use of energy efficiency projects that will pay back into the fund.

Policy RC-8-h **Solar Assistance.** Identify and publicize information about financial mechanisms for private solar installations and provide over-the-counter permitting for solar

installations meeting specified standards, which may include maximum size (in kV) of units that can be so approved.

Policy RC-8-i **Renewable Target.** Adopt and implement a program to increase the use of renewable energy to meet a given percentage of the City's peak electrical load within a given time frame.

Policy RC-8-j **Alternative Fuel Network.** Support the development of a network of integrated charging and alternate fuel station for both public and private vehicles, and if feasible, open up municipal stations to the public as part of network development.

Policy RC-8-k **Energy Efficiency Education.** Provide long-term and ongoing education of homeowners and businesses as to the value of energy efficiency and the need to upgrade existing structures on the regular basis as technology improves and structures age.

Fresno Southeast Development Area Specific Plan

The Fresno Southeast Development Area (SEDA) Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Specific Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to energy:

Housing Element

Objective HC-3 Link housing and transportation together to limit family expenditures on both housing and transportation. The multimodal transportation network connects housing and jobs within the Southeast Development Area and to other major regional centers, facilitating internal travel by non-automobile means. The Urban Form Chapter addresses the location, distribution, and standards for transportation infrastructure investment, combining transportation options with land use development to ultimately lower travel costs for SEDA residents and employees.

Policy HC-3.3 **Smart Land Uses.** Build smaller-lot single-family and multifamily housing types which use less energy and water than larger units.

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.5 **Renewable Energy Generation**. Support renewable energy technology systems in open spaces, where appropriate.

- Pursue arrangements with public agencies and private partners to accommodate renewable energy systems, such as solar arrays, in areas that can serve a joint use as passive open space.

Objective OS-6 Ensure that all park, trail, and recreational facilities make the most efficient use of energy, water, and other natural resources.

Policy OS-6.1 **Green Building.** As important civic structures, park buildings shall conform to green building standards for energy and water efficiency.

Policy OS-6.3 **Renewable Energy Systems.** Explore developing renewable energy systems to provide power to park facilities.

Objective OS-10 Civic facilities, such as libraries, community centers, senior centers, post offices, and other civic buildings, will be integrated into the urban fabric of centers and communities, and will be well-served by public transit, paths, and trails.

Policy OS-10.5 **On-Site Renewable Energy Generation.** Pursue opportunities to develop renewable energy systems for civic facilities.

Conservation Element

Objective RC-1 Meet statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.4 **Energy Conservation Strategies.** Although new residential development now must meet zero-net-energy requirements, there is still a need to conserve energy to reduce GHG emissions. Energy use in buildings is the second largest generator of GHG emissions after transportation. The following policies will help accomplish needed GHG reductions:

a) Consider developing an incentive program in SEDA for new buildings that exceed the California Energy Code requirements by 15 percent.
b) Encourage and reward compliance with voluntary energy conservation certification programs such LEED®, EnergyStar, or Greenpoint Rating systems.
c) Promote compliance with State law mandating disclosure of a building's energy data and rating of the previous year to prospective buyers and lessees of the entire building or lenders financing the entire building.
d) Partner with PG&E or other organization to offer a home energy retrofit program to existing homeowners in the SEDA. Ensure that solar retrofits are made available to existing homeowners.

Policy RC-1.5 **Waste Diversion, Recycling, & Energy Recovery.** Establishing programs and actions that promote recycling and diversion of waste from landfills can reduce energy consumed in the transport and handling of the waste material and can reduce the greenhouse gases that are emitted during the decomposition of organic waste.

The State of California has adopted increasingly stringent mandates for the percentage of solid waste that can be disposed in landfills. In addition, certain landfills are mandated to install methane capture systems to result in greenhouse gas reductions from these sources. The effects of methane are powerful—as it is 21 times more effective than carbon dioxide in retaining heat in the atmosphere. Methane can be flared, producing mainly carbon dioxide or used in combustion devices to generate heat or power that can be used for productive purposes displacing the use of fossil fuels. The following policies are recommended in the SEDA to reduce GHGs and conserve energy:

1. Maintain current targets for recycling and re-use of all types of waste material in the City and enhance waste and wastewater management practices to reduce natural resource consumption, including the following measures:
   a) Continue to require recyclable material collection and storage areas in all residential development.
   b) Establish recycling collection and storage area standards for commercial and industrial facilities to size the recycling areas according to the anticipated types and amounts of recyclable material generated.
   c) Provide educational materials to residents on how and what to recycle and how to dispose of hazardous waste.
   d) Provide recycling canisters and collection in public areas where trash cans are also provided.
   e) Institute a program to evaluate major waste generators and identify recycling opportunities for their facilities and operations.
   f) Continue to partner with the California Integrated Waste Management Board on waste diversion and recycling programs and the CalMax (California Materials Exchange) program.
   g) Evaluate the feasibility of a residential, restaurant and institutional food waste segregation and recycling program, to reduce the amount of organic material sent to landfill and minimize the emissions generated by decomposing organic material.
   h) Evaluate the feasibility of "carbon footprinting" for the City's wastewater treatment facilities, biomass and composting operations, solid waste collection and recycling programs.
   i) Expand yard waste collection to divert compostable waste from landfills.
   j) Study the feasibility and cost-benefit analysis of a municipal composting program to collect and compost food and yard waste, including institutional food and yard waste, using the resulting compost matter for City park and median maintenance.
2. Create a strategic and operations plan for fulfilling the City Council resolution committing the City of Fresno to a Zero Waste goal.
3. Continue to pursue opportunities to reduce air pollution by using methane gas from the old City landfill and the City's wastewater treatment process.

Policy RC-1.6 **Municipal Facilities.** SEDA will include a range of municipal facilities from streetlights to parks and open spaces to community centers and police and fire facilities. It is important to include greenhouse gas reductions and energy conservation at City facilities, over which the City has direct control and can allocate resources for this purpose. In addition, implementing these measures at City facilities also establishes the City as a leader in GHG reduction and conservation, which is important as it implements these measures on a citywide basis. The following are potential citywide actions that can be initiated within the SEDA as opportunity allows:

a) Improve energy efficiency in City operations.
b) Exceed Title 24 energy efficiency standards for new City buildings.
c) Install renewable energy systems on City facilities.
d) Implement City operated transportation demand management for City employees.
e) Purchase green vehicles for City fleets.
f) Enhance reduction, reuse and recycling efforts at City facilities.
g) Implement water efficient landscaping in City parks and facilities.
h) Establish a green purchasing program.

Policy RC-1.7 **Urban Forestry Program.** Encouraging the integration and protection of new and existing mature trees within our communities can lead to significant reductions in the urban heat island effect and energy required for cooling. As another significant benefit, trees also store harmful carbon as they grow, in a process known as sequestration. As these trees continue to grow, mature and sequester carbon, it is also important for urban forestry projects to consider potential tree emissions that result from the maintenance and ultimate disposition of trees to ensure a net decrease in greenhouse gas emissions occurs.

Maintaining trees, vegetation and plants throughout City parks is important to the success and longevity of these publicly owned spaces. In addition, these areas provide opportunities for new tree planting and replacement of tree species that possess a low potential to store carbon, with tree species that possess higher carbon storage potential. To better understand how to achieve these opportunities, there are many tools that communities can utilize. The Climate Action Reserve, Urban Forest Project Reporting Protocol (CAR 2019) provides criteria for generating greenhouse gas emission offsets with tree planting along with procedures for project monitoring.

Development of the SEDA will present many opportunities for the strategic planting of trees with high carbon storage potential, as noted below:

a) Develop a tree palette for the SEDA that reinforces its sense of place, reflects native species, and includes tree species with high carbon storage potential.
b) Meet parks shading targets noted in the Parks Master Plan.

c) Plant shade trees to delineate corridors and the boundaries of urban areas, and to provide tree canopy for bike lanes, sidewalks, parking lots, and trails.

Objective RC-2 Integrate water supply, treatment and delivery, and flood control and stormwater planning in the Southeast Development Area.

Policy RC-2.1 **Energy Planning.** Support cooperative, multi-agency water and energy resource planning involving the City of Fresno and other local jurisdictions, water and flood control agencies, the San Joaquin Valley Clean Energy Organization and Pacific Gas and Electric Company.

Objective RC-6 Develop sufficient wet utility infrastructure to meet the demand created by new development within the Southeast Development Area, applying cost-effective and low-impact strategies to the extent possible.

Policy RC-6.4 Shared Resources and Infrastructure. Develop methods and systems to share resources, infrastructure, and to capture the highest possible value for all public agencies. Resource-sharing strategies and plans shall be included in the SEDA Infrastructure Financing Plan.

- **Energy Generation:** Evaluate the potential to generate energy and heat from wastewater treatment facilities.
- **Biodigestion:** Study opportunities to treat wastewater sludge and organic waste to capture methane, alcohols, fertilizers, and other fuels to transform into renewable energies.
- **Wastewater Treatment Plants:** Require treatment facilities to separate wastewater solids for energy generation and water for irrigation in the SEDA.
- **Safety and Access Standards for Facilities:** Develop facilities design and management standards that address public safety and access issues.

Economic Development Policies Element

Objective EO-2 Target economic growth in industries in which Fresno has a competitive advantage.

Policy EO-2.2 **Local and Regional Economic Development.** Coordinate with other local and regional economic development efforts to build on opportunities presented by new development in the SEDA. This includes plans and programs within the City of Fresno Economic Development Department, as well as any related efforts.

Objective EO-3 Support growth in clean energy and agricultural technologies, tapping into broad demand from the local to national level and beyond. Citywide strategies should be developed to align with and build upon the goals and policies of the Southeast Development Area Specific Plan.

Policy EO-3.1 **Collaboration with the San Joaquin Valley Clean Energy Organization (SJVCEO).** Work with the SJVCEO to attract projects and investments to the SEDA,

promoting it as a key location in which to implement emerging clean energy. Local renewable energy projects can capitalize on Fresno's abundant solar and biomass resources.

Policy EO-3.2 **Coordination with California State University, Fresno.** Build on partnerships with California State University, Fresno to develop programs and projects to attract funding for research and development in the following areas:

A. Agricultural technology
B. Clean energy technology
C. Green building technology
D. Value-added manufacturing technology
E. Water and wastewater technology
F. City and Regional Planning

Objective EO-5 Expand the economic base and fiscal sustainability of the City by supporting high sales, property values, and employment intensity per acre for economic development in key locations throughout the Southeast Development Area.

Policy EO-5.4 **Employment in Open Space Network.** Develop the open space network to support employment opportunities.

- Support small-scale farms in rural cluster areas.
- Support agricultural research in open space areas.
- Support the development of clean energy systems within the open space network (e.g., solar farms in parks, flood basins).

Fresno Municipal Code

Fresno Municipal Code, Chapter 11, Article 1, SEC. 11-108 (California Energy Code) states that the California Energy Code, 2019 Edition, is adopted by the City of Fresno and incorporated into the Code and shall be referred to as the Fresno Energy Code.

SEC. 11-109 (California Green Building Standards) states that the California Green Building Standards Code, 2022 Edition, which may be referred to in the Code as CALGreen, is adopted by the City of Fresno and incorporated into the Code and shall be referred to as the Fresno CALGreen Code.

Therefore, future developments within the Plan Area would be required to comply with the Fresno Energy Code and Fresno CALGreen Code.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan PEIR does not contain any mitigation measures related to energy that are applicable to the proposed project.

3.6.4 - Methodology

A discussion of the proposed project's energy use is presented below. The proposed project's anticipated energy use was estimated, including natural gas, electricity, and fuel consumption (for vehicles traveling to and from the project), for project construction and operation. Energy calculations are included as Appendix E of this Draft PEIR analysis.

3.6.5 - Thresholds of Significance

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts related to energy are significant environmental effects. The project would have a significant impact on the environment if it would:

a) Result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.

b) Conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

3.6.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the project and provides mitigation measures where appropriate. This Draft PEIR contemplates implementation of the Fresno SEDA Specific Plan; future discretionary projects facilitated by the proposed project will be evaluated for project-specific energy impacts at the time they are proposed.

Energy Use

Impact ENER-1:	**The proposed project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources, during project construction or operation.**

Implementation of the proposed project would utilize energy resources during construction and operational activities. Energy resources that would be potentially impacted include electricity, natural gas, and petroleum-based fuel supplies and distribution systems. A significant impact would occur if the proposed project would result in the inefficient, wasteful, or unnecessary use of energy.

Construction Energy Usage

During construction, the proposed project would result in energy consumption through the combustion of fossil fuels in construction vehicles, worker commute vehicles, and construction equipment and the use of electricity for temporary buildings, lighting, and other sources. It is not anticipated that natural gas would be consumed as part of project construction. Fossil fuels used for construction vehicles and other energy-consuming equipment would be used during site clearing, grading, paving, and building construction. The types of equipment could include gasoline- and diesel-powered construction and transportation equipment, including trucks, bulldozers, frontend loaders, forklifts, and cranes.

Based on CalEEMod estimations within the modeling output files used to estimate GHG emissions associated with future development projects, under the proposed project construction-related vehicle trips would result in approximately 5,576.3 million Vehicle Miles Traveled (VMT) and consume an estimated 294,072,433 gallons of gasoline and diesel combined during future development projects' construction phases (Appendix B).[20] Additionally, on-site construction equipment would consume an estimated 861,427 gallons of diesel fuel (Appendix B).[21] Limitations on idling of vehicles and equipment and requirements that equipment be properly maintained would result in fuel savings. California Code of Regulations, Title 13, Sections 2449 and 2485, limit idling from both on-road and off-road diesel-powered equipment and are enforced by the ARB. Additionally, given the cost of fuel, contractors and owners have a strong financial incentive to avoid wasteful, inefficient, and unnecessary consumption of energy during construction.

Other equipment could include construction lighting, field services (office trailers), and electrically driven equipment such as pumps and other tools. Because of the temporary nature of construction and the financial incentives for developers and contractors to use energy-consuming resources in an efficient manner, the construction phase of the proposed project would not result in wasteful, inefficient, and unnecessary consumption of energy.

Furthermore, as required by Fresno Municipal Code, Chapter 11, Article 1, SEC. 11-108 and SEC. 11-109, new development would be subject to energy conservation requirements in the California Energy Code (Title 24, Part 6, of the California Code of Regulations [CCR], California's Energy Efficiency Standards for Residential and Nonresidential Buildings) and CALGreen (CCR Title 24, Part 11). Based on standards for new construction established by the State and adherence to the development standards in the Municipal Code, activities associated with implementation of the proposed project would not result in wasteful, inefficient, or unnecessary consumption of energy. Pursuant to the Municipal Code, the City would review development proposals prior to the approval of development plans to ensure that sufficient energy resources and facilities are available and that the development complies with energy conservation and efficiency standards of Title 24 and the Municipal Code. Additionally, implementation of the proposed project's policies would help to minimize the effects of growth and development on energy resources. Therefore, implementation of the proposed project will have a less than significant impact under this criterion.

Operation Energy Usage

Implementation of the proposed project may result in the development of approximately 45,000 homes, as well as the development of office centers, flexible research and development districts, and institutional uses within the nearly 9,000-acre Plan Area by the year 2050. Operation of future developments envisioned as a part of the proposed project would consume natural gas and electricity for building heating and power, lighting, and water conveyance, among other operational

[20] Construction-related vehicle fuel was calculated by dividing the Vehicle Miles Traveled (VMT) for each phase of construction by the corresponding fuel efficiencies. The EMFAC2017 web database was used to calculate fuel efficiencies based on worker, vendor, and hauling fleet mixes, and VMT was calculated by multiplying trip length by number of trips for each phase of construction. These calculations and assumptions can be found in Appendix B.

[21] On-site construction fuel consumption is the sum of diesel fuel usage of each type of equipment during each phase of construction. Diesel fuel usage was calculated for each type of construction equipment by multiplying the number of pieces of equipment by usage hours by horsepower by load factor by number of days and by an estimated fuel usage value of 0.05 gallons of diesel fuel per horsepower-hour. These calculations and assumptions can be found in Appendix B.

requirements. The electrical consumption and natural gas usage associated with the potential development have been calculated in the CalEEMod model, which estimates that the potential development would consume 500,083,800 kWh of electricity per year and 1,200,642,400 kilo-British Thermal Units (kBTU) of natural gas per year. All CalEEMod modeling output files and energy consumption estimates are contained in Appendix B.

Future development projects would be designed and constructed in accordance with the City's latest adopted energy efficiency standards, which are based on the California Title 24 energy efficiency standards. Title 24 standards include a broad set of energy conservation requirements that apply to the structural, mechanical, electrical, and plumbing systems in a building. For example, the Title 24 Lighting Power Density requirements define the maximum wattage of lighting that can be used in a building based on its square footage. Title 24 additionally requires new low-rise residential developments to include rooftop solar systems meeting a minimum system capacity consistent with calculations contained in Title 24, Part 6, Subchapter 8. Title 24 standards, widely regarded as the most advanced energy efficiency standards, would help to reduce the amount of energy required for lighting, water heating, and heating and air conditioning in buildings and promote energy conservation. Additionally, implementation of the General Plan and the proposed project's policies would help to minimize the effects of growth and development on energy resources. The General Plan, and the guiding principles of the Fresno SEDA Specific Plan, promote higher-density housing development in proximity to mixed-use areas and transit options. The plans and policies in the General Plan encourage alternative transit options through the creation of bicycle and pedestrian paths to improve the bikeability and walkability in the Plan Area.

Additionally, the General Plan includes numerous policies and implementation programs focused on improving the sustainability of the City, including reducing the consumption of non-renewable energy resources by requiring and encouraging conservation measures and the use of alternative energy sources (Policies RC-8-a through RC-8-k) and incentives for affordable housing providers, agencies, and non-profit and market rate developers to use Leadership in Energy and Environmental Design (LEED™) and CALGreen Tier 1 or Tier 2 standards or third party equivalents (Policy HC-3-d). Moreover, the energy efficiency of buildings is expected to continue to increase and improve throughout the life of the project as new energy efficiency standards are established. Similarly, the proposed project includes Policy RC-1.4 which includes Energy Conservation Strategies and incentives for residential projects.

Plans submitted for building permits of development projects in the project area would be required to include verification demonstrating compliance with the Building and Energy Efficiency Standards for Residential and Non-Residential Buildings in effect at the time building permits are issued. These standards are updated every 3 years, with the latest update (2022) having gone into effect on January 1, 2023. The proposed project would also be required to adhere to the provisions of CALGreen, which established planning and design standards for sustainable site development, energy efficiency (beyond the California Energy Code requirements), water conservation, material conservation, and internal air contaminants. Additionally, because developments that would be considered under the proposed project have not been designed or proposed at this time, potential improvements to the current energy and natural gas facilities would be identified at the time such projects are considered. Therefore, with adherence to Title 24 regulations and the objectives and

policies included in the approved General Plan and the proposed Specific Plan, the proposed project would not result in potentially significant environmental impact due to wasteful, inefficient, or unnecessary consumption of energy resources during project construction or operation.

Furthermore, compliance with recommended mitigation for potential Air Quality and GHG impacts included as part of this Draft PEIR would reduce energy usage from the proposed project by requiring energy efficiency measures that go beyond the Title 24 and CALGreen standards, including the use of energy efficient building design and materials and EV infrastructure as included as a part of the City of Fresno GHG Reduction Plan. These mitigation measures will further reduce the potential energy impacts of the proposed project.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Energy Efficiency and Renewable Energy Standards Consistency

Impact ENER-2: The proposed project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

Impact Analysis

A significant impact would occur if the proposed project would conflict with or obstruct a State or local plan for renewable energy or energy efficiency.

Potential new development that may occur from implementation of the proposed project would be required to comply with the CALGreen Code (CCR Title 24, Part 11) and the California Energy Code (CCR Title 24, Part 6), which includes provisions related to insulation and design aimed at minimizing energy consumption. Future development projects envisioned as a part of the proposed project would also be required to comply with objectives and policies included in the General Plan that are aimed at reducing energy consumption.

Construction

As discussed under Impact ENER-1, the proposed project would result in energy consumption through the combustion of fossil fuels in construction vehicles, worker commute vehicles, and construction equipment and through the use of electricity for temporary buildings, lighting, and other sources. California Code of Regulations Title 13, Sections 2449 and 2485, limit idling from both on-road and off-road diesel-powered equipment and are enforced by the ARB. The proposed project would comply with these regulations. There are no policies at the local level applicable to energy conservation specific to the construction phase; thus, it is anticipated that construction of the proposed project would not conflict with any applicable plan, policy, or regulation adopted for the

purpose of reducing energy use or increasing the use of renewable energy. Therefore, construction-related energy efficiency and renewable energy standards consistency impacts would be less than significant.

Operation

The General Plan aims to promote mixed-use development and encourage alternative modes of transportation to reduce vehicle trip lengths and reliance on the automobile, which in turn would reduce the transportation energy demand in the Plan Area. The General Plan also encourages development of housing near employment and transportation, which supports reductions in per capita VMT. Implementation of the policies in the General Plan, as well as the guiding principles and policies included in the proposed Fresno SEDA Specific Plan, would also promote land use patterns that would improve walking and bicycling facilities to be more prominent, comfortable, and safe throughout the City. Compliance with the policies included in the General Plan, including Policy RC-8-j, would support the development of a network of integrated charging and alternate fuel station for both public and private vehicles that would also serve to reduce the overall transportation energy demand. The proposed Fresno SEDA Specific Plan includes the policies to reduce or minimize the effects of the additional demand and consumption of energy resources associated with the planned growth and ensure consistency with State and local plans. Implementation of Policy EO-3.1 encourages collaboration with the San Joaquin Valley Clean Energy Organization (SJVCEO) to attract projects and investments to Fresno and specifically the SEDA. Local renewable energy projects can capitalize on Fresno's abundant solar and biomass resources and would help reduce the effects of the additional demand and consumption of energy resources.

As discussed in Section 3.17, Transportation, average VMT per capita under existing conditions for the City of Fresno is 13.1 miles compared to 16.2 miles for the County of Fresno (approximately 19 percent less than the county average). Through the implementation of the General Plan, in 2035, the City VMT per capita (16.5 miles) is forecast to be 17 percent less than the County VMT per capita (19.9 miles). Corresponding numbers for VMT per employee indicate that the City average is forecast to be 13 percent lower than the 2035 County average. This is a greater reduction in VMT than forecast by the Fresno Council of Governments (Fresno COG) in the Regional Transportation Plan (RTP), a 12 percent reduction in VMT for the RTP project. The buildout of the proposed project would serve to further reduce VMT per capita in the region by locating high-density housing near service amenities and jobs.

California's RPS requires that 33 percent of electricity retail sales be served by renewable energy sources by 2020. The proposed project would be served with electricity provided by PG&E. A total of 33 percent of PG&E's delivered electricity comes from renewable sources, including solar, wind, geothermal, small hydroelectric and various forms of bioenergy. PG&E reached California's 2020 renewable energy goal in 2017 and is positioned to meet the State's 60 percent by 2030 renewable energy mandate set forth in SB 100.

The State's Title 24 energy efficiency standards establishes mandatory measures for residential buildings, including material conservation and resource efficiency. Development consistent with the proposed project would be required to comply with these mandatory measures. The proposed project would also comply with the California Building Standards Code (CBC) requiring proposed low-

rise residential buildings to include rooftop solar systems. In addition, per the CBC, the proposed buildings would be required to provide wiring that would allow installation of EV charging equipment in any private garages or carports. Mandatory compliance with the applicable provisions of CALGreen would ensure that development consistent with the proposed project uses energy efficiently.

Compliance with the above measures would ensure that development consistent with the proposed project would not conflict with any applicable plan, policy, or regulation adopted for the purpose of reducing energy use or increasing the use of renewable energy. Therefore, operational energy efficiency and renewable energy standards consistency impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.6.7 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for energy use is the Plan Area and portions of the City of Fresno, City of Clovis, and unincorporated Fresno County adjacent to the Plan Area. This analysis evaluates whether impacts of the Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to energy use. This analysis then considers whether incremental contribution of the impacts associated with implementation of the Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to the level of significance.

Construction Energy Demand

Past, present, and future development projects would contribute to energy impacts. All cumulative projects would be required to comply with the Municipal Code, City ordinances and County policies that address energy conservation and energy efficiency during construction, such as complying with the latest California Energy Code. Further, since PG&E is the official electricity provider for the County, cumulative projects would be eligible for PG&E's clean energy programs and incentives. Additional citywide programs, such as those required by the General Plan, would combine to reduce the energy demand, water use, amount of materials and wood use, and carbon dioxide emissions of buildings. Accordingly, potential cumulative impacts would be less than significant.

Moreover, the Specific Plan would not have a significant incremental contribution to the less than significant cumulative impacts. Based on the preceding analysis, implementation of the General Plan and the proposed project's policies would help to minimize the effects of growth and development on energy resources. The construction activity associated with the proposed project would not result in potentially significant environmental impacts due to wasteful, inefficient, or unnecessary

consumption of energy resources. Construction activities associated with the proposed project would not be more energy intensive than other similar construction operations throughout the region, and the proposed project would be subject to applicable regulations designed to reduce energy consumption. Accordingly, the proposed project's contribution to less than significant cumulative impacts due to construction-related energy consumption would be less than significant and would not be cumulatively considerable.

Operational Energy Demand

Mandatory compliance with the applicable provisions of CALGreen would ensure that the proposed project and other past, present, and future projects would use energy efficiently. Additionally, all cumulative projects would be required to comply with City ordinances and County policies that address energy conservation and energy efficiency. Accordingly, potential cumulative impacts would be less than significant.

Moreover, the proposed project would not have a significant incremental contribution to cumulative impacts. Energy consumed by the proposed project is calculated to be comparable to, or less than, energy consumed by other individual residential or commercial uses of similar scale and intensity currently constructed and operating in California. On this basis, the proposed project would not result in the inefficient, wasteful, or unnecessary consumption of energy. The proposed project would not result in additional energy facilities or energy delivery systems outside of connection to the existing utilities located in the adjacent roadways, and any potential additional energy facilities would be analyzed as a separate project.

As indicated under the analysis for Impact ENER-2, the proposed project would not conflict with or obstruct a State or local plan for renewable energy or energy efficiency. As such, the proposed project has no cumulatively considerable impacts due to a conflict with or obstruction of such plans.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

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3.8 - Greenhouse Gas Emissions

3.8.1 - Introduction

This section describes the existing greenhouse gas (GHG) emissions setting and potential effects from project implementation on the project site and its surrounding area. Descriptions and analysis in this section are based, in part, on modeling information and assumptions presented in Section 3.3, Air Quality. The Greenhouse Gas Analysis is included in this Draft Program Environmental Impact Report (Draft PEIR) as Appendix B. No public comments were received during the Environmental Impact Report (EIR) scoping period related to GHG emissions.

3.8.2 - Environmental Setting

Greenhouse Effect, Global Warming, and Climate Change

Most of the energy that affects the Earth's climate comes from the sun. Some solar radiation is absorbed by the Earth's surface, and a smaller portion of this radiation is reflected by the atmosphere back toward space. As the Earth absorbs high-frequency solar radiation, its surface gains heat and then re-radiates lower frequency infrared radiation back into the atmosphere.[1]

Most solar radiation passes through gases in the atmosphere classified as GHGs; however, infrared radiation is selectively absorbed by GHGs. GHGs in the atmosphere play a critical role in maintaining the balance between the Earth's absorbed and radiated energy, the Earth's radiation budget,[2] by trapping some of the infrared radiation emitted from the Earth's surface that otherwise would have escaped to space. Radiative forcing is the difference between the incoming energy and outgoing energy.[3] Specifically, GHGs affect the atmosphere's radiative forcing,[4] which in turn affects the Earth's average surface temperature. This phenomenon, the *greenhouse effect*, keeps the Earth's atmosphere near the surface warmer than it would be otherwise and allows successful habitation by humans and other forms of life.

Combustion of fossil fuels and deforestation release carbon into the atmosphere that historically has been stored underground in sediments or in surface vegetation, thus exchanging carbon from the geosphere and biosphere to the atmosphere in the carbon cycle. With the accelerated increase in fossil fuel combustion and deforestation since the Industrial Revolution of the nineteenth century, concentrations of GHGs in the atmosphere have increased exponentially. Such emissions of GHGs in excess of natural ambient concentrations contribute to the enhancement of the natural greenhouse effect. This enhanced greenhouse effect has contributed to *global warming*, an increased rate of warming of the Earth's average surface temperature.[5] Specifically, increases in GHGs lead to

[1] Frequencies at which bodies emit radiation are proportional to temperature. The Earth has a much lower temperature than the sun and emits radiation at a lower frequency (longer wavelength) than the high-frequency (short-wavelength) solar radiation emitted by the sun.
[2] This includes all gains of incoming energy and all losses of outgoing energy; the planet is always striving to be in equilibrium.
[3] Positive forcing tends to warm the surface while negative forcing tends to cool it.
[4] This is the change in net irradiance at the tropopause after allowing stratospheric temperatures to readjust to radiative equilibrium, but with surface and tropospheric temperatures and state held fixed at the unperturbed values.
[5] This condition results when the Earth has to work harder to maintain its radiation budget, because when more GHGs are present in the atmosphere, the Earth must force emissions of additional infrared radiation out into the atmosphere.

increased absorption of infrared radiation by the Earth's atmosphere and warm the lower atmosphere further, thereby increasing temperatures and evaporation rates near the surface.

Variations in natural phenomena such as volcanoes and solar activity produced most of the global temperature increase that occurred during preindustrial times; more recently, however, increasing atmospheric GHG concentrations resulting from human activity have been responsible for most of the observed global temperature increase.[6]

Global warming affects global atmospheric circulation and temperatures; oceanic circulation and temperatures; wind and weather patterns; average sea level; ocean acidification; chemical reaction rates; precipitation rates, timing, and form; snowmelt timing and runoff flow; water supply; wildfire risks; and other phenomena, in a manner commonly referred to as *climate change*. Climate change is a change in the average weather of the Earth that is measured by alterations in wind patterns, storms, precipitation, and temperature. These changes are assessed using historical records of temperature changes occurring in the past, such as during previous ice ages. Many of the concerns regarding climate change use this data to extrapolate a level of statistical significance specifically focusing on temperature records from the last 150 years (the Industrial Age) that differ from previous climate changes in rate and magnitude.

Temperature Predictions by the Intergovernmental Panel on Climate Change

The United Nations Intergovernmental Panel on Climate Change (IPCC) was established by the World Meteorological Organization and United Nations Environment Programme to assess scientific, technical, and socioeconomic information relevant to understanding climate change, its potential impacts, and options for adaptation and mitigation. The IPCC constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. In its Sixth Assessment Report, the IPCC predicted that the global mean temperature change from 2015 to 2100, given five scenarios, could range from 1.4°C (degrees Celsius) to 4.4°C. Regardless of analytical methodology, global average temperatures and sea levels are expected to rise under all scenarios.[7] The report also concluded that "[i]t is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred." Warming of the climate system is now considered to be unequivocal,[8] with the likely range of total human-caused global surface temperature increases from approximately 0.8°C to 1.3°C since 1850.[9]

Greenhouse Gases and Global Emission Sources

Gases that trap heat in the atmosphere are referred to as GHGs. The effect is analogous to the way a greenhouse retains heat. Prominent GHGs that naturally occur in the Earth's atmosphere are water vapor, carbon dioxide (CO_2), methane (CH_4), oxides of nitrogen (NO_X), and ozone. Anthropogenic

[6] These basic conclusions have been endorsed by more than 45 scientific societies and academies of science, including all of the national academies of science of the major industrialized countries. Since 2007, no scientific body of national or international standing has maintained a dissenting opinion.

[7] United Nations Intergovernmental Panel on Climate Change (IPCC). 2021. Climate Change 2021: The Physical Science Basis Summary for Policymakers.

[8] Ibid.

[9] Ibid.

(human-caused) GHG emissions include releases of these GHGs plus release of human-made gases with high global warming potential (GWP) (ozone-depleting substances such as chlorofluorocarbons (CFCs)[10] and aerosols, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6). The GHGs listed by the IPCC (CO_2, methane, nitrous oxide [N_2O], HFCs, PFCs, and sulfur hexafluoride) are discussed below, in order of abundance in the atmosphere. Water vapor, despite being the most abundant GHG, is not discussed below because natural concentrations and fluctuations far outweigh anthropogenic influences, making it impossible to predict. Ozone is not included because it does not directly affect radiative forcing. Ozone-depleting substances, which include chlorofluorocarbons, halons, carbon tetrachloride, methyl chloroform, and hydrochlorofluorocarbons, are not included because they have been primarily replaced by HFCs and PFCs.

The GWP is the potential of a gas or aerosol to trap heat in the atmosphere. The GWP of a gas is essentially a measurement of the radiative forcing of a GHG compared with the reference gas, carbon dioxide (CO_2).

Individual GHG compounds have varying potential for contributing to global warming. For example, methane is 25 times as potent as CO_2, while sulfur hexafluoride is 22,200 times more potent than CO_2 on a molecule-per-molecule basis. To simplify reporting and analysis, methods have been set forth to describe emissions of GHGs in terms of a single gas. The most commonly accepted method for comparing GHG emissions is the GWP methodology defined in the IPCC reference documents. The IPCC defines the GWP of various GHG emissions on a normalized scale that recasts all GHG emissions in terms of carbon dioxide equivalents (CO_2e), which compares the gas in question to that of the same mass of CO_2 (by definition, CO_2 has a GWP of 1). The GWP of a GHG is a measure of how much a given mass of a GHG is estimated to contribute to global warming. Thus, to describe how much global warming a given type and amount of GHG may cause, the CO_2e is used. A CO_2e is the mass emissions of an individual GHG multiplied by its GWP. As such, a high GWP represents high absorption of infrared radiation and a long atmospheric lifetime compared to CO_2. One must also select a time horizon to convert GHG emissions to equivalent CO_2 emissions to account for chemical reactivity and lifetime differences among various GHG species. The standard time horizon for climate change analysis is 100 years. Generally, GHG emissions are quantified in terms of metric tons (MT) of CO_2e (MT CO_2e) emitted per year.

Table 3.8-1 lists the GWP of each GHG and its lifetime. Units commonly used to describe the concentration of GHGs in the atmosphere are parts per million (ppm), parts per billion (ppb), and parts per trillion (ppt), referring to the number of molecules of the GHG in a sampling of 1 million, 1 billion, or 1 trillion molecules of air. Collectively, HFCs, PFCs, and sulfur hexafluoride are referred to as high GWP gases. CO_2 is by far the largest component of worldwide CO_2e emissions, followed by methane, N_2O, and high GWP gases, in order of decreasing contribution to CO_2e.

The primary human processes that release GHGs include the burning of fossil fuels for transportation, heating, and electricity generation; agricultural practices that release methane, such as livestock grazing and crop residue decomposition; and industrial processes that release smaller

[10] CFCs destroy stratospheric ozone. The Montreal Protocol on Substances that Deplete the Ozone Layer prohibited CFCs production in 1987.

amounts of high GWP gases. Deforestation and land cover conversion have also been identified as contributing to global warming by reducing the Earth's capacity to remove CO_2 from the air and altering the Earth's albedo or surface reflectance, thus allowing more solar radiation to be absorbed. Specifically, CO_2 emissions associated with fossil fuel combustion are the primary contributors to human-induced climate change. CO_2, methane, and N_2O emissions associated with human activities are the next largest contributors to climate change.

GHGs of California concern are defined by California Assembly Bill (AB) 32 (see the Regulatory Environment subsection below for a description) and include CO_2, CH_4, NO_X, HFCs, PFCs, and SF_6. A seventh GHG, nitrogen trifluoride (NF_3), was also added under the California Health and Safety Code Section 38505(g)(7) as a GHG of concern. These GHGs are described in Table 3.8-1 in terms of their physical description and properties, GWP, atmospheric residence lifetime, sources, and atmospheric concentration in 2005.

Table 3.8-1: Description of Greenhouse Gases of California Concern

Greenhouse Gas	Physical Description and Properties	Global Warming Potential (100 years)	Atmospheric Residence Lifetime (years)	Sources
Carbon dioxide (CO_2)	Odorless, colorless, natural gas.	1	50-200	burning coal, oil, natural gas, and wood; decomposition of dead organic matter; respiration of bacteria, plants, animals, and fungus; oceanic evaporation; volcanic outgassing; cement production; land use changes
Methane (CH_4)	Flammable gas and is the main component of natural gas.	25	12	geological deposits (natural gas fields) extraction; landfills; fermentation of manure; and decay of organic matter
Nitrous oxide (N_2O)	Nitrous oxide (laughing gas) is a colorless GHG.	298	114	microbial processes in soil and water; fuel combustion; industrial processes
Chloro-fluoro-carbons (CFCs)	Nontoxic, nonflammable, insoluble, and chemically unreactive in the troposphere (level of air at the Earth's surface); formed synthetically by replacing all hydrogen atoms in methane or ethane with chlorine and/or fluorine atoms.	3,800-8,100	45-640	refrigerants aerosol propellants; cleaning solvents

Greenhouse Gas	Physical Description and Properties	Global Warming Potential (100 years)	Atmospheric Residence Lifetime (years)	Sources
Hydro-fluoro-carbons (HFCs)	Synthetic human-made chemicals used as a substitute for CFCs and contain carbon, chlorine, and at least one hydrogen atom.	140 to 11,700	1-50,000	automobile air conditioners; refrigerants
Per-fluoro-carbons (PFCs)	Stable molecular structures and only break down by ultraviolet rays about 60 kilometers above Earth's surface.	6,500 to 9,200	10,000-50,000	primary aluminum production; semiconductor manufacturing
Sulfur hexafluoride (SF_6)	Human-made, inorganic, odorless, colorless, and nontoxic, nonflammable gas.	22,800	3,200	electrical power transmission equipment insulation; magnesium industry, semiconductor manufacturing; a tracer gas
Nitrogen trifluoride (NF_3)	Inorganic, is used as a replacement for PFCs, and is a powerful oxidizing agent.	17,200	740	electronics manufacture for semiconductors and liquid crystal displays

Sources:
United Nations Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller [eds.]). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

United Nations Intergovernmental Panel on Climate Change (IPCC). 2007. Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Core Writing Team, Pachauri, R.K. and Reisinger, A. [eds.]). IPCC, Geneva, Switzerland.

The State has begun the process of addressing pollutants referred to as short-lived climate pollutants. Senate Bill (SB) 605, approved by the Governor on September 14, 2014, required the California Air Resources Board (ARB) to complete a comprehensive strategy to reduce emissions of short-lived climate pollutants by January 1, 2016. The ARB released the Proposed Short-Lived Climate Pollutant Reduction Strategy in April 2016. The ARB has completed an emission inventory of these pollutants, identified research needs, identified existing and potential new control measures that offer co-benefits, and coordinated with other State agencies and districts to develop measures.

The short-lived climate pollutants include three main components: black carbon, fluorinated gases, and methane. Fluorinated gases and methane are described in Table 3.8-1 and are already included in the California GHG inventory. Black carbon has not been included in past GHG inventories; however, the ARB will include it in its comprehensive strategy.[11]

[11] California Air Resources Board (ARB). 2015. Short-Lived Climate Pollutant Reduction Strategy, Concept Paper. May.

Black carbon is a component of fine particulate matter. Black carbon is formed by incomplete combustion of fossil fuels, biofuels, and biomass. Sources of black carbon within a jurisdiction may include exhaust from diesel trucks, vehicles, and equipment, as well as smoke from biogenic combustion. Biogenic combustion sources of black carbon include the burning of biofuels used for transportation, the burning of biomass for electricity generation and heating, prescribed burning of agricultural residue, and natural and unnatural wildfires. Black carbon is not a gas but an aerosol—particles or liquid droplets suspended in air. Black carbon only remains in the atmosphere for days to weeks, whereas other GHGs can remain in the atmosphere for years. Black carbon can be deposited on snow, where it absorbs sunlight, reduces sunlight reflectivity, and hastens snowmelt. Direct effects include absorbing incoming and outgoing radiation; indirectly, black carbon can also affect cloud reflectivity, precipitation, and surface dimming (cooling).

GWPs for black carbon were not defined by the IPCC in its Fourth Assessment Report. The ARB has identified a GWP of 3,200 using a 20-year time horizon and 900 using a 100-year time horizon from the IPCC Fifth Assessment. Sources of black carbon are already regulated by the ARB, and air district criteria pollutant and toxic regulations that

control fine particulate emissions from diesel engines and other combustion sources.[12] Additional controls on the sources of black carbon specifically for their GHG impacts beyond those required for toxic and fine particulates are not likely to be needed.

Ozone is another short-lived climate pollutant that will be part of the strategy. Ozone affects evaporation rates, cloud formation, and precipitation levels. Ozone is not directly emitted, so its precursor emissions, volatile organic compounds (VOC) and oxides of nitrogen (NO_X) on a regional scale and CH_4 on a hemispheric scale will be subject of the strategy.[13]

Water vapor is also considered a GHG. Water vapor is an important component of our climate system and is not regulated. Increasing water vapor leads to warmer temperatures, which causes more water vapor to be absorbed into the air. Warming and water absorption increase in a spiraling cycle. Water vapor feedback can also amplify the warming effect of other GHGs, such that the warming brought about by increased carbon dioxide allows more water vapor to enter the atmosphere.[14]

Global Climate Change Issue

Climate change is a global problem because GHGs are global pollutants, unlike criteria air pollutants and hazardous air pollutants (also called toxic air contaminants), which are pollutants of regional and local concern. Pollutants with localized air quality effects have relatively short atmospheric lifetimes, approximately 1 day; by contrast, GHGs have long atmospheric lifetimes, several years to several thousand years. GHGs persist in the atmosphere for a long enough time to be dispersed around the globe.

[12] California Air Resources Board (ARB). 2015. Short-Lived Climate Pollutant Reduction Strategy, Concept Paper. May.
[13] Ibid.
[14] National Aeronautics and Space Administration (NASA). 2015. NASA—Global Climate Change, Vital Signs of a Planet. Website: http://climate.nasa.gov/causes/. Accessed June 24, 2022.

Although the exact lifetime of any particular GHG molecule depends on multiple variables and cannot be pinpointed, more CO_2 is currently emitted into the atmosphere than is sequestered. CO_2 sinks, or reservoirs, include vegetation and the ocean, which absorb CO_2 through photosynthesis and dissolution, respectively. These are two of the most common processes of CO_2 sequestration. Of the total annual CO_2 emissions generated by human and natural causes in the decade 2011-2020, approximately 26 percent was sequestered through ocean uptake and approximately 29 percent was sequestered through land vegetation, whereas the remaining 45 percent of CO_2 emissions is stored in the atmosphere.[15]

Similarly, effects of GHGs are borne globally, as opposed to the localized air quality effects of criteria air pollutants and hazardous air pollutants. The quantity of GHGs that it takes to ultimately result in climate change is not precisely known and cannot be quantified, and no single project would be expected to measurably contribute to a noticeable incremental change in the global average temperature, or to global or local climates or microclimate.

Emissions of GHGs have the potential to adversely affect the environment because such emissions contribute, on a cumulative basis, to global climate change. A cumulative discussion and analysis of project impacts on global climate change is presented in this EIR because, although it is unlikely that a single project will contribute significantly to climate change, cumulative emissions from many projects affect global GHG concentrations and the climate system.

Global climate change has the potential to result in sea level rise (resulting in flooding of low-lying areas), to affect rainfall and snowfall (leading to changes in water supply), to affect temperatures and habitats (affecting biological resources and public health), and to result in many other adverse environmental consequences.

Although the international, national, State, and regional communities are beginning to address GHGs and the potential effects of climate change, worldwide GHG emissions will likely continue to rise over the next decades.

Climate and Topography

Climate is the accumulation of daily and seasonal weather events over a long period of time, whereas weather is defined as the condition of the atmosphere at any particular time and place. For a detailed discussion of existing regional and project site climate and topography, see Section 3.2, Air Quality.

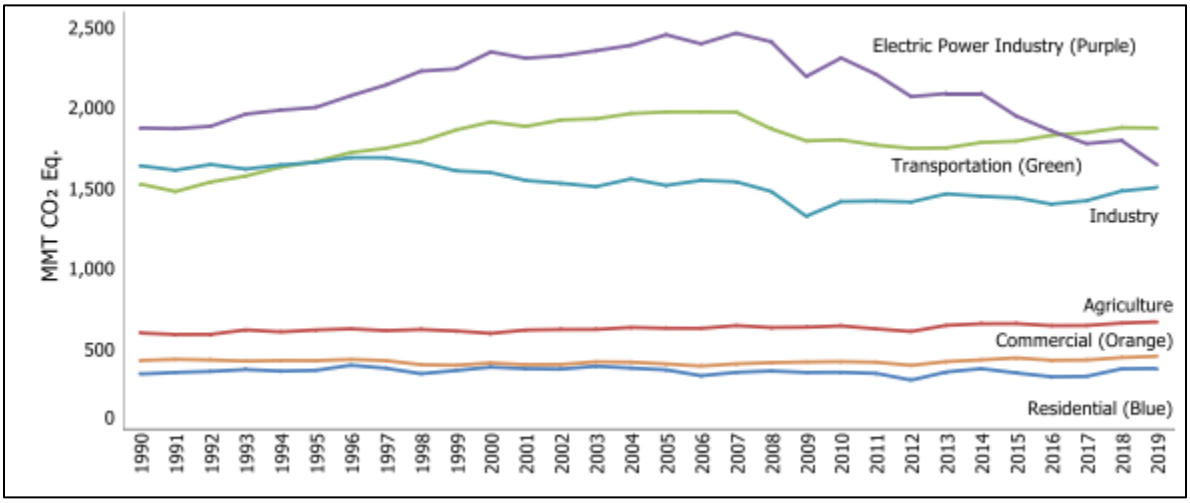
Existing GHG Emissions

United States GHG Inventory

Total U.S. GHG emissions in 2019 were 6,558 MM Ton CO_2e, increasing overall by 1.8 percent from 1990 to 2019.[16] Figure 3.8-1 presents the trend in U.S. GHG emissions by economic sector during this time. Since 1990, U.S. emissions have increased at an average annual rate of 0.3 percent. Transportation emissions also increased because of an increase in Vehicle Miles Traveled (VMT).

[16] United States Environmental Protection Agency (EPA). 2021. Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019 – Executive Summary.

Within the United States, fossil fuel combustion accounted for 92.4 percent of CO_2 emissions in 2019. Transportation was the largest emitter of CO_2 in 2019, accounting for 28.6 percent of emissions, followed by electric power generation, accounting for 25.1 percent.



Note: Emissions shown do not include carbon sinks such as change in land uses and forestry.
Source: United States Environmental Protection Agency (EPA). 2021.

Figure 3.8-1: Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019

California GHG Inventory

As the second largest emitter of GHG emissions in the United States, California contributes a large quantity (418.2 million metric tons [MMT] CO_2e in 2019) of GHG emissions to the atmosphere.[17,18] Human-related emissions of CO_2 are largely byproducts of fossil fuel combustion and are attributable to transportation, industry/ manufacturing, electricity generation, natural gas consumption, and agriculture processes. In California, the transportation sector is the largest emitter at 41 percent of GHG emissions, followed by industrial at 24 percent of GHG emissions.[19]

Climate Change Trends and Effects

CO_2 accounts for more than 75 percent of all anthropogenic GHG emissions, the atmospheric residence time of CO_2 is decades to centuries, and global atmospheric concentrations of CO_2 continue to increase at a faster rate than ever previously recorded. Thus, the warming impacts of CO_2 will persist for hundreds of years after mitigation is implemented to reduce GHG concentrations.

California

Substantially higher temperatures, more extreme wildfires, and rising sea levels are just some of the direct effects experienced in California.[20,21] As reported by the California Natural Resources Agency

[17] World Resources Institute (WRI). 2017. 8 Charts to Understand US State Greenhouse Gas Emissions. Website: https://www.wri.org/insights/8-charts-understand-us-state-greenhouse-gas-emissions. Accessed June 24, 2022.
[18] California Air Resources Board (ARB). 2021. Current California GHG Emission Inventory Data, 2000-2019 Trends Figure Data. Website: https://ww2.arb.ca.gov/ghg-inventory-data. Accessed June 24, 2022.
[19] California Air Resources Board (ARB). 2021. California Greenhouse Gas Emissions for 2000 to 2019.
[20] California Natural Resources Agency (NRA). 2009. 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008.
[21] California Energy Commission (CEC). 2012. Our Changing Climate 2012: Vulnerability and Adaptation to the Increasing Risks from Climate Change in California.

in 2009, despite annual variations in weather patterns, California has seen a trend of increased average temperatures, more extreme hot days, fewer cold nights, longer growing seasons, less winter snow, and earlier snowmelt and rainwater runoff. Statewide average temperatures increased by about 1.7°F from 1895 to 2011, and a larger proportion of total precipitation is falling as rain instead of snow.[22] Sea level rose by as much as 7 inches along the California coast over the last century, leading to increased erosion and adding pressure to the State's infrastructure, water supplies, and natural resources.

These observed trends in California's climate are projected to continue in the future. Research indicates that California will experience overall hotter and drier conditions with a continued reduction in winter snow (with concurrent increases in winter rains), as well as increased average temperatures and accelerating sea level rise. The frequency, intensity, and duration of extreme weather events such as heat waves, wildfires, droughts, and floods will also change.[23] In addition, increased air pollution and spread of insects potentially carrying infectious diseases will also occur as the climate-associated temperature and associated species clines shift in latitude.

The following is a summary of climate change factors and predicted trends specific to California.

In California, climate change may result in consequences such as the following.[24,25]

- **A reduction in the quality and supply of water from the Sierra snowpack.** If heat-trapping emissions continue unabated, more precipitation will fall as rain instead of snow, and the snow that does fall will melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. This can lead to challenges in securing adequate water supplies. It can also lead to a potential reduction in hydropower.
- **Increased risk of large wildfires.** If rain increases as temperatures rise, wildfires in the grasslands and chaparral ecosystems of Southern California are estimated to increase by approximately 30 percent toward the end of the 21st Century because more winter rain will stimulate the growth of more plant "fuel" available to burn in the fall. In contrast, a hotter, drier climate could promote up to 90 percent more Northern California fires by the end of the century by drying out and increasing the flammability of forest vegetation.
- **Reductions in the quality and quantity of certain agricultural products.** The crops and products likely to be adversely affected include wine grapes, fruit, nuts, and milk.
- **Exacerbation of air quality problems.** If temperatures rise to the medium warming range, there could be 75 to 85 percent more days with weather conducive to ozone formation in Los Angeles and the San Joaquin Valley, relative to today's conditions. This is more than twice the

[22] California Energy Commission (CEC). 2006. Inventory of California Greenhouse Gas Emissions and Sinks: 1990 to 2004. Draft Final Report. CEC-600-2006-013-D.
[23] California Natural Resources Agency (CNRA). 2009. 2009 California Climate Adaptation Strategy: A Report to the Governor of the State of California in Response to Executive Order S-13-2008.
[24] California Climate Change Center. (CCCC). 2006. Our Changing Climate: Assessing the Risks to California.
[25] California Energy Commission (CEC). 2009. The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California.

increase expected if rising temperatures remain in the lower warming range. This increase in air quality problems could result in an increase in asthma and other health-related problems.

- **A rise in sea levels resulting in the displacement of coastal businesses and residences.** During the past century, sea levels along California's coast have risen about 7 inches. If emissions continue unabated and temperatures rise into the higher anticipated warming range, sea level is expected to rise an additional 22 to 35 inches by the end of the century. Elevations of this magnitude would inundate coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats.
- **An increase temperature and extreme weather events.** Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in California. More heat waves can exacerbate chronic disease or heat-related illness.
- **A decrease in the health and productivity of California's forests.** Climate change can cause an increase in wildfires, an enhanced insect population, and establishment of non-native species.

Consequences of Climate Change in the Fresno Area

Source: Cal-Adapt. 2022. Local Climate Snapshots. Website: https://beta.cal-adapt.org/tools/local-climate-change-snapshot. Accessed June 24, 2022.

Figure 3.8-2 displays a chart of measured historical and projected annual average temperatures in the Fresno area. As shown in the figure, temperatures are expected to rise in the medium and high GHG emissions scenarios. The results indicate that temperatures are predicted to increase by 4.5°F (degrees Fahrenheit) under the medium emission scenario and 8.5°F under the high emissions scenario.

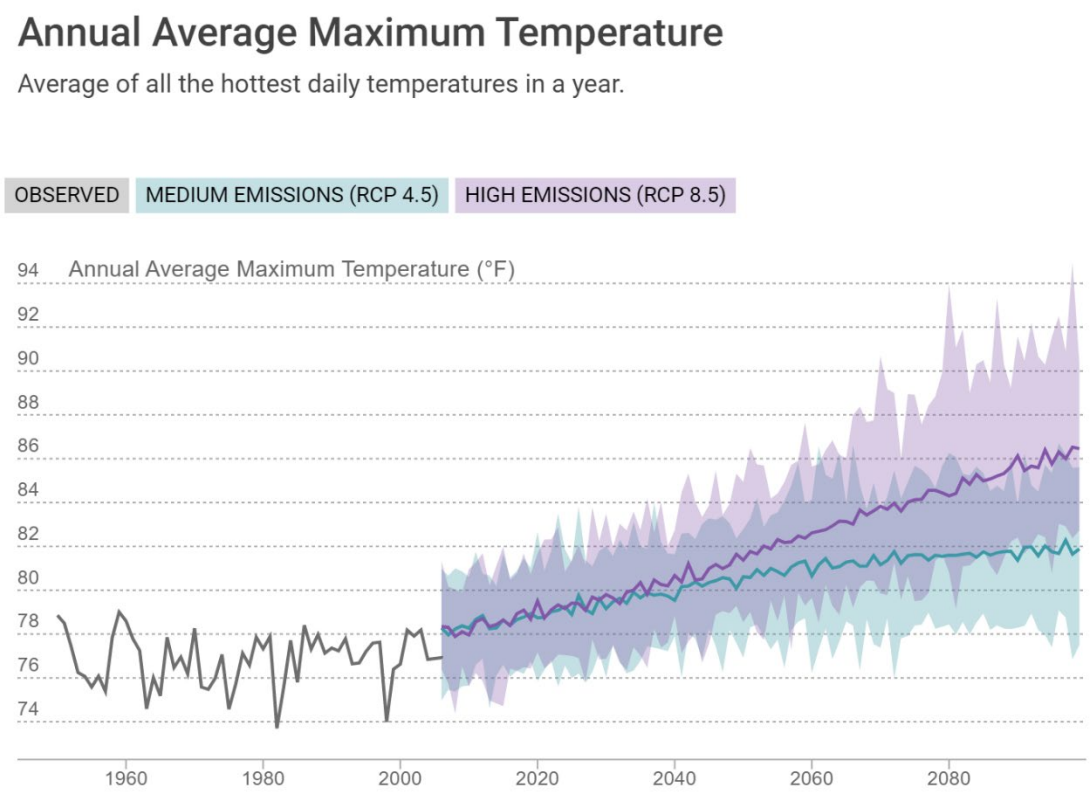
Temperature/Heat/Wildfire and Drought Events

Because of increasing GHG emissions and temperature increases, increasing large wildfires (greater than 25,000 acres) could become 50 percent more frequent by the end of the century. Incidences of extreme heat are expected to increase in both intensity and length as a result of climate change.[26]

Precipitation/Rainfall/Flooding Events

By 2050, the average water supply from snowpack is projected to decline to two-thirds from historical levels. If emissions reductions do not occur, water from snowpack could fall to less than one-third of historical levels by 2100.[27]

[26] California Energy Commission. California's Fourth Climate Change Assessment: California's Changing Climate 2018.
[27] Ibid.



Source: Cal-Adapt. 2022. Local Climate Snapshots. Website: https://beta.cal-adapt.org/tools/local-climate-change-snapshot. Accessed June 24, 2022.

Figure 3.8-2: Observed and Projected Temperatures for Climate Change in the City of Fresno Area

3.8.3 - Regulatory Framework

International

International organizations such as the ones discussed below have made substantial efforts to reduce GHGs. Preventing human-induced climate change will require the participation of all nations in solutions to address the issue.

Kyoto Protocol

In 1988, the United Nations established the IPCC to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United States joined other countries around the world in signing the United Nations Framework Convention on Climate Change (UNFCCC) agreement with the goal of controlling GHG emissions. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The Plan currently consists of more than 50 voluntary programs for member nations to adopt.

The Kyoto Protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. Some have estimated that if the commitments outlined in the Kyoto Protocol were met, global GHG emissions could have been reduced an estimated 5 percent from

1990 levels during the first commitment period of 2008-2012. Notably, while the United States is a signatory to the Kyoto Protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments. In December 2009, international leaders from 192 nations met in Copenhagen to address the future of international climate change commitments post-Kyoto.

On September 23, 2014, more than 100 heads of state and government, and leaders from the private sector and civil society met at the Climate Summit in New York hosted by the United Nations. At the Summit, heads of government, business and civil society announced actions in areas that would have the greatest impact on reducing emissions, including climate finance, energy, transport, industry, agriculture, cities, forests, and building resilience.

Paris Climate Change Agreement

Parties to the UNFCCC reached a landmark agreement on December 12, 2015, in Paris, charting a fundamentally new course in the two-decade-old global climate effort. Culminating a 4-year negotiating round, the new treaty ends the strict differentiation between developed and developing countries that characterized earlier efforts, replacing it with a common framework that commits all countries to put forward their best efforts and to strengthen them in the years ahead. This includes, for the first time, requirements that all parties report regularly on their emissions and implementation efforts and undergo international review.

The agreement and a companion decision by parties were the key outcomes of the conference, known as the 21st session of the UNFCCC Conference of the Parties, or "COP 21." Together, the Paris Agreement and the accompanying COP decision:[28]

- Reaffirm the goal of limiting global temperature increase well below 2 degrees Celsius, while urging efforts to limit the increase to 1.5 degrees;
- Establish binding commitments by all parties to make "nationally determined contributions" (NDCs), and to pursue domestic measures aimed at achieving them;
- Commit all countries to report regularly on their emissions and "progress made in implementing and achieving" their NDCs, and to undergo international review;
- Commit all countries to submit new NDCs every five years, with the clear expectation that they will "represent a progression" beyond previous ones;
- Reaffirm the binding obligations of developed countries under the UNFCCC to support the efforts of developing countries, while for the first time encouraging voluntary contributions by developing countries too;
- Extend the current goal of mobilizing $100 billion a year in support by 2020 through 2025, with a new, higher goal to be set for the period after 2025;
- Extend a mechanism to address "loss and damage" resulting from climate change, which explicitly will not "involve or provide a basis for any liability or compensation;"
- Require parties engaging in international emissions trading to avoid "double counting;" and

[28] Center for Climate and Energy Solutions (C^2ES). 2015. Outcomes of the U.N. Climate Change Conference in Paris.

- Call for a new mechanism, similar to the Clean Development Mechanism under the Kyoto Protocol, enabling emission reductions in one country to be counted toward another country's NDC.[29]

On June 1, 2017, President Trump announced the decision for the United States to withdraw from the Paris Climate Accord and the United States officially filed its intent to withdraw on November 4, 2019. Following the 1-year grace period for withdrawal from the Agreement, the United States formally withdrew from the Agreement on November 4, 2020. President Biden rejoined the Agreement on his first day in office, January 20, 2021. The United States officially became a party to the Agreement once again on February 19, 2021, after a mandatory 30-day waiting period.[30]

Federal

Prior to the last decade, there were no concrete federal regulations of GHGs or major planning for climate change adaptation. Since then, federal activity has increased. The following are actions regarding the federal government, GHGs, and fuel efficiency.

Massachusetts et al. v. EPA (U.S. Supreme Court GHG Endangerment Ruling)

Massachusetts et al. v. EPA (Supreme Court Case 05-1120) was argued before the United States (U.S.) Supreme Court on November 29, 2006, in which it was petitioned that the EPA regulate four GHGs, including CO_2, under Section 202(a)(1) of the Clean Air Act (CAA). A decision was made on April 2, 2007, in which the Supreme Court found that GHGs are air pollutants covered by the CAA. The Court held that the Administrator must determine whether emissions of GHGs from new motor vehicles cause or contribute to air pollution, which may reasonably be anticipated to endanger public health or welfare, or whether the science is too uncertain to make a reasoned decision. On December 7, 2009, the EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- **Endangerment Finding:** The Administrator finds that the current and projected concentrations of the six key well-mixed greenhouse gases—CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6—in the atmosphere threaten the public health and welfare of current and future generations; and
- **Cause or Contribute Finding:** The Administrator finds that the combined emissions of these well-mixed greenhouse gases from new motor vehicles and new motor vehicle engines contribute to the greenhouse gas pollution, which threatens public health and welfare.

These findings do not impose requirements on industry or other entities. However, this was a prerequisite for implementing GHG emissions standards for vehicles, as discussed under "Clean Vehicles" below. After a lengthy legal challenge, the U.S. Supreme Court declined to review an Appeals Court ruling upholding that upheld the EPA Administrator findings.

[29] Center for Climate and Energy Solutions (C^2ES). 2015. Outcomes of the U.N. Climate Change Conference in Paris.

[30] United States Department of State. 2021. The United States Officially Rejoins the Paris Agreement. https://www.state.gov/the-united-states-officially-rejoins-the-paris-agreement/. Accessed June 24, 2022.

U.S. Consolidated Appropriations Act (Mandatory GHG Reporting)

The Consolidated Appropriations Act of 2008, passed in December 2007, requires the establishment of mandatory GHG reporting requirements. On September 22, 2009, the EPA issued the Final Mandatory Reporting of Greenhouse Gases Rule, which became effective January 1, 2010. The rule requires reporting of GHG emissions from large sources and suppliers in the United States, and is intended to collect accurate and timely emissions data to inform future policy decisions. Under the rule, suppliers of fossil fuels or industrial GHGs, manufacturers of vehicles and engines, and facilities that emit 25,000 MT or more per year of GHG emissions are required to submit annual reports to the EPA. The first annual reports for the largest emitting facilities, covering calendar year 2010, were submitted to EPA in 2011.

U.S. Clean Air Act Permitting Programs (New GHG Source Review)

The EPA issued a final rule on May 13, 2010, that establishes thresholds for GHGs that define when permits under the New Source Review Prevention of Significant Deterioration and Title V Operating Permit programs are required for new and existing industrial facilities. This final rule "tailors" the requirements of these CAA permitting programs to limit which facilities will be required to obtain Prevention of Significant Deterioration and Title V permits. In the preamble to the revisions to the Federal Code of Regulations, the EPA states:

> This rulemaking is necessary because without it the Prevention of Significant Deterioration and Title V requirements would apply, as of January 2, 2011, at the 100 or 250 tons per year levels provided under the Clean Air Act, greatly increasing the number of required permits, imposing undue costs on small sources, overwhelming the resources of permitting authorities, and severely impairing the functioning of the programs. EPA is relieving these resource burdens by phasing in the applicability of these programs to greenhouse gas sources, starting with the largest greenhouse gas emitters. This rule establishes two initial steps of the phase in. The rule also commits the agency to take certain actions on future steps addressing smaller sources, but excludes certain smaller sources from Prevention of Significant Deterioration and Title V permitting for greenhouse gas emissions until at least April 30, 2016.

The EPA estimates that facilities responsible for nearly 70 percent of the national GHG emissions from stationary sources will be subject to permitting requirements under this rule. This includes the nation's largest GHG emitters—power plants, refineries, and cement production facilities.

Energy Independence and Security Act

The Energy Policy Act of 2005 created the Renewable Fuel Standard program. The Energy Independence and Security Act of 2007 expanded this program by:

- Expanding the Renewable Fuel Standard program to include diesel in addition to gasoline.
- Increasing the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022.

- Establishing new categories of renewable fuel, and setting separate volume requirements for each one.
- Requiring EPA to apply lifecycle GHG performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

This expanded Renewable Fuel Standard program lays the foundation for achieving substantial reductions of GHG emissions from the use of renewable fuels, reducing the use of imported petroleum, and encouraging the development and expansion of the nation's renewable fuels sector.

Signed on December 19, 2007, by President George W. Bush, the Energy Independence and Security Act of 2007 (EISA) aims to:

- Move the United States toward greater energy independence and security.
- Increase the production of clean renewable fuels.
- Protect consumers.
- Increase the efficiency of products, buildings, and vehicles.
- Promote research on and deploy GHG emission capture and storage options.
- Improve the energy performance of the federal government.
- Increase U.S. energy security, develop renewable fuel production, and improve vehicle fuel economy.

EISA reinforces the energy reduction goals for federal agencies put forth in Executive Order 13423, as well as introduces more aggressive requirements. The three key provisions enacted are the Corporate Average Fuel Economy Standards, the Renewable Fuel Standard, and the appliance/lighting efficiency standards.

The EPA is committed to developing, implementing, and revising both regulations and voluntary programs under the following subtitles in EISA, among others: [31]

- Increased Corporate Average Fuel Economy Standards
- Federal Vehicle Fleets
- Renewable Fuel Standard
- Biofuels Infrastructure
- Carbon Capture and Sequestration

The EPA and National Highway Traffic Safety Administration Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards Final Rule

Congress first passed the Corporate Average Fuel Economy law in 1975 to increase the fuel economy of cars and light-duty trucks. The law has become more stringent over time. On April 1, 2010, the EPA and the Department of Transportation's National Highway Traffic Safety Administration (NHTSA) announced a joint final rule establishing a national program that would reduce GHG emissions and improve fuel economy for new cars and trucks sold in the United States. The EPA and the NHTSA

[31] United States Environment Protection Agency (EPA). Summary of the Energy Independence and Security Act. Website: https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act. Accessed June 24, 2022.

issued final rules on a second phase joint rulemaking, establishing national standards for light-duty vehicles for model years 2017 through 2025 in August 2012.[32] The new standards for model years 2017 through 2025 apply to passenger cars, light-duty trucks, and medium-duty passenger vehicles. The final standards are projected to result in an average industry fleet wide level of 163 grams/mile of CO_2 in model year 2025, which is equivalent to 54.5 miles per gallon if achieved exclusively through fuel economy improvements.

The EPA and NHTSA issued final rules for the first national standards to reduce GHG emissions and improve fuel efficiency of heavy-duty trucks and buses on September 15, 2011, which became effective November 14, 2011. For combination tractors, the agencies are proposing engine and vehicle standards that began in the 2014 model year and achieve up to a 20 percent reduction in CO_2 emissions and fuel consumption by the 2018 model year. For heavy-duty pickup trucks and vans, the agencies are proposing separate gasoline and diesel truck standards, which phase in starting in the 2014 model year and achieve up to a 10 percent reduction for gasoline vehicles, and a 15 percent reduction for diesel vehicles by 2018 model year (12 and 17 percent respectively if accounting for air conditioning leakage). Lastly, for vocational vehicles, the engine and vehicle standards would achieve up to a 10 percent reduction in fuel consumption and CO_2 emissions from the 2014 to 2018 model years.

The State of California has received a waiver from the EPA to have separate, stricter Corporate Average Fuel Economy Standards. Although global climate change did not become an international concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the incidental reduction of GHG emissions. In order to manage the State's energy needs and promote energy efficiency, AB 1575 created the California Energy Commission (CEC) in 1975.

State

California Assembly Bill 32: Global Warming Solutions Act and Scoping Plan

The California State Legislature enacted AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires that GHGs emitted in California be reduced to 1990 levels by the year 2020. "Greenhouse gases" as defined under AB 32 include CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6. Since AB 32 was enacted, a seventh chemical, nitrogen trifluoride, has also been added to the list of GHGs. The ARB is the State agency charged with monitoring and regulating sources of GHGs.

The State has made steady progress in implementing AB 32. The ARB's initial Climate Change Scoping Plan (Scoping Plan) contained measures designed to reduce the State's emissions to 1990 levels by the year 2020 to comply with AB 32.[33] The Scoping Plan identified recommended measures for multiple GHG emission sectors and the associated emission reductions needed to achieve the year 2020 emissions target. In addition, the Scoping Plan differentiates between "capped" and "uncapped" strategies. Capped strategies are subject to the ARB's Cap-and-Trade Program. The Cap-

[32] United States Environmental Protection Agency (EPA). 2012. EPA and NHTSA Set Standards to Reduce Greenhouse Gases and Improve Fuel Economy for Model Years 2017-2025 Cars and Light Trucks.

[33] California Air Resources Board (ARB). 2008. Climate Change Scoping Plan, a framework for change.

and-Trade Program works with other direct regulatory measures and provides an economic incentive to reduce emissions.

The State achieved the 2020 target several years ahead of schedule.[34] As further discussed below, the Scoping Plan has been subsequently updated to go beyond the emission reductions called for in the initial version, in line with more recent State policy directives.

California Senate Bill 32

Former Governor Brown signed SB 32 in September of 2016, giving ARB the statutory responsibility to include the 2030 emissions target previously contained in Executive Order B-30-15 in the 2017 Scoping Plan Update. SB 32 states, "In adopting rules and regulations to achieve the maximum technologically feasible and cost-effective greenhouse gas emissions reductions authorized by this division, the state [air resources] board shall ensure that Statewide greenhouse gas emissions are reduced to at least 40 percent below the Statewide greenhouse gas emissions limit no later than December 31, 2030." As such, SB 32 lays the foundation for the legislative reduction targets for 2030.

Assembly Bill 1279

AB 1279 (2022) establishes the policy of the State to achieve carbon neutrality as soon as possible, but no later than 2045 and maintain net negative greenhouse gas emissions thereafter, and to ensure that by 2045 Statewide anthropogenic greenhouse gas emissions are reduced at least 85 percent below 1990 levels. The Bill requires ARB to ensure that the Scoping Plan identifies and recommends measures to achieve carbon neutrality, and to identify and implement policies and strategies that enable carbon dioxide removal and carbon capture, utilization, and storage technologies to complement these emission reductions.

2022 Scoping Plan

The most recent version of the ARB's Scoping Plan, the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan), addresses the new AB1279 targets and was adopted on December 15, 2022. This plan builds upon previously adopted Scoping Plans, including the 2017 Scoping Plan which originally addressed the emission reduction goals in SB 32, and provides a detailed sector-by-sector guide to address climate change by cutting greenhouse gas emissions by 85 percent and achieving carbon neutrality in 2045, with the main focus of emission reductions efforts being the transportation and energy sectors.[35]

California Executive Order S-3-05 (GHG Emissions Reduction Targets)

Former California Governor Arnold Schwarzenegger announced on June 1, 2005, through Executive Order S-3-05, the following reduction targets for GHG emissions:

- By 2010, reduce GHG emissions to 2000 levels.
- By 2020, reduce GHG emissions to 1990 levels.
- By 2050, reduce GHG emissions to 80 percent below 1990 levels.

[34] California Air Resources Board (ARB). 2008. Climate Change Scoping Plan, a framework for change.
[35] California Air Resources Board (ARB). 2022. The 2022 Scoping Plan for Achieving Carbon Neutrality. Accessed December 2022.

The 2050 reduction goal represents what some scientists believe is necessary to reach levels that will stabilize the climate. The 2020 goal was established to be a mid-term target. Because this is an Executive Order, the goals are not legally enforceable for local governments or the private sector.

California AB 1493: Pavley Regulations and Fuel Efficiency Standards

California AB 1493, enacted on July 22, 2002, required the ARB to develop and adopt regulations that reduce GHGs emitted by passenger vehicles and light-duty trucks. Implementation of the regulation was delayed by lawsuits filed by automakers and by the EPA's denial of an implementation waiver. The EPA subsequently granted the requested waiver in 2009, which was upheld by the by the U.S. District Court for the District of Columbia in 2011.[36]

The standards are to be phased in during the 2009 through 2016 model years. When fully phased in, the near-term (2009–2012) standards will result in an approximately 22 percent reduction compared with the 2002 fleet, and the mid-term (2013–2016) standards will result in about a 30 percent reduction. Several technologies stand out as providing significant reductions in emissions at favorable costs. These include discrete variable valve lift or camless valve actuation to optimize valve operation rather than relying on fixed valve timing and lift as has historically been done; turbocharging to boost power and allow for engine downsizing; improved multi-speed transmissions; and improved air conditioning systems that operate optimally, leak less, and/or use an alternative refrigerant.[37]

The second phase of the implementation for the Pavley Bill was incorporated into Amendments to the Low Emission Vehicle (LEV) Program referred to as LEV III or the Advanced Clean Cars program. The Advanced Clean Car program combines the control of smog-causing pollutants and GHG emissions into a single coordinated package of requirements for model years 2017 through 2025. The regulation will reduce GHGs from new cars by 34 percent from 2016 levels by 2025. The new rules will reduce pollutants from gasoline and diesel-powered cars, and deliver increasing numbers of zero-emission technologies, such as full battery electric cars, newly emerging plug-in hybrid electric vehicles and hydrogen fuel cell cars. The regulations will also ensure adequate fueling infrastructure is available for the increasing numbers of hydrogen fuel cell vehicles planned for deployment in California.[38]

California SB 1078: Renewable Electricity Standards

On September 12, 2002, Governor Gray Davis signed SB 1078, requiring California to generate 20 percent of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a Renewable Portfolio Standard target for California requiring that all retail sellers of electricity serve 33 percent of their load with renewable energy by 2020. Governor Schwarzenegger also directed the ARB (Executive Order S-21-09) to adopt a regulation by July 31, 2010, requiring the State's load serving entities to meet a 33 percent renewable energy target by

[36] Legislative Counsel's Digest. 2002. Assembly Bill No. 1493.
[37] California Air Resources Board (ARB). 2022. Advanced Clean Cars Program. Website: https://ww2.arb.ca.gov/our-work/programs/advanced-clean-cars-program/about. Accessed June 30, 2022
[38] California Air Resources Board (ARB). 2011. Status of Scoping Plan Recommended Measures.

2020. The ARB approved the Renewable Electricity Standard on September 23, 2010 by Resolution 10-23.

California SB 375: Sustainable Communities and Climate Protection Act

SB 375 was signed into law on September 30, 2008. According to SB 375, the transportation sector is the largest contributor of GHG emissions, which emits over 40 percent of the total GHG emissions in California. SB 375 states, "Without improved land use and transportation policy, California will not be able to achieve the goals of AB 32." SB 375 does the following: (1) requires metropolitan planning organizations to include sustainable community strategies in their regional transportation plans for reducing GHG emissions, (2) aligns planning for transportation and housing, and (3) creates specified incentives for the implementation of the strategies.

Concerning California Environmental Quality Act (CEQA), SB 375, as codified in Public Resources Code Section 21159.28, states that CEQA findings determinations for certain projects are not required to reference, describe, or discuss (1) growth inducing impacts or (2) any project-specific or cumulative impacts from cars and light-duty truck trips generated by the project on global warming or the regional transportation network if the project:

1. Is in an area with an approved Sustainable Communities Strategy (SCS) or an alternative planning strategy that the ARB accepts as achieving the GHG emission reduction targets;
2. Is consistent with that strategy (in designation, density, building intensity, and applicable policies); and
3. Incorporates the mitigation measures required by an applicable prior environmental document.

California SB 1368: Emission Performance Standards

In 2006, the State Legislature adopted SB 1368, which was subsequently signed into law by the Governor. SB 1368 directs the California Public Utilities Commission to adopt a performance standard for GHG emissions for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than 5 years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Because of the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants. Accordingly, the new law effectively prevents California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. The California Public Utilities Commission adopted the regulations required by SB 1368 on August 29, 2007. The regulations implementing SB 1368 establish a standard for baseload generation owned by, or under long-term contract to publicly owned utilities, of 1,100 pounds (lbs) CO_2 per megawatt-hour (MWh).

California Executive Order S-01-07: Low Carbon Fuel Standard

The Governor signed Executive Order S 01-07 on January 18, 2007. The Executive Order mandates that a Statewide goal shall be established to reduce the carbon intensity of California's

transportation fuels by at least 10 percent by 2020. In particular, the Executive Order established an Low Carbon Fuel Standard (LCFS) and directed the Secretary for Environmental Protection to coordinate the actions of the CEC, the ARB, the University of California, and other agencies to develop and propose protocols for measuring the "lifecycle carbon intensity" of transportation fuels. This analysis supporting development of the protocols was included in the State Implementation Plan for alternative fuels (State Alternative Fuels Plan adopted by CEC on December 24, 2007) and was submitted to the ARB for consideration as an "early action" item under AB 32. The ARB adopted the LCFS on April 23, 2009.

The LCFS was subject to legal challenge in 2011. Ultimately, on August 8, 2013, the Fifth District Court of Appeal (California) ruled that ARB failed to comply with CEQA and the Administrative Procedure Act when adopting regulations for Low Carbon Fuel Standards. In a partially published opinion, the Court of Appeal directed that Resolution 09-31 and two Executive Orders of ARB approving LCFS regulations promulgated to reduce GHG emissions be set aside. However, the Court tailored its remedy to protect the public interest by allowing the LCFS regulations to remain operative while ARB complies with the procedural requirements it failed to satisfy.

To address the Court ruling, ARB was required to bring a new LCFS regulation to the Board for consideration in February 2015. The proposed LCFS regulation was required to contain revisions to the 2010 LCFS as well as new provisions designed to foster investments in the production of the low carbon fuels, offer additional flexibility to regulated parties, update critical technical information, simplify and streamline program operations, and enhance enforcement. The second public hearing for the new LCFS regulation was held on September 24, 2015, and September 25, 2015, where the LCFS regulation was adopted. The Final Rulemaking Package adopting the regulation was filed with the Office of Administrative Law (OAL) on October 2, 2015. The OAL approved the regulation on November 16, 2015.[39]

California Executive Order S-13-08

Executive Order S-13-08 states that "climate change in California during the next century is expected to shift precipitation patterns, accelerate sea level rise and increase temperatures, thereby posing a serious threat to California's economy, to the health and welfare of its population and to its natural resources." Pursuant to the requirements in the order, the 2009 California Climate Adaptation Strategy was adopted, which is the ". . . first Statewide, multi-sector, region-specific, and information-based climate change adaptation strategy in the United States." Objectives include analyzing risks of climate change in California, identifying and exploring strategies to adapt to climate change, and specifying a direction for future research.

California SBX 7-7: Water Conservation Act

This 2009 legislation directs urban retail water suppliers to set individual 2020 per capita water use targets and begin implementing conservation measures to achieve those goals. Meeting this

[39] California Air Resources Board (ARB). 2015. Low Carbon Fuel Standard Regulation. Website: http://www.arb.ca.gov/regact/2015/lcfs2015/lcfs2015.htm. Accessed June 24, 2022.

Statewide goal of 20 percent decrease in demand will result in a reduction of almost 2 million acre-feet in urban water use in 2020.

California SB 350: Clean Energy and Pollution Reduction Act

In 2015, the State Legislature approved and the Governor signed SB 350 that reaffirms California's commitment to reducing its GHG emissions and addressing climate change. Key provisions include an increase in the Renewables Portfolio Standard (RPS), higher energy efficiency requirements for buildings, initial strategies toward a regional electricity grid, and improved infrastructure for electric vehicle charging stations. Provisions for a 50 percent reduction in the use of petroleum Statewide were removed from the Bill due to opposition and concern that it would prevent the Bill's passage. Specifically, SB 350 requires the following to reduce Statewide GHG emissions:

- Increase the amount of electricity procured from renewable energy sources from 33 percent to 50 percent by 2030, with interim targets of 40 percent by 2024, and 25 percent by 2027.
- Double the energy efficiency in existing buildings by 2030. This target will be achieved through the California Public Utility Commission (CPUC), the CEC, and local publicly owned utilities.
- Reorganize the Independent System Operator (ISO) to develop more regional electrify transmission markets and to improve accessibility in these markets, which will facilitate the growth of renewable energy markets in the western United States.[40]

California Executive Order B-30-15

On April 29, 2015, an Executive Order was issued by the Governor to establish a California GHG emissions reduction target of 40 percent below 1990 levels by 2030. The Governor's Executive Order aligns California's GHG reduction targets with those of leading international governments ahead of the United Nations Climate Change Conference in Paris late 2015. The Executive Order sets a new interim Statewide GHG emission reduction target to reduce GHG emissions to 40 percent below 1990 levels by 2030 in order to ensure California meets its target of reducing GHG emissions to 80 percent below 1990 levels by 2050 and directs the ARB to update the Climate Change Scoping Plan to express the 2030 target in terms of MMT CO_2e. The Executive Order also requires the State's climate adaptation plan to be updated every three years and for the State to continue its climate change research program, among other provisions. As with Executive Order S-3-05, this Executive Order is not legally enforceable against local governments and the private sector. Legislation that would update AB 32 to make post 2020 targets and requirements a mandate is in process in the State Legislature.

California Code of Regulations Title 20: Appliance Efficiency Regulations

California Code of Regulations, Title 20: Division 2, Chapter 4, Article 4, Sections 1601-1608: Appliance Efficiency Regulations regulates the sale of appliances in California. The Appliance Efficiency Regulations include standards for both federally regulated appliances and non-federally regulated appliances. Twenty-three categories of appliances are included in the scope of these regulations. The standards within these regulations apply to appliances that are sold or offered for

[40] California Legislative Information (California Leginfo). 2015. Senate Bill 350 Clean Energy and Pollution Reduction Act of 2015. Website: https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201520160SB350. Accessed June 24, 2022.

sale in California, except those sold wholesale in California for final retail sale outside the State and those designed and sold exclusively for use in recreational vehicles or other mobile equipment.[41] The 2019 Building Energy Efficiency Standards went into effect on January 1, 2020.

California Code of Regulations Title 24: Energy Efficiency Standards

California Code of Regulations Title 24 Part 6: California's Energy Efficiency Standards for Residential and Nonresidential Buildings, was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The 2022 Building Energy Efficiency Standards went into effect on January 1, 2023.[42]

California Code of Regulations Title 24: California Green Building Standards Code

California Code of Regulations Title 24, Part 11, is a comprehensive and uniform regulatory code for all residential, commercial, and school buildings that went in effect January 1, 2011. The code is updated on a regular basis, with the most recent update consisting of the 2022 California Green Building Code Standards Code (CALGreen) which became effective January 1, 2023.[43] Local jurisdictions are permitted to adopt more stringent requirements, as State law provides methods for local enhancements. The Code recognizes that many jurisdictions have developed existing construction and demolition ordinances, and defers to them as the ruling guidance provided they provide a minimum 50 percent diversion requirement. The Code also provides exemptions for areas not served by construction and demolition recycling infrastructure. The California Building Standards Code (CBC) provides the minimum standard that buildings need to meet in order to be certified for occupancy, which is generally enforced by the local building official.

California Code of Regulations, Title 24, Part 11 requires the following:

- **Short-term bicycle parking**. If a commercial project is anticipated to generate visitor traffic, provide permanently anchored bicycle racks within 200 feet of the visitors' entrance, readily visible to passers-by, for 5 percent of visitor motorized vehicle parking capacity, with a minimum of one two-bike capacity rack (5.106.4.1.1).
- **Long-term bicycle parking**. For buildings with over 10 tenant-occupants, provide secure bicycle parking for 5 percent of tenant-occupied motorized vehicle parking capacity, with a minimum of one space (5.106.4.1.2).
- **Designated parking**. Provide designated parking in commercial projects for any combination of low-emitting, fuel-efficient and carpool/van pool vehicles as shown in Table 5.106.5.2 (5.106.5.2).

[41] California Energy Commission (CEC). 2022. Appliance Energy Efficiency Regulations – Title 20. Website: https://www.energy.ca.gov/rules-and-regulations/appliance-efficiency-regulations-title-20. Accessed June 24, 2022.
[42] California Energy Commission. 2023. 2022 Building Energy Efficiency Standards. Website: https://www.energy.ca.gov/programs-and-topics/programs/building-energy-efficiency-standards/2022-building-energy-efficiency. Accessed March 15, 2023.
[43] State of California. 2022. California Green Building Standards Code (CALGreen). Website: https://calgreenenergyservices.com/. Accessed March 21, 2023.

- **Recycling by Occupants**. Provide readily accessible areas that serve the entire building and are identified for the depositing, storage and collection of nonhazardous materials for recycling (5.410.1).
- **Construction waste**. A minimum 65 percent diversion of construction and demolition waste from landfills. (5.408.1, A5.408.3.1 [nonresidential], A5.408.3.1 [residential]). All (100 percent) of trees, stumps, rocks and associated vegetation and soils resulting from land clearing shall be reused or recycled (5.408.3).
- **Wastewater reduction**. Each building shall reduce the generation of wastewater by one of the following methods:
    1. The installation of water conserving fixtures or
    2. Using nonpotable water systems (5.303.4).
- **Water use savings**. 20 percent mandatory reduction in indoor water use with voluntary goal standards for 30, 35, and 40 percent reductions (5.303.2, A5303.2.3 [nonresidential]).
- **Water meters**. Separate water meters for buildings in excess of 50,000 square feet or buildings projected to consume more than 1,000 gallons per day (5.303.1).
- **Irrigation efficiency**. Moisture-sensing irrigation systems for larger landscaped areas (5.304.3).
- **Materials pollution control**. Low-pollutant emitting interior finish materials such as paints, carpet, vinyl flooring and particleboard (5.404).
- **Building commissioning**. Mandatory inspections of energy systems (i.e., heat furnace, air conditioner, mechanical equipment) for nonresidential buildings over 10,000 square feet to ensure that all are working at their maximum capacity according to their design efficiencies (5.410.2).

California Model Water Efficient Landscape Ordinance

The Model Water Efficient Landscape Ordinance (Ordinance) was required by AB 1881 Water Conservation Act. The Bill required local agencies to adopt a local landscape ordinance at least as effective in conserving water as the Model Ordinance by January 1, 2010. Reductions in water use of 20 percent consistent with (SBX-7-7) 2020 mandate are expected for Ordinance. Governor Brown's Drought Executive Order of April 1, 2015 (Executive Order B-29-15) directed the California Department of Water Resources (DWR) to update the Ordinance through expedited regulation. The California Water Commission approved the revised Ordinance on July 15, 2015, which became effective on December 15, 2015. New development projects that include landscaped areas of 500 square feet or more are subject to the Ordinance. The update requires:

- More efficient irrigation systems
- Incentives for graywater usage
- Improvements in on-site stormwater capture
- Limiting the portion of landscapes that can be planted with high water use plants
- Reporting requirements for local agencies.

California SB 97 and the CEQA Guidelines Update

Passed in August 2007, SB 97 added Section 21083.05 to the Public Resources Code. The Code states "(a) On or before July 1, 2009, the Office of Planning and Research shall prepare, develop, and transmit to the Resources Agency guidelines for the mitigation of GHG emissions or the effects of GHG emissions as required by this division, including, but not limited to, effects associated with transportation or energy consumption. (b) On or before January 1, 2010, the Resources Agency shall certify and adopt guidelines prepared and developed by the Office of Planning and Research pursuant to subdivision (a)."

Section 21097 was also added to the Public Resources Code, which provided an exemption until January 1, 2010, for transportation projects funded by the Highway Safety, Traffic Reduction, Air Quality, and Port Security Bond Act of 2006 or projects funded by the Disaster Preparedness and Flood Prevention Bond Act of 2006, in stating that the failure to analyze adequately the effects of GHGs would not violate CEQA. The Natural Resources Agency completed the approval process and the Amendments became effective on March 18, 2010.

The 2010 CEQA Amendments provide guidance to public agencies regarding the analysis and mitigation of the effects of GHG emissions in CEQA documents. The CEQA Amendments fit within the existing CEQA framework by amending existing CEQA Guidelines to reference climate change.

Section 15064.4(b) of the CEQA Guidelines provides direction for lead agencies for assessing the significance of impacts of GHG emissions:

- The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting.
- Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project.
- The extent to which the project complies with regulations or requirements adopted to implement a Statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The CEQA Guidelines amendments do not identify a threshold of significance for GHG emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a "good-faith effort, based on available information, to describe, calculate, or estimate the amount of greenhouse gas emissions resulting from a project." The amendments encourage lead agencies to consider many factors in performing a CEQA analysis and preserve lead agencies' discretion to make their own determinations based upon substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses.

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts, respectively. GHG mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze GHG emissions in an EIR when a project's incremental contribution of emissions may be cumulatively considerable; however, it does not answer the question of when emissions are cumulatively considerable.

Section 15183.5 permits programmatic GHG analysis and later project-specific tiering, as well as the preparation of Greenhouse Gas Reduction Plans. Compliance with such plans can support a determination that a project's cumulative effect is not cumulatively considerable, according to Section 15183.5(b).

California Supreme Court GHG Ruling

In a November 30, 2015, ruling, the *California Supreme Court in Center for Biological Diversity v. California Department of Fish and Wildlife* on the Newhall Ranch project concluded that whether the project was consistent with meeting Statewide emission reduction goals is a legally permissible criterion of significance, but the significance finding for the project was not supported by a reasoned explanation based on substantial evidence. The Court offered potential solutions on pages 25-27 of the ruling to address this issue summarized below:

Specifically, the Court advised that:

- **Substantiation of Project Reductions from Business as Usual (BAU)**. A lead agency may use a BAU comparison based on the Scoping Plan's methodology if it also substantiates the reduction a particular project must achieve to comply with Statewide goals (page 25).
- **Compliance with Regulatory Programs or Performance Based Standards**. A lead agency "might assess consistency with AB 32's goal in whole or part by looking to compliance with regulatory programs designed to reduce greenhouse gas emissions from particular activities" (page 26).
- **Compliance with GHG Reduction Plans or Climate Action Plans**. A lead agency may utilize "geographically specific GHG emission reduction plans" such as Climate Action Plans (CAPs) or GHG emission reduction plans to provide a basis for the tiering or streamlining of project-level CEQA analysis (page 26).
- **Compliance with Local Air District Thresholds**. A lead agency may rely on "existing numerical thresholds of significance for greenhouse gas emissions" adopted by, for example, local air districts (page 27).

Regional

San Joaquin Valley Air Pollution Control District Climate Change Action Plan

On August 21, 2008, the San Joaquin Valley Air Pollution Control District (Valley Air District) Governing Board approved a proposal called the Climate Change Action Plan (CCAP). The CCAP began with a public process bringing together stakeholders, land use agencies, environmental groups, and business groups to conduct public workshops to develop comprehensive policies for

CEQA Guidelines, a carbon exchange bank, and voluntary GHG emissions mitigation agreements for the Governing Board's consideration. The CCAP contains the following goals and actions:

- Develop GHG significance thresholds to address CEQA projects with GHG emission increases.
- Develop the San Joaquin Valley Carbon Exchange for banking and trading GHG reductions.
- Authorize use of the Valley Air District's existing inventory reporting system to allow use for GHG reporting required by AB 32 regulations.
- Develop and administer GHG reduction agreements to mitigate proposed emission increases from new projects.
- Support climate protection measures that reduce greenhouse gas emissions as well as toxic and criteria pollutants. Oppose measures that result in a significant increase in toxic or criteria pollutant emissions in already impacted areas.

On December 17, 2009, the Valley Air District Governing Board adopted "Guidance for Valley Land-use Agencies in Addressing GHG Emission Impacts for New Projects under CEQA," and the policy "District Policy—Addressing GHG Emission Impacts for Stationary Source Projects Under CEQA When Serving as the lead agency." The Valley Air District concluded that the existing science is inadequate to support quantification of the impacts that project-specific GHG emissions have on global climatic change. The Valley Air District found the effects of project-specific emissions to be cumulative, and without mitigation, their incremental contribution to global climatic change could be considered cumulatively considerable. The Valley Air District found that this cumulative impact is best addressed by requiring all projects to reduce their GHG emissions, whether through project design elements or mitigation.

The Valley Air District's approach is intended to streamline the process of determining whether project-specific GHG emissions would have a significant effect. Projects exempt from the requirements of CEQA, and projects complying with an approved plan or mitigation program would be determined to have a less than significant cumulative impact. Such plans or programs must be specified in law or adopted by the public agency with jurisdiction over the affected resources and must have a certified final CEQA document. For non-exempt projects, those projects for which there is no applicable approved plan or program, or those projects not complying with an approved plan or program, the lead agency must evaluate the project against performance-based standards and would require the adoption of design elements, known as a Best Performance Standard, to reduce GHG emissions. The Best Performance Standards (BPS) have not yet fully been established, though they must be designed to result in a 29 percent reduction when compared with the BAU projections identified in the ARB AB 32 Scoping Plan.

For stationary source permitting projects, BPS means, "The most stringent of the identified alternatives for control of GHG emissions, including type of equipment, design of equipment and operational and maintenance practices, which are achieved-in-practice for the identified service, operation, or emissions unit class." The Valley Air District has identified BPS for the following sources: boilers; dryers and dehydrators; oil and gas extraction, storage, transportation, and refining operations; cogeneration; gasoline dispensing facilities; volatile organic compound control

technology; and steam generators. For development projects, BPS means, "Any combination of identified GHG emission reduction measures, including project design elements and land use decisions that reduce project-specific GHG emission reductions by at least 29 percent compared with business as usual."

Projects not incorporating BPS would require quantification of GHG emissions and demonstration that BAU GHG emissions have been reduced or mitigated by 29 percent. As stated earlier, the ARB's adjusted inventory reduced the amount required by the State to achieve 1990 emission levels from 29 percent to 21.7 percent to account for slower growth experienced since the 2008 recession. According to Valley Air District guidance, quantification of GHG emissions would be required for all projects for which the lead agency has determined that an EIR is required, regardless of whether the project incorporates BPS.

San Joaquin Valley Carbon Exchange

The Valley Air District initiated work on the San Joaquin Valley Carbon Exchange in November 2008. The purpose of the carbon exchange is to quantify, verify, and track voluntary GHG emissions reductions generated within the San Joaquin Valley. However, the Valley Air District has pursued an alternative strategy that incorporates the GHG emissions into its existing Rule 2301—Emission Reduction Credit Offset Banking that formerly only addressed criteria pollutants. The Valley Air District is also participating with the California Air Pollution Control Officers Association (CAPCOA), of which it is a member, in the CAPCOA Greenhouse Gas Reduction Exchange (GHG Rx). The GHG Rx is operated cooperatively by air districts that have elected to participate. Participating districts have signed a Memorandum of Understanding (MOU) with CAPCOA and agree to post only those credits that meet the Rx standards for quality. The objective is to provide a secure, low-cost, high-quality, GHG exchange for credits created in California. The GHG Rx is intended to help fulfill compliance obligations, or mitigation needs of local projects subject to environmental review, reducing the uncertainty of using credits generated in distant locations.

Rule 2301

While the CCAP indicated that the GHG emission reduction program would be called the San Joaquin Valley Carbon Exchange, the Valley Air District incorporated a method to register voluntary GHG emission reductions into its existing Rule 2301—Emission Reduction Credit Banking through amendments of the rule. Amendments to the rule were adopted on January 19, 2012. The purposes of the amendments to the rule include the following:

- Provide an administrative mechanism for sources to bank voluntary GHG emission reductions for later use.
- Provide an administrative mechanism for sources to transfer banked GHG emission reductions to others for any use.
- Define eligibility standards, quantitative procedures, and administrative practices to ensure that banked GHG emission reductions are real, permanent, quantifiable, surplus, and enforceable.

Fresno Council of Governments 2018-2042 Regional Transportation Plan/Sustainable Community Strategy

SB 375 requires the Metropolitan Planning Organization (MPO) to prepare a SCS in their regional transportation plan. The SCS establishes a development pattern for the region, which, when integrated with the transportation network and other transportation measures and policies, would reduce GHG emissions from transportation (excluding goods movement). The SCS provides growth strategies to achieve the regional GHG emissions reduction targets. It does not require that local general plans, specific plans, or zoning be consistent with the SCS, but provides incentives for consistency. The eight counties of the San Joaquin Valley are coordinating on development of their SCS to maximize resources through the Valley Vision SCS process. However, each MPO is developing a separate SCS. The Fresno Council of Governments' (Fresno COG) 2022-2046 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS) was adopted on July 28, 2022. The RTP/SCS includes modeling and quantification of GHG emissions and carbon sequestration in natural and working lands, and charts the long-range vision of regional transportation in Fresno County through the year 2046. The RTP identifies existing and future transportation related needs, while considering all modes of travel, analyzing alternative solutions, and identifying what can be completed with anticipated available funding for the projects and programs included within it. The SCS is intended to show how integrated land use and transportation planning can lead to lower GHG emissions from autos and light trucks in support of ARB's GHG emission reduction targets.[44]

Local

Fresno General Plan

The Fresno General Plan was adopted in 2014. The City updated the previous General Plan Master EIR (MEIR) and certified a Program EIR (PEIR) for the General Plan in 2021 to be in conformance with State law and consistent with legislative changes related to VMT. The General Plan contains the following goals and policies related to energy:

Resource Conservation and Resiliency Element

Objective RC-2 Promote land uses that conserve resources.

Policy RC-2-a **Link Land Use to Transportation**. Promote mixed-use, higher density infill development in multi-modal corridors. Support land use patterns that make more efficient use of the transportation system and plan future transportation investments in areas of higher-intensity development. Discourage investment in infrastructure that would not meet these criteria.

Policy RC-5-a **Support State Goal to Reduce Statewide GHG Emissions.** As is consistent with State law, strive to meet AB 32 goal to reduce greenhouse gas emissions to 1990 levels by 2020 and strive to meet a reduction of 80 percent below 1990 levels by 2050 as stated in Executive Order S-03-05. As new Statewide GHG reduction targets and dates are set by the State update the City's Greenhouse Gas Reduction Plan to

[44] Fresno Council of Governments (Fresno COG). 2017. Regional Transportation Plan Sustainable Communities Strategy 2022-2046. July.

include a comprehensive strategy to achieve consistency with those targets by the dates established.

Policy RC-5-b **Greenhouse Gas Reduction Plan.** As is consistent with State law, prepare and adopt a Greenhouse Gas Reduction Plan as part of the Master Environmental Impact Report to be concurrently approved with the Fresno General Plan in order to achieve compliance with State mandates, assist development by streamlining the approval process, and focus on feasible actions the City can take to minimize the adverse impacts of growth and development on global climate change. The Greenhouse Gas Reduction Plan shall include, but not be limited to:

- A baseline inventory of all known or reasonably discoverable sources of GHGs that currently exist in the City and sources that existed in 1990.
- A projected inventory of the GHGs that can reasonably be expected to be emitted from those sources in the year 2035 with implementation of this General Plan and foreseeable community-wide and municipal operations.
- A target for the reduction of emissions from those identified sources.
- A list of feasible GHG reduction measures to meet the reduction target, including energy conservation and "green building" requirements in municipal buildings and private development.
- Periodically update municipal and community-wide GHG emissions inventories to determine the efficacy of adopted measures and to guide future policy formulation needed to achieve and maintain GHG emissions reduction targets.

Policy RC-5-c **GHG Reduction through Design and Operations.** Increase efforts to incorporate requirements for GHG emission reductions in land use entitlement decisions, facility design, and operational measures subject to City regulation through the following measures and strategies:

- Promote the expansion of incentive-based programs that involve certification of projects for energy and water efficiency and resiliency. These certification programs and scoring systems may include public agency "Green" and conservation criteria, Energy Star™ certification, CALGreen Tier 1 or Tier 2, Leadership in Energy Efficient Design (LEED®) certification, etc.
- Promote appropriate energy and water conservation standards and facilitate mixed-use projects, new incentives for infill development, and the incorporation of mass transit, bicycle and pedestrian amenities into public and private projects.
- Require energy and water audits and upgrades for water conservation, energy efficiency, and mass transit, pedestrian, and bicycle amenities at the time of renovation, change in use, change in occupancy, and change in ownership for major projects meeting review thresholds specified in an implementing ordinance.
- Incorporate the City's "Guidelines for Ponding Basin/Pond Construction and Management to Control Mosquito Breeding" as conditions of approval for any

project using an on-site stormwater basin to prevent possible increases in vector-borne illnesses associated with global climate change.
- Periodically evaluate the City's facility maintenance practices to determine whether there are additional opportunities to reduce GHGs through facility cleaning and painting, parks maintenance, road maintenance, and utility system maintenance.
- Periodically evaluate standards and mitigation strategies for highly vehicle-dependent land uses and facilities, such as drive-through facilities and auto-oriented development.

Policy RC-5-d **SCS and CAP Conformity Analysis**. Ensure that the City includes analysis of a project's conformity to an adopted regional Sustainable Community Strategy or Alternative Planning Strategy (APS), an adopted Climate Action Plan (CAP), and any other applicable City and regional greenhouse gas reduction strategies in effect at the time of project review.

Policy RC-5-e **Ensure Compliance.** Ensure ongoing compliance with GHG emissions reduction plans and programs by requiring that air quality measures are incorporated into projects' design, conditions of approval, and mitigation measures.

Policy RC-5-f **Toolkit**. Provide residents and project applicants with a "toolkit" of feasible measures that can be used to reduce GHG emissions, including educational materials on energy-efficient and "climate-friendly" products.

Policy RC-6-d **Recycled Water**. Prepare, Adopt, and implement a City of Fresno Recycled Water Master Plan.

Objective RC-7 Promote water conservation through standards, incentives, and capital investments.

Policy RC-7-a **Water Conservation Program Target**. Maintain a comprehensive conservation program to help reduce per capita water usage in the City's water service area to 243 gallons per capita per day (GPCD) by 2020 and 190 GPCD by 2035, by adopting conservation standards and implementing a program of incentives, design and operation standards, and user fees:

- Support programs that result in decreased water demand, such as landscaping standards that require drought-tolerant plants, rebates for water conserving devices and systems, turf replacement, xeriscape landscape for new homes, irrigation controllers, commercial/industrial/institutional water conserving programs, prioritized leak detection program, complete water system audit, landscape water audit and budget program, and retrofit upon resale ordinance.
- Implement the US Bureau of Reclamation Best Management Practices for water consideration as necessary to maintain the City's surface water entitlements.
- Adopt and implement policies in the event that an artificial lake is proposed for development.

- Work cooperatively toward effective uniform water conservation measures that would apply throughout the Planning Area.
- Expand efforts to educate the public about water supply issues and water conservation techniques.

Policy RC-7-b **Water Pricing and Metering**. Develop a tiered water cost structure for both residential and commercial users that will properly price water based on its true cost; require all new development to be metered for water use; and charge all customers the true, full cost of their water supply, including costs of acquisition, initial treatment, conveyance, wastewater treatment, operations, maintenance, and remediation.

Policy RC-7-c **Best Practices for Conservation**. Require all City facilities and all new private development to follow US Bureau of Reclamation Best Management Practices for water conservation, as warranted and appropriate.

Policy RC-7-d **Update Standards for New Development**. Continue to refine water saving and conservation standards for new development.

Policy RC-7-h **Landscape Water Conservation Standards**. Refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance and other State regulations:

- Evaluate and apply, as appropriate, augmented xeriscape, "water wise," and "green gardening" practices to be implemented in public and private landscaping design and maintenance.
- Facilitate implementation of the State's Water Efficient Landscape Ordinance by developing alternative compliance measures that are easy to understand and observe.

Objective RC-8 Reduce the consumption of nonrenewable energy resources by requiring and encouraging conservation measures and the use of alternative energy sources.

Policy RC-8-a **Existing Standards and Programs**. Continue existing beneficial energy conservation programs, including adhering to the California Energy Code in new construction and major renovations.

Policy RC-8-b **Energy Reduction Targets**. Strive to reduce per capita residential electricity use to 1,800 kWh per year and nonresidential electricity use to 2,700 kWh per year per capita by developing and implementing incentives, design and operation standards, promoting alternative energy sources, and cost-effective savings.

Policy RC-8-c **Energy Conservation in New Development**. Consider providing an incentive program for new buildings that exceed California Energy Code requirements by 15 percent.

Policy RC-8-d - **Incentives**. Establish an incentive program for residential developers who commit to building all of their homes to ENERGY STAR performance guidelines.

Policy RC-8-h **Solar Assistance**. Identify and publicize information about financial mechanisms for private solar installations and provide over-the-counter permitting for solar installations meeting specified standards, which may include maximum size (in kV) of units that can be so approved.

Policy RC-8-I **Renewable Target**. Adopt and implement a program to increase the use of renewable energy to meet a given percentage of the City's peak electrical load within a given time frame.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan PEIR contains the following mitigation measures that are applicable to the proposed project.[45]

MM GHG-1.1 Prior to the City's approval of subsequent discretionary projects, the Director of the City Planning and Development Department, or designee, shall confirm that development projects are consistent with the Recirculated GHG Reduction Plan Update (2021) and shall implement all measures deemed applicable to the project through the GHG Reduction Plan Update-Project Consistency Checklist.

Fresno Southeast Development Area Specific Plan

The Fresno Southeast Development Area (SEDA) Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to greenhouse gas emissions:

Urban Form Element

Objective UF-1 Create complete neighborhoods in the Southeast Development Area that integrate housing, business and retail amenities. Implement a Southeast Development Area plan that balances and mixes housing, jobs, commercial businesses, services, and public facilities to help meet existing thresholds for lower vehicle miles traveled, reduced air pollution, and the efficient use of groundwater resources in compliance with the Sustainable Groundwater Management Act of 2014.

Policy UF-1.2 **Jobs-Housing Balance.** Maintain a target jobs-housing balance of at least one job to 1.25 housing units within the Plan Area.

Objective UF-2 Provide a mix of Regional, Community, and Neighborhood Town Centers where individuals can live, work and play.

[45] City of Fresno. 2020. Fresno General Plan Final Program Environmental Impact Report. March.

Policy UF-2.1 **Network of Town Centers.** The SEDA will include Mixed-Use Districts of Regional, Community and Neighborhood Town Centers that form a network of complementary employment, commercial, cultural and civic opportunities linked by multimodal transportation systems.

Objective UF-5 Provide a well-balanced transportation network accessible to all users.

Policy UF-5.2 **Transit Service.** Safe, convenient and frequent transit service will be provided to and within the SEDA via regional transit connections along Kings Canyon Boulevard alignment and potentially, along existing rail right-of-ways. Local service will be provided along primary internal circulation corridors, including Arterials and Collectors.

a) **Regional Transit Planning.** Thoughtful transit planning must occur in order to incorporate the primary centers, particularly the Regional Town Center along Kings Canyon. A Bus Rapid Transit (BRT) extension study including planning, design and environmental analysis should be completed to evaluate the potential costs and benefits of extending the BRT to the SEDA Plan Area.
b) **Station Location.** The location of transit stations and stops will better serve local community members if they are placed within or adjacent to major activity centers, schools, medical facilities, public places such as libraries, parks, senior centers, and recreation facilities, commercial uses and high-density residential and employment areas.
c) **Station Connectivity and Accessibility.** To provide opportunities for the highest possible transit use, stations will feature a convenient and accessible path of travel and will include pedestrian and bicycle connections to the surrounding street network and transit transfer points. Bus stops and stations will be oriented toward major streets and public spaces, with primary commercial entrances opening directly toward bus stops. Important to ensuring all members within the SEDA community have access to transit opportunities, bus stops and stations will comply with the accessibility requirements of the Americans with Disabilities Act (ADA).

Policy UF-5.3 **Bicycle and Pedestrian Travel.** Promoting a network of pedestrian and bicycle routes, including dedicated trails, multi-purpose paths, and priority Bicycle Boulevards throughout the Plan Area will serve work, school, and recreational trips and provide options for healthier outcomes within the community. In addition, both existing and proposed regional trails will be coordinated in tandem within this walkable and bikeable network. The Fresno General Plan Figure MT-2: Paths and Trails and the Active Transportation Plan (ATP) identify active trails.

Policy UF-5.4 **Safe Streets.** Streets are designed for drivers, pedestrians, bicyclists, and transit users within the Southeast Fresno Development Area and will enhance safety within the community. SEDA street design will reflect best practice standards as included in the City of Fresno Complete Streets Policy, adopted by the City in 2019.

Policy UF-5.5 **Ranking of Travel Modes.** In order to create a cohesive network between all modes of travel within the SEDA, the Plan will prioritize the following travel modes:

1. Pedestrian
2. Bicycle
3. High-capacity transit
4. Automobile

Policy UF-5.6 **Performance Standards & Evaluation.** Transit will be provided as demand warrants. Upon Plan, buildout or when warranted, 10-minute peak-period headways will be provided along the BRT corridor (e.g., Kings Canyon), and 15-minute peak-period headways shall be provided for high-priority transit routes (e.g., De Wolf, Clovis).

In addition, all other transit routes in the planning area shall be operated at 30-minute headways upon Plan completion. Extended hour or late-night service shall be provided at 60-minute headways.

- Bus stop locations are generally placed at ¼ mile spacing. Bus stop placement will be prioritized at:
  - Schools and medical facilities
  - Libraries, parks, senior centers, and recreation facilities
  - Concentrated commercial areas
  - Concentrated residential and employment areas

1. **Bicycles:** A user-friendly bicycle network will be provided to welcome all riders throughout the entire Plan Area. Bicycle lanes including Class II and Class IV facilities should be provided on all Super Arterials, Arterials, and Local Streets. A Bicycle network should be designated on Neighborhood or Local Streets. Ensuring the safety of vulnerable users will be an important priority, as the Plan will seek to create a network of easy to use, lower stress amenities that provide the ability to connect riders to key destinations throughout the City, as descripted in the Fresno Active Transportation Plan (2017).

2. **Pedestrians:** A first-class pedestrian system shall be provided, including sidewalks on all streets, bicycle/pedestrian trails, and other design elements that prioritize safety and convenience for pedestrians, as described in the Fresno Active Transportation Plan (2017).

3. **Vehicles:** A highly connected, grid-based roadway system shall be provided for efficient vehicular travel. Please see the Streets and Circulation Standards in the Development Code and the City of Fresno's Department of Public Works Standard Drawings.

Housing Element

Objective HC-3 Link housing and transportation together to limit family expenditures on both housing and transportation. The multimodal transportation network connects housing and jobs within the Southeast Development Area and to other major regional centers, facilitating internal travel by non-automobile means. The Urban Form Chapter addresses the location, distribution, and standards for transportation infrastructure investment, combining transportation options with land use development to ultimately lower travel costs for SEDA residents and employees.

Policy HC-3.2 **Travel.** Encourage accessible, mixed-use development that incorporates housing and jobs, while lowering daily vehicle miles traveled.

Policy HC-3.3 **Smart Land Uses.** Build smaller lot single-family and multifamily housing types which use less energy and water than larger units.

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.5 **Renewable Energy Generation**. Support renewable energy technology systems in open spaces, where appropriate.

a) Pursue arrangements with public agencies and private partners to accommodate renewable energy systems, such as solar arrays, in areas that can serve a joint use as passive open space.

Objective OS-6 Ensure that all park, trail, and recreational facilities make the most efficient use of energy, water, and other natural resources**.**

Policy OS-6.1 **Green Building.** As important civic structures, park buildings shall conform to green building standards for energy and water efficiency.

Policy OS-6.3 **Renewable Energy Systems.** Explore developing renewable energy systems to provide power to park facilities.

Objective OS-10 Civic facilities, such as libraries, community centers, senior centers, post offices, and other civic buildings, will be integrated into the urban fabric of centers and communities, and will be well-served by public transit, paths, and trails.

Policy OS-10.5 **On-Site Renewable Energy Generation.** Pursue opportunities to develop renewable energy systems for civic facilities.

Conservation Element

Objective RC-1 Meet Statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.1 **Land Use Strategies.** Link land use and transportation by incorporating the following components into SEDA's land use plan:

a) Compact Development. Maximize opportunities in the SEDA for compact, higher density development to provide more housing, conserve resources, and reduce travel distances.
b) Design the Neighborhood, Community, and Regional Town Centers in the SEDA as Mixed-Use Districts that include ground floor retail, civic and other commercial uses and upper floors of office and residential uses. Locate mixed-use development along high-quality transit corridors such as the Ventura/Kings Canyon Corridor that will serve SEDA's Regional Town Center. Incentivize developments that are mixed use, defined as pedestrian-friendly development that blends two or more residential, commercial, cultural or institutional uses, one of which must be residential.
c) Pedestrian-Oriented Development. Providing pedestrian-friendly infrastructure such as sidewalks, paths, and direct connections to neighboring uses such as shopping, schools, libraries, and parks increases the potential for people to make trips on foot, bicycle, or transit instead of by car. New development should include all sidewalks, paths, trails, and facilities required by the General Plan, the Active Transportation Plan and the SEDA.
d) Incentives for Pedestrian-Oriented Anchor Retail. Consider adopting and implementing incentives for new pedestrian-friendly anchor retail to be applied within the SEDA's Regional, Community, and Neighborhood Town Centers.
e) Complete Streets. Ensure that all streets in the SEDA comply with the City's Complete Streets Policy.
f) Transit Oriented Development. Design land uses and integrate development site plans along high-quality transit corridors such as the Ventura/Kings Canyon Corridor, with transit oriented development that supports transit ridership and convenient pedestrian access to bus stops and station stops.

Policy RC-1.2 **Transportation Facilities Strategies.** Provide the following interconnected transportation facilities to encourage use of alternative modes of transportation and reduce vehicle trips:

a) **Transit Facilities.** Ensure adequate transit routes and facilities are provided in the SEDA through coordination between the Planning and Development and FAX Departments. Planned facilities should include bus stops, multimodal transfer centers and information kiosks.
b) **Pedestrian and Bicycle Infrastructure.** Ensure the SEDA is well-served by pedestrian and bicycle infrastructure, including sidewalks, bicycle lanes, bicycle

paths and trails, and safe crossing infrastructure pursuant to the Active Transportation Plan.

c) **Traffic Calming Measures**. Design features and strategies to reduce vehicle speeds and reduce conflicts with pedestrians to encourage more walking. Slower speeds encouraged by traffic calming can also improve safety and increase bicycling. Where appropriate, provide on-street parking, or street trees and landscaping to separate vehicles from pedestrians to improve walkability.

Policy RC-1.3 **Transportation Demand Strategies.** Transportation Demand Strategies focus on commute trips and provide both incentives for using alternative modes of transportation and disincentives for use of the gas powered single-occupant vehicles. Examples include Transportation Demand Management (TDM) programs, parking strategies, and electric vehicle charging stations. The following strategies should be considered for implementation in the SEDA:

a) Support the San Joaquin Valley Air Pollution Control District's Rule 9410 by encouraging a Transportation Demand Management (TDM) Plan prior to issuance of certificates of occupancy at employer sites with 100 or more employees. TDM programs include making physical improvements to work sites, such as adding showers and lockers to encourage biking to work, free transit passes, carpool services, and preferential parking.
b) Consider requiring employers with 50 or more employees to implement TDM programs in the SEDA.
c) The City of Fresno and the San Joaquin Valley Air District should jointly fund a TDM Coordinator that would assist large employers in Fresno to develop and maintain TDM programs. This position would also support the creation of maintenance of these programs in the SEDA.
d) Develop a trip reduction parking strategy in the SEDA that would encourage the use of alternative transportation modes. Such a program might include parking pricing at worksites, paid parking structures, and limited parking requirements.
e) Develop minimum requirements for electric vehicle charging stations to be installed at worksites over a given size (50-100 employees).

Policy RC-1.4 **Energy Conservation Strategies.** Although new residential development now must meet zero-net-energy requirements, there is still a need to conserve energy to reduce GHG emissions. Energy use in buildings is the second largest generator of GHG emissions after transportation. The following policies will help accomplish needed GHG reductions:

a) Consider developing an incentive program in SEDA for new buildings that exceed the California Energy Code requirements by 15 percent.
b) Encourage and reward compliance with voluntary energy conservation certification programs such LEED®, EnergyStar, or Greenpoint Rating systems.

c) Promote compliance with State law mandating disclosure of a building's energy data and rating of the previous year to prospective buyers and lessees of the entire building or lenders financing the entire building.
d) Partner with PG&E or other organization to offer a home energy retrofit program to existing homeowners in the SEDA. Ensure that solar retrofits are made available to existing homeowners.

Policy RC-1.5 **Waste Diversion, Recycling, and Energy Recovery.** Establishing programs and actions that promote recycling and diversion of waste from landfills can reduce energy consumed in the transport and handling of waste material and can reduce the greenhouse gases that are emitted during the decomposition of organic waste.

The State of California has adopted increasingly stringent mandates for the percentage of solid waste that can be disposed in landfills. In addition, certain landfills have been mandated to install methane capture systems to result in greenhouse gas reductions from these sources. The effects of methane are powerful – as it is 21 times more effective than carbon dioxide in retaining heat in the atmosphere. Methane can be flared, producing mainly carbon dioxide or used in combustion devices to generate heat or power that can be used for productive purposes displacing the use of fossil fuels. The following policies are recommended in the SEDA to reduce GHGs and conserve energy:

1. Maintain current targets for recycling and re-use of all types of waste material in the City and enhance waste and wastewater management practices to reduce natural resource consumption, including the following measures:
   a) Continue to require recyclable material collection and storage areas in all residential development.
   b) Establish recycling collection and storage area standards for commercial and industrial facilities to size the recycling areas according to the anticipated types and amounts of recyclable material generated.
   c) Provide educational materials to residents on how and what to recycle and how to dispose of hazardous waste.
   d) Provide recycling canisters and collection in public areas where trash cans are also provided.
   e) Institute a program to evaluate major waste generators and identify recycling opportunities for their facilities and operations.
   f) Continue to partner with the California Integrated Waste Management Board on waste diversion and recycling programs and the CalMax (California Materials Exchange) program.
   g) Evaluate the feasibility of a residential, restaurant and institutional food waste segregation and recycling program, to reduce the amount of organic material sent to landfill and minimize the emissions generated by decomposing organic material.

h) Evaluate the feasibility of "carbon footprinting" for the City's wastewater treatment facilities, biomass and composting operations, solid waste collection and recycling programs.
i) Expand yard waste collection to divert compostable waste from landfills.
j) Study the feasibility and cost-benefit analysis of a municipal composting program to collect and compost food and yard waste, including institutional food and yard waste, using the resulting compost matter for City park and median maintenance.

2. Create a strategic and operations plan for fulfilling the City Council Resolution committing the City of Fresno to a Zero Waste goal.
3. Continue to pursue opportunities to reduce air pollution by using methane gas from the old City landfill and the City's wastewater treatment process.

Policy RC-1.6 **Municipal Facilities.** SEDA will include a range of municipal facilities from streetlights to parks and open spaces to community centers and police and fire facilities will be constructed. It is important to include greenhouse gas reductions and energy conservation at City facilities, over which the City has direct control and can allocate resources for this purpose. In addition, implementing these measures at City facilities also establishes the City as a leader in GHG reduction and conservation, which is important as it implements these measures on a citywide basis. The following potential citywide actions that can be initiated within the SEDA as opportunity allows:

a) Improve energy efficiency in City operations.
b) Exceed Title 24 Energy Efficiency Standards for new City buildings.
c) Install renewable energy systems on City facilities.
d) Implement City operated Transportation Demand Management for City employees.
e) Purchase green vehicles for City fleets.
f) Enhance reduction, reuse, and recycling efforts at City facilities.
g) Implement water efficient landscaping in City parks and facilities.
h) Establish a green purchasing program.

Policy RC-1.7 **Urban Forestry Program.** Encouraging the integration and protection of new and existing mature trees within our communities can lead to significant reductions in the urban heat island effect and energy required for cooling. As another significant benefit, trees also store harmful carbon as they grow, in a process known as sequestration. As these trees continue to grow, mature and sequester carbon, it is also important for urban forestry projects to consider potential tree emissions that result from the maintenance and ultimate disposition of trees to ensure a net decrease in greenhouse gas emissions occurs.

Maintaining trees, vegetation and plants throughout City parks is important to the success and longevity of these publicly owned spaces. In addition, these areas

provide opportunities for new tree planting and replacement of tree species that possess a low potential to store carbon, with tree species that possess higher carbon storage potential. To better understand how to achieve these opportunities, there are many tools that communities can utilize. The Climate Action Reserve, Urban Forest Project Reporting Protocol (CAR 2019) provides criteria for generating greenhouse gas emission offsets with tree planting along with procedures for project monitoring.

Development of the SEDA will present many opportunities for the strategic planting of trees with high carbon storage potential, as noted below:

a) Develop a tree palette for the SEDA that reinforces its sense of place, reflects native species, and includes tree species with high carbon storage potential.
b) Meet parks shading targets noted in the Parks Master Plan.
c) Plant shade trees to delineate corridors and the boundaries of urban areas, and to provide tree canopy for bike lanes, sidewalks, parking lots, and trails.

City of Fresno Greenhouse Gas Reduction Plan (2021)

The City of Fresno adopted its first GHG Reduction Plan (GHG Plan) in December 2014. The GHG Plan established a target of reducing per capita GHG emissions in the City by 21.7 percent below 2020 BAU levels by 2020 and includes GHG reduction measures designed to achieve the reduction target. The GHG Plan is considered a "Qualified Plan," according to CEQA Guidelines §15183.5.2. The City of Fresno updated its 2014 Greenhouse Gas Reduction Plan in 2021[46] to conform with State climate change policies and regulations, including SB 32 and the 2017 Climate Change Scoping Plan. The GHG Plan Update outlines strategies that the City will undertake to achieve its proportional share of GHG emission reductions. The plan includes a Consistency Checklist to help provide a streamlined review process for new development projects that are subject to discretionary review pursuant to CEQA Guidelines Section 15183.5.

3.8.4 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist to determine whether greenhouse emissions impacts are significant environmental effects. The project would have a significant impact on the environment if it would:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment.

b) Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.

The vast majority of individual projects do not generate sufficient GHG emissions to create a project-specific impact through a direct influence to climate change; therefore, the issue of climate change typically involves an analysis of whether a project's contribution toward an impact is cumulatively

[46] City of Fresno. 2021. Fresno Greenhouse Gas (GHG) Reduction Plan Update. March.

considerable. As defined in the CEQA Guidelines, Section 15355, "cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects. For future projects, the significance of GHG emissions may be evaluated based on locally adopted quantitative thresholds, or consistency with a regional GHG Reduction Plan (such as a Climate Action Plan [CAP]).

As previously mentioned, CEQA Guidelines Section 15183.5(b) allows projects and plans to be analyzed through a streamlined or tiered approach utilizing an adopted GHG Reduction Plan. According to CEQA Guidelines Section 15183.5(b), for a GHG Reduction Plan to be considered a "qualified" reduction strategy capable of being utilized for a streamlined or tiered analysis under CEQA, it must complete the following requirements:[47]

- Quantify GHG emissions, both existing and projected over a specified time period, resulting from activities within a defined geographic area;
- Establish a level, based on substantial evidence, below which the contribution to GHG emissions from activities covered by the plan would not be cumulatively considerable;
- Identify and analyze the GHG emissions resulting from specific actions or categories of actions anticipated within the geographic area;
- Specify measures or a group of measures, including performance standards, that substantial evidence demonstrates, if implemented on a project-by-project basis, would collectively achieve the specified emissions level;
- Establish a mechanism to monitor the plan's progress toward achieving the level and to require amendments if the plan is not achieving specified levels; and
- Be adopted in a public process following environmental review.

The City of Fresno developed its first GHG Plan in 2014 and adopted an updated GHG Plan (the GHG Plan Update) on September 30, 2021, pursuant to a certified General Plan Program EIR (State Clearinghouse Number 2019050005). The GHG Plan Update was developed by the City to ensure conformity with the mandates of California Supreme Court in the Newhall Ranch case and the State of California's latest GHG regulations. The GHG Plan Update re-evaluates the City's GHG reduction targets and reduction strategies from the 2014 GHG Plan. The City's GHG inventory, based on the most recent data available for the year 2016, is evaluated and the future growth in emissions for the BAU and adjusted BAU scenarios (the adjusted BAU scenario takes into account the State policies) for the years 2020, 2030, and 2035 are projected. The 2020 and 2030 forecast years are consistent with the goals identified in AB 32 and SB 32, which identify Statewide GHG reduction targets by 2020 and 2030. The 2035 forecast year corresponds to the City's General Plan horizon year and will allow the City to develop long-term strategies to continue GHG reductions.

As discussed in the GHG Plan Update,[48] GHG emissions are quantified for both existing and projected conditions over a specified time and those emissions quantified are specific to the City of Fresno

[47] Association of Environmental Professionals (AEP). 2022. 2022 CEQA California Environmental Quality Act Statute and Guidelines.
[48] City of Fresno. 2020. Appendix G Greenhouse Gas Reduction Plan Update. March.

with and without incorporation of identified reduction measures and strategies in the GHG Plan Update. The GHG Plan Update establishes reduction goals consistent with the legislative reduction targets contained in AB 32 and SB 32 as the foundation for determining what would constitute cumulatively considerable GHG contributions to global climate change. Chapter 7 of the GHG Plan Update establishes a monitoring and tracking program that requires that annual reporting taking place. As discussed, the GHG Plan Update was adopted along with the City's Recirculated Draft General Plan EIR in 2021, thereby acting as the public environmental review for the GHG Plan Update. Therefore, the GHG Plan Update is considered a "qualified" GHG reduction strategy as defined by CEQA Guidelines Section 15183.5(b).

As a qualified GHG reduction strategy, the GHG Plan Update enables streamlined environmental review of future development projects and plans. Therefore, consistent with CEQA Guidelines Section 15183.5(b)(2), the proposed project is evaluated in comparison to the City's GHG Plan Update to determine GHG impact significance.

3.8.5 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the project and provides mitigation measures where necessary.

Greenhouse Gas Emissions

Impact GHG-1:	**The proposed project would generate direct and indirect greenhouse gas emissions, and these emissions would result in a significant impact on the environment.**
Impact GHG-2:	**The proposed project would conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of greenhouse gases.**

Impact Analysis

The proposed project's GHG emissions impact determination is based on the extent to which the project complies with regulations or requirements adopted to implement a Statewide, regional, or local plan for the reduction or mitigation of GHG emissions. Implementation of the proposed project would contribute to global climate change through direct emissions of GHG from on-site area sources and vehicle trips generated by the proposed project, and indirectly through off-site energy production required for on-site activities, water use, and waste disposal.

As discussed earlier, the City of Fresno has developed a GHG Reduction Plan that meets the description of mitigation found in CEQA Guidelines Section 15130(a)(3) and Section 15183.5 and allows for streamlined CEQA compliance for new development projects. The GHG Reduction Plan Update was developed consistent with AB 32, SB 32, and Executive Order S-3-05, and supports State and international efforts to stabilize climate change. The GHG Plan Update provides strategies and guidelines for the reduction of GHG emissions in accordance with CEQA Guidelines Section 15183.5. A GHG Reduction Plan Consistency Checklist (Checklist) is presented to provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to CEQA.

Per the Checklist, the first step in analyzing a project's consistency with the GHG Reduction Plan is to determine the proposed project's consistency with the land use assumptions in the GHG Reduction Plan. As the proposed Specific Plan would change the land use designation of various properties, the proposed project would not be consistent with the approved General Plan, and the growth envisioned as a part of the proposed project was not accounted for in the inventories and reduction strategies included in the GHG Plan Update. Since the proposed project is not consistent with the approved planned land use and zoning designations, the Checklist calls for a disclosure of the estimated GHG project emissions under both the existing and proposed designations for comparison. The Checklist recommends that the maximum buildout of the existing designation be compared with the maximum buildout of the proposed designation. It should be noted that the proposed Plan Area is not currently included in the City limits, and the proposed project includes a General Plan amendment and the incorporation of the Plan Area, which is currently County of Fresno land, into the City boundaries.

Estimated GHG emissions attributable to future development would be primarily associated with increases of CO_2 and other GHG pollutants, such as methane (CH_4) and N_2O, from mobile sources and utility usage. The short-term construction-related and long-term operational GHG emissions associated with future buildout of the Plan Area allowed under the proposed Specific Plan were estimated using California Emissions Estimator Model (CalEEMod) Version 2020.4.0. CalEEMod is a Statewide model designed to provide a uniform platform for government agencies, land use planners, and environmental professionals to quantify GHG emissions from land use projects. The model quantifies direct GHG emissions from construction and operation (including vehicle use), as well as indirect GHG emissions, such as GHG emissions from electricity use, solid waste disposal, vegetation planting and/or removal, and water use. Emissions are expressed in annual metric tons of CO_2 equivalent units of measure (i.e., MT CO_2e), based on the GWP of the individual pollutants.

Construction

Construction activities associated with future development under the proposed project would generate temporary short-term GHG emissions from heavy-duty construction equipment, worker trips, and material delivery and hauling. On-site activities would consist of the operation of off-road construction equipment as well as on-site truck travel (e.g., haul trucks, dump trucks, and concrete trucks). Off-site sources would include emissions from construction vehicles used for hauling materials and worker vehicle trips.

Estimated unmitigated GHG emissions associated with construction of the proposed project were estimated and are summarized in Table 3.8-2 for informational purposes. These emissions include all worker vehicle, vendor vehicle, hauler vehicle, and off-road construction vehicle GHG emissions. For the purposes of this analysis, based on the anticipated buildout year, future development facilitated by the proposed project is assumed to commence construction in 2024 and continue construction over an approximately 25-year buildout schedule. This schedule is an approximation and may change over time. A regularized construction schedule was utilized for modeling purposes for the sake of simplicity.

Table 3.8-2: Construction Greenhouse Gas Emissions

Construction Year	Emissions (MT CO_2e)
Construction 2024	155,615
Construction 2025	141,996
Construction 2026	133,150
Construction 2027	129,805
Construction 2028	126,230
Construction 2029	123,855
Construction 2030	121,323
Construction 2031	119,041
Construction 2032	117,479
Construction 2033	114,823
Construction 2034	113,256
Construction 2035	112,307
Construction 2036	112,737
Construction 2037	112,307
Construction 2038	112,307
Construction 2039	111,877
Construction 2040	107,665
Construction 2041	107,665
Construction 2042	107,665
Construction 2043	35,476
Total[1]	**2,316,578**

Notes:
MT CO_2e = metric tons of carbon dioxide equivalent
[1] Figures may not appear to add exactly due to rounding.
Source: CalEEMod Output (see Appendix B).

Future development under the proposed project would comply with the requirements of the City's General Plan policies and programs related to GHG emissions as well as applicable Valley Air District regulations. Short-term construction GHG emissions are a one-time release of GHGs and are not expected to significantly contribute to global climate change. Additionally, the implementation of the mitigation measures presented in Section 3.3, Air Quality, of this Draft PEIR would further reduce the overall annual GHG emissions associated with the proposed project. For instance, MM AIR-1b would require the use of "super compliant" architectural coatings during construction to reduce the generation of VOC emissions, which are also GHGs with low GWP. Therefore, future development under the proposed project at construction would not result in significant adverse effects related to

GHG emissions. As such, the construction of proposed project would result in a less than significant impact relative to this topic.

Operation

Operational or long-term emissions occur over the life of the project. Sources of emissions may include motor vehicles and trucks, energy usage, water usage, waste generation, and area sources, such as landscaping activities. As shown in Table 3.8-3, operation of the proposed project would result in a net increase of GHG emissions by 510,791 MT CO_2e per year compared to the existing conditions in the project area.

Table 3.8-3: Operational GHG Emissions at Project Buildout

Source Category	Emissions with Proposed Project Buildout (MT CO_2e)
Area Sources	18,945
Energy Usage	111,179
Transportation	432,219
Solid Waste	25,336
Water and Wastewater	14,233
Annual Total[1]	**601,912**
Existing Land Use Emissions	91,121
NET Total Annual Emissions	**510,791**

Notes:
MT CO_2e = metric tons of carbon dioxide equivalent
[1] Figures may not appear to add exactly due to rounding.
Source: CalEEMod Output (see Appendix B).

While implementation of the proposed project would generate a substantive increase in GHG emissions, its guiding principles, design guidelines, and proposed land use designations for the Plan Area would contribute to minimizing emissions to the extent feasible. Guiding principles and objectives of the proposed project include providing for a balanced mix of uses, boosting the economy, and promoting sustainable development. Additionally, objectives of the proposed project include encouraging a balanced mix of uses and promoting development that reduces VMT and encourages active transportation. Applicable General Plan policies, which are listed in greater detail below, support the installation of electric infrastructure to support electric vehicles at residential, commercial, and industrial land uses. Future developments consistent with the proposed project would be subject to State regulations that will reduce emissions from project construction and operation, including Title 24 and CALGreen standards and the California Code of Regulations, which the City has adopted.

An increase in population and employment would contribute to an increase in wastewater generation, water demand, and vehicle trips. New buildings would be more energy efficient, but there would be an overall increase in energy usage due to the magnitude of new building space that

would be constructed. As previously discussed, the City's GHG Plan Update includes a Checklist to assess a future development project's consistency with the City's GHG reduction strategy. The Checklist states that,

> If the estimated project emission at maximum buildout of the proposed designation(s) is **greater than** the estimated project emissions at maximum buildout of the existing designation(s), then in accordance with the City's Significance Determination Thresholds, the project's GHG impact is significant.
>
> The project must either show consistency with applicable GP objectives and policies…or provide analysis and measures to incorporate into the project to bring the GHG emissions to a level that is less than or equal to the estimated project emission at maximum buildout of the existing designation(s) unless the decision-maker finds that a measure is infeasible in accordance with CEQA Guidelines Section 15091. If there is a proposed development project associated with this plan amendment and or rezone then complete the GHG Plan Update Consistency Checklist and incorporate applicable measures, otherwise there is no further step required.

Per the GHG Plan Update guidance above, the environmental impact of the proposed project related to GHG emissions is significant, because the estimated emissions of the proposed project are significantly greater than the emissions of the existing land use designations in the Plan Area. As a result, the proposed project is not consistent with the GHG Plan Update, and the proposed project's contribution to environmental impacts related to GHG emissions are significant.

In accordance with the GHG Plan Update Checklist, the next step in the impact analysis is to either show consistency with the General Plan objectives and policies, or to provide analysis and measures to reduce the GHG emissions of the project to a level that is less than or equal to the estimated emissions at maximum buildout of the existing designations. There are no mitigation measures feasible that would sufficiently reduce the emissions from the proposed project to levels less than or equal to the existing land uses in the Plan Area, due to the intensity of the emissions that would occur from development projects envisioned as a part of the proposed project. Therefore, the proposed project is analyzed for consistency with the General Plan policies and objectives in the following section.

Consistency with City of Fresno General Plan

The General Plan includes objectives and policies designed to reduce GHG emissions throughout the City. As discussed above, the General Plan includes a GHG Plan Update that provides the City's primary strategy for reducing GHG emissions. The intent of the GHG Plan Update is to achieve compliance with State GHG reduction mandates by focusing on feasible actions the City can take to minimize the adverse impacts of growth and development on climate change. The GHG Plan Update does not create an entirely new, separate strategy; rather, it builds on the policies and implementation measures contained in the City's General Plan. Where needed, the GHG Plan Update provides more details to clarify and focus action and to ensure implementation. The General Plan

contains the following policies related to GHG emissions reduction that are applicable to the proposed project.[49]

Objective

RC-5 In cooperation with other jurisdictions and agencies in the San Joaquin Valley Air Basin, take timely, necessary, and the most cost-effective actions to achieve and maintain reductions in greenhouse gas emissions and all strategies that reduce the causes of climate change in order to limit and prevent the related potential detrimental effects upon public health and welfare of present and future residents of the Fresno community.

Implementing Policies

RC-5-a **Support State Goal to Reduce Statewide GHG Emissions.** As is consistent with State law, strive to meet AB 32 goal to reduce greenhouse gas emissions to 1990 levels by 2020 and strive to meet a reduction of 80 percent below 1990 levels by 2050 as stated in Executive Order S-03-05. As new Statewide GHG reduction targets and dates are set by the State update the City's Greenhouse Gas Reduction Plan to include a comprehensive strategy to achieve consistency with those targets by the dates established.

RC-5-b **Greenhouse Gas Reduction Plan.** As is consistent with State law, prepare and adopt a Greenhouse Gas Reduction Plan as part of the Master Environmental Impact Report to be concurrently approved with the Fresno General Plan in order to achieve compliance with State mandates, assist development by streamlining the approval process, and focus on feasible actions the City can take to minimize the adverse impacts of growth and development on global climate change. The Greenhouse Gas Reduction Plan shall include, but not be limited to:

- A baseline inventory of all known or reasonably discoverable sources of GHGs that currently exist in the City and sources that existed in 1990.
- A projected inventory of the GHGs that can reasonably be expected to be emitted from those sources in the year 2035 with implementation of this General Plan and foreseeable community-wide and municipal operations.
- A target for the reduction of emissions from those identified sources.
- A list of feasible GHG reduction measures to meet the reduction target, including energy conservation and "green building" requirements in municipal buildings and private development.
- Periodically update municipal and community-wide GHG emissions inventories to determine the efficacy of adopted measures and to guide future policy formulation needed to achieve and maintain GHG emissions reduction targets.

RC-5-c **GHG Reduction through Design and Operations.** Increase efforts to incorporate requirements for GHG emission reductions in land use entitlement decisions, facility

[49] City of Fresno (City). 2014. Fresno General Plan. December.

design, and operational measures subject to City regulation through the following measures and strategies:

a) Promote the expansion of incentive-based programs that involve certification of projects for energy and water efficiency and resiliency. These certification programs and scoring systems may include public agency "Green" and conservation criteria, Energy Star™ certification, CALGreen Tier 1 or Tier 2, Leadership in Energy Efficient Design (LEED®) certification, etc.
b) Promote appropriate energy and water conservation standards and facilitate mixed-use projects, new incentives for infill development, and the incorporation of mass transit, bicycle and pedestrian amenities into public and private projects.
c) Require energy and water audits and upgrades for water conservation, energy efficiency, and mass transit, pedestrian, and bicycle amenities at the time of renovation, change in use, change in occupancy, and change in ownership for major projects meeting review thresholds specified in an implementing ordinance.
d) Incorporate the City's "Guidelines for Ponding Basin/Pond Construction and Management to Control Mosquito Breeding" as conditions of approval for any project using an on-site stormwater basin to prevent possible increases in vector-borne illnesses associated with global climate change.
e) Periodically evaluate the City's facility maintenance practices to determine whether there are additional opportunities to reduce GHGs through facility cleaning and painting, parks maintenance, road maintenance, and utility system maintenance.
f) Periodically evaluate standards and mitigation strategies for highly vehicle-dependent land uses and facilities, such as drive-through facilities and auto-oriented development.

RC-5-d **SCS and CAP Conformity Analysis.** Ensure that the City includes analysis of a project's conformity to an adopted regional Sustainable Community Strategy or Alternative Planning Strategy (APS), an adopted Climate Action Plan (CAP), and any other applicable City and regional greenhouse gas reduction strategies in effect at the time of project review.

RC-5-e **Ensure Compliance.** Ensure ongoing compliance with GHG emissions reduction plans and programs by requiring that air quality measures are incorporated into projects' design, conditions of approval, and mitigation measures.

RC-5-f **Toolkit.** Provide residents and project applicants with a "toolkit" of generally feasible measures that can be used to reduce GHG emissions, including educational materials on energy efficient and "climate friendly" products.

RC-5-g **Evaluate Impacts with Models.** Continue to use computer models such as those used by SJVAPCD [Valley Air District] to evaluate greenhouse gas impacts of plans and projects that require such review.

As detailed in the Regulatory Framework section, the proposed Specific Plan includes numerous policies related to reducing GHG emissions associated with development in the Plan Area. Policy RC-1.1, Land Use Strategies, would support compact, mixed-use development that is pedestrian-oriented and located in high-quality transit corridors. Policy RC-1.2 and Policy RC-1.3 further outline the Fresno SEDA Specific Plan focus on transit oriented development, as well as TDM strategies. Several policies promote exceeding Title 24 requirements through encouraging compliance with voluntary energy conservation certification programs, such as LEED® and EnergyStar, and Policy RC-1.6 states that City buildings in the Plan Area will exceed Title 24 Energy Efficiency Standards, along with purchasing green vehicles for City fleets, and supporting water conservation and waste reduction efforts throughout the Plan Area. These proposed Specific Plan policies are consistent with, and support the goals and objectives of, the City's General Plan and GHG Plan Update related to GHG emissions reductions. Additionally, Mitigation Measure GHG-1.1, as included in the General Plan PEIR, requires that:

> Prior to the City's approval of subsequent discretionary projects, the Director of the City Planning and Development Department, or designee, shall confirm that development projects are consistent with the Recirculated GHG Reduction Plan Update (2021) and shall implement all measures deemed applicable to the project through the GHG Reduction Plan Update-Project Consistency Checklist.

Compliance with this General Plan PEIR mitigation measure will ensure that development projects consistent with the proposed project implement GHG reduction measures that support the General Plan goals and the objectives of the GHG Plan Update.

As illustrated above, the proposed project is consistent with the goals and objectives of the General Plan. The proposed project's consistency with State policies and programs, as well as the Fresno COG SCS, is discussed in the following sections.

Consistency with California's Post-2020 Targets

The ARB Scoping Plan is applicable to State agencies but is not directly applicable to cities/counties and individual projects (i.e., the Scoping Plan does not require the City to adopt policies, programs, or regulations to reduce GHG emissions). However, new regulations adopted by the State agencies outlined in the Scoping Plan result in GHG emissions reductions at the local level. As a result, local jurisdictions benefit from reductions in transportation emissions rates, increases in water efficiency in the building and landscape codes, and other Statewide actions that affect a local jurisdiction's emissions inventory from the top down. Statewide strategies to reduce GHG emissions include the LCFS and changes in the Corporate Average Fuel Economy Standards (e.g., Pavley I and Pavley California Advanced Clean Cars program).

Development projects accommodated under the proposed project are required to adhere to the programs and regulations identified by the Scoping Plan and implemented by State, regional, and

local agencies to achieve the Statewide GHG reduction goals of AB 32. These future individual development projects would comply with these Statewide GHG emissions reduction measures. For example, new buildings under the proposed project would meet the current CALGreen and Building Energy Efficiency standards, and future developments in the Plan Area would be encouraged to exceed these standards through the implementation of Specific Plan policies. Therefore, the proposed project would not obstruct implementation of the ARB Scoping Plan.

The State's executive branch adopted several Executive Orders related to GHG emissions. Executive Orders S-3-05 and B-30-15 are two examples. Executive Order S-3-05 sets goals to reduce emissions to 1990 levels by 2020 and 80 percent below 1990 levels by 2050. The goal of Executive Order S-3-05 to reduce GHG emissions to 1990 levels by 2020 was codified by AB 32. The project, as analyzed above, is consistent with AB 32. Therefore, the project does not conflict with this component of Executive Order S-3-05. Executive Order B-30-15 establishes an interim goal to reduce GHG emissions to 40 percent below 1990 levels by 2030.

The 2030 goal was codified under SB 32 and is now addressed by the 2022 Scoping Plan. The new plan provides a strategy that is capable of reaching the SB 32 target if the measures included in the plan are implemented and achieve reductions within the ranges expected. Under the 2022 Scoping Plan, local government plays a supporting role through its land use authority and control over local transportation infrastructure. The Plan Update includes reductions from implementation of SB 375 that applies to VMT from passenger vehicles. Fresno County targets for SB 375 are a 5 percent per capita reduction by 2020 and a 10 percent per capita reduction by 2035 relative to 2005 levels. (SB 375 is implemented with the Fresno COG RTP/SCS). The RTP/SCS envisions an increase in development density that would encourage fewer and shorter trips and more trips by transit, walking, and bicycling in amounts sufficient to achieve the SB 375 targets. The strategies included in the proposed Fresno SEDA Specific Plan are consistent with the measures included in the RTP/SCS, and would serve to support a per capita reduction in VMT in the Plan Area after the implementation of the proposed project.

Now that the 2022 Scoping Plan has been adopted, new methodologies and threshold approaches are required to determine the fair-share contributions City development projects would need to make to achieve the 2030 target. In the meantime, however, the discussion under "Consistency with SB 32" below addresses the consistency of the proposed project with SB 32, which provides the statutory underpinning of the 2022 Scoping Plan. The SB 32 target requires GHG emissions to be reduced from 1990 levels. No consensus has been reached around the State on a new quantitative target for new development based on consistency with the SB 32 targets.

The Executive Order S-3-05 2050 target has not been codified by legislation. Studies have shown that, in order to meet the 2050 target, aggressive pursuit of technologies in the transportation and energy sectors, including electrification and the decarbonization of fuel, will be required. Because of the technological shifts required and the unknown parameters of the regulatory framework in 2050,

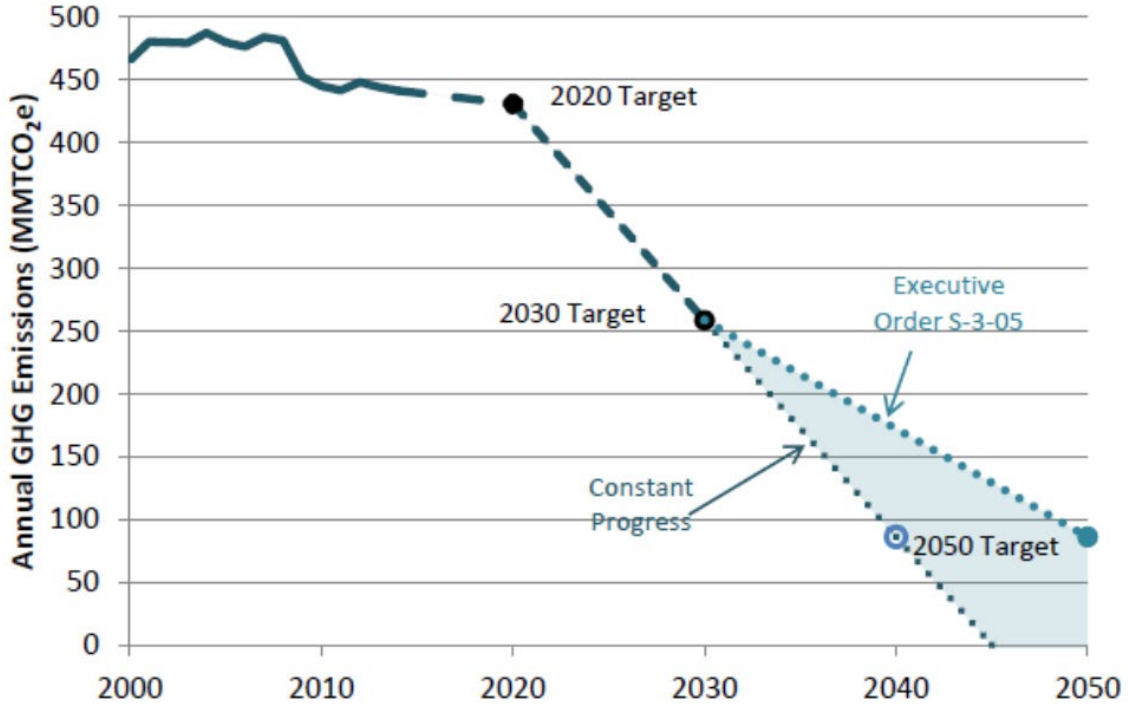
quantitatively analyzing the project's impacts further relative to the 2050 goal is speculative for purposes of CEQA.[50]

The ARB recognizes that AB 32 establishes an emissions reduction trajectory that will allow California to achieve the more stringent 2050 target: "These [GHG emission reduction] measures also put the State on a path to meet the long-term 2050 goal of reducing California's GHG emissions to 80 percent below 1990 levels. This trajectory is consistent with the reductions that are needed globally to stabilize the climate." In addition, the ARB's First Update "lays the foundation for establishing a broad framework for continued emission reductions beyond 2020, on the path to 80 percent below 1990 levels by 2050," and many of the emission reduction strategies recommended by ARB would serve to reduce the proposed project's post-2020 emissions level to the extent applicable by law:

- **Energy Sector:** Continued improvements in California's appliance and building energy efficiency programs and initiatives, such as the State's zero-net-energy building goals, would serve to reduce the proposed project's emissions level. Additionally, further additions to California's renewable resource portfolio would favorably influence the project's emissions level.
- **Transportation Sector:** Anticipated deployment of improved vehicle efficiency, zero-emission technologies, lower carbon fuels, and improvement of existing transportation systems all will serve to reduce the project's emissions level.
- **Water Sector:** The project's emissions level will be reduced as a result of further desired enhancements to water conservation technologies.
- **Waste Management Sector:** Plans to further improve recycling, reuse and reduction of solid waste will beneficially reduce the project's emissions level.

For the reasons described above the project's post-2020 emissions trajectory is expected to follow a declining trend, consistent with the 2030 and 2050 targets. The trajectory required to achieve the post-2020 targets is shown in Figure 3.8-3.

[50] California Air Resources Board (ARB). 2014. First Update to the Climate Change Scoping Plan. Website: http://ww2.arb.ca.gov/sites/default/files/barcu/board/books/2014/022014/14-2-4pres.pdf. Accessed June 24, 2022.



Source: California Air Resources Board (ARB). 2017. The 2017 Climate Change Scoping Plan Update. January 20. Website: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf. Accessed June 30, 2022.

Figure 3.8-3: California's Path to Achieving the 2050 Target

In his January 2015 inaugural address, Governor Brown expressed a commitment to achieve "three ambitious goals" that he would like to see accomplished by 2030 to reduce the State's GHG emissions:

- Increasing the State's Renewable Portfolio Standard from 33 percent in 2020 to 50 percent in 2030;
- Cutting the petroleum use in cars and trucks in half; and
- Doubling the efficiency of existing buildings and making heating fuels cleaner.

These expressions of executive branch policy may be manifested in adopted legislative or regulatory action through the State agencies and departments responsible for achieving the State's environmental policy objectives, particularly those relating to global climate change.[51]

Further, recent studies show that the State's existing and proposed regulatory framework will allow the State to reduce its GHG emissions level to 40 percent below 1990 levels by 2030, and to 80 percent below 1990 levels by 2050. Even though these studies did not provide an exact regulatory and technological roadmap to achieve the 2030 and 2050 goals, they demonstrated that various combinations of policies could allow the Statewide emissions level to remain very low through 2050,

[51] Brown, Edmund G. Jr. 2015. Press Release: California Establishes Most Ambitious Greenhouse Gas Goal in North America. April 29. Website: https://www.ca.gov/archive/gov39/2015/04/29/news18938/index.html. Accessed June 24, 2022.

suggesting that the combination of new technologies and other regulations not analyzed in the studies could allow the State to meet the 2050 target.[52]

Given the proportional contribution of mobile source-related GHG emissions to the State's inventory, recent studies also show that relatively new trends—such as the increasing importance of web-based shopping, the emergence of different driving patterns, and the increasing effect of web-based applications on transportation choices—are beginning to substantially influence transportation choices and the energy used by transportation modes. These factors have changed the direction of transportation trends in recent years and will require the creation of new models to effectively analyze future transportation patterns and the corresponding effect on GHG emissions. For the reasons described above the proposed project's post-2020 emissions trajectory is expected to follow a declining trend, consistent with the 2030 and 2050 targets.

Consistency with SB 32

The most recent version of the ARB's Scoping Plan, the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan), addresses the AB1279 targets and was adopted on December 15, 2022. It provides a detailed sector-by-sector guide to address climate change by cutting greenhouse gas emissions by 85 percent and achieving carbon neutrality in 2045. The elements of the framework proposed to achieve the new targets are as follows:

- Transportation
  - Achieve 100 percent Zero-Emission Vehicle (ZEV) sales of light-duty vehicles by 2035 and medium heavy-duty vehicles by 2040.
  - Achieve a 20 percent zero-emission target for the aviation sector.
  - Prioritize and increase funding for clean transportation equity programs.
  - Accelerate the reduction and replacement of fossil fuel production and consumption in California.
  - Increase the stringency and scope of the Low Carbon Fuel Standard (LCFS).
  - Achieve a per capita VMT reduction of at least 25 percent below 2019 levels by 2030 and 30 percent below by 2045.
- Clean Electricity Grid
  - Per SB 350, double Statewide energy efficiency savings by 2030.
  - Use long-term planning processes to support grid reliability and expansion of renewable and zero-carbon development.
  - Per SB 100 and 1020, achieve 90 percent, 95 percent, and 100 percent renewable and zero-carbon retail sales by 2035, 2040, and 2045, respectively.
- Sustainable Manufacturing and Buildings
  - Maximize air quality benefits using the best available control technologies for stationary sources in communities most in need.
  - Implement SB 905.
  - Develop a net-zero cement strategy to meet SB 956 targets for the GHG intensity of cement use.

[52] Energy and Environmental Economics. 2015. Pathways to Deep Decarbonization in the United States. Website: http://ww2.arb.ca.gov/sites/default/files/2020-07/williams.pdf. Accessed June 24, 2022.

  - Leverage energy-efficiency and low carbon hydrogen programs.
  - Prioritize most vulnerable residents with the majority of funds in the new $922 million Equitable Building Decarbonization program.
  - Achieve three million all-electric and electric-ready homes by 2030 and seven million by 2035 with six million heat pumps installed by 2030.
  - Adopt a zero-emission standard for new space and water heaters sold in California beginning in 2030.
  - Implement biomethane procurement targets for investor-owned utilities as specified in SB 1440.
- Carbon Dioxide Removal and Capture
  - Implement SB 905.
  - Achieve the 85 percent reduction in anthropogenic sources below 1990 levels per AB 1279 by incorporating CCS into sectors and programs beyond transportation.
  - Evaluate and propose the role for CCS in cement decarbonization and as part of hydrogen peroxide pathways.
  - Explore carbon capture application for zero-carbon power for reliability needs per SB 100.
- Short-Lived Climate Pollutants (Non-Combustion Gases)
  - Install anaerobic digesters to maximize air and water quality protection, maximize biomethane capture, and direct biomethane to specific sectors.
  - Increase alternative manure management projects.
  - Expand markets for products made from organic waste.
  - Pursuant to SB 1137, develop leak detection and repair plans for facilities in health protection zones, implement emission detection system standards, and provide public access to emissions data.
  - Convert large HFC emitters to the lowest practical GWP technologies.
- Natural and Working Lands
  - Implement AB 1757 and SB 27.
  - Implement the Climate Smart Strategy.
  - Accelerate the pace and scale of climate smart forest management to at least 2.3 million acres annually by 2025.
  - Accelerate the pace and scale of healthy soils practices to 80,000 acres annually by 2025, conserve at least 8,000 acres of annual crops annually, and increase organic agriculture to 20 percent of all cultivated acres by 2045.
  - Restore 60,000 acres of Delta wetlands annually by 2045.
  - Increase urban forestry investment annually by 200 percent, relative to business as usual.

Table 3.8-4 provides an analysis of the project's consistency with the 2017 Scoping Plan Update measures.

Table 3.8-4: Consistency with SB 32 2017 Scoping Plan Update

Scoping Plan Measure	Project Consistency
SB 350 50 percent Renewable Mandate. Utilities subject to the legislation will be required to increase their renewable energy mix from 33 percent in 2020 to 50 percent in 2030.	**Not applicable.** This measure would apply to utilities and not to individual development projects. The proposed project would purchase electricity from a utility subject to the SB 350 Renewable Mandate and the RPS requirements. SB 100 has increased the 2030 RPS standards to 60 percent by 2030, superseding the increase required by SB 350.
SB 350 Double Building Energy Efficiency by 2030. This is equivalent to a 20 percent reduction from 2014 building energy usage compared to current projected 2030 levels.	**Not applicable**. This measure applies to existing buildings. New structures are required to comply with Title 24 Energy Efficiency Standards that are expected to increase in stringency over time. Future developments envisioned as a part of the proposed project would comply with the applicable Title 24 Energy Efficiency Standards in effect at the time building permits are received.
Low Carbon Fuel Standard. This measure requires fuel providers to meet an 18 percent reduction in carbon content by 2030.	**Not applicable.** This is a Statewide measure that cannot be implemented by a project applicant or lead agency. However, vehicles accessing the planning area would benefit from the standards.
Mobile Source Strategy (Cleaner Technology and Fuels Scenario). Vehicle manufacturers will be required to meet existing regulations mandated by the LEV III and Heavy-Duty Vehicle programs. The strategy includes a goal of having 4.2 million ZEVs on the road by 2030 and increasing numbers of ZEV trucks and buses.	**Consistent**. The proposed project would support the increase of electric vehicle infrastructure in the Plan Area through compliance with General Plan policies and objectives. Furthermore, MM AIR-1c would require the construction of all buildings to facilitate sufficient electric charging for trucks to plug in, in anticipation of future technology that allows trucks to operate partially or completely on electricity.
Sustainable Freight Action Plan. The plan's target is to improve freight system efficiency 25 percent by increasing the value of goods and services produced from the freight sector, relative to the amount of carbon that it produces by 2030. This would be achieved by deploying over 100,000 freight vehicles and equipment capable of zero-emission operation and maximize near zero-emission freight vehicles and equipment powered by renewable energy by 2030.	**Consistent.** This measure applies to owners and operators of trucks and freight operations. The proposed project would include future developments that are industrial in nature and would support truck and freight operations. MM AIR-1c would require the construction of all buildings to facilitate sufficient electric charging for trucks to plug in, in anticipation of future technology that allows trucks to operate partially or completely on electricity.
Short-Lived Climate Pollutant (SLCP) Reduction Strategy. The strategy requires the reduction of SLCPs by 40 percent from 2013 levels by 2030 and the reduction of black carbon by 50 percent from 2013 levels by 2030.	**Consistent.** The proposed project would not include major sources of black carbon. This measure revolves around ARB's SLCP Reduction Strategy that was released in April 2016 as a result of SB 650. SB 650 required the State to develop a strategy to reduce emissions of SLCPs. Diesel particulate matter (DPM) reductions have come from strong efforts to reduce on-road vehicle emissions. Car and truck engines used to be the largest sources of anthropogenic black carbon emissions in California, but the State's existing air

Scoping Plan Measure	Project Consistency
	quality policies will virtually eliminate black carbon emissions from on-road diesel engines within 10 years. These policies are based on existing technologies.
SB 375 Sustainable Communities Strategies. Requires Regional Transportation Plans to include a Sustainable Communities Strategy for reduction of per capita vehicle miles traveled.	**Not applicable.** The proposed project does not include the development of a Regional Transportation Plan.
Post-2020 Cap-and-Trade Program. The Post 2020 Cap-and-Trade Program continues the existing program for another 10 years. The Cap-and-Trade Program applies to large industrial sources such as power plants, refineries, and cement manufacturers.	**Not applicable.** The proposed project is not one targeted by the cap-and-trade system regulations, and, therefore, this measure does not apply to the project. However, the post-2020 Cap-and-Trade Program indirectly affects people and entities who use the products and services produced by the regulated industrial sources when increased cost of products or services (such as electricity and fuel) are transferred to the consumers.
Natural and Working Lands Action Plan. The ARB is working in coordination with several other agencies at the federal, State, and local levels, stakeholders, and with the public, to develop measures as outlined in the Scoping Plan Update and the Governor's Executive Order B-30-15 to reduce GHG emissions and to cultivate net carbon sequestration potential for California's natural and working land.	**Not Applicable**. The majority of the Plan Area consists of rural residential housing or agricultural uses. The proposed Specific Plan Policy CF-4.4 includes the conservation of agricultural lands as a guiding principle, and the proposed project would serve to support the conservation of working lands and natural lands outside of the Plan Area by providing high density housing in areas located near to new or existing public transit, reducing housing buildout in more rural areas with high-quality farm lands, and decreasing Vehicle Miles Traveled (VMT).
Source: California Air Resources Board (ARB). 2017. The 2017 Climate Change Scoping Plan Update. January 20. Website: https://www.arb.ca.gov/cc/scopingplan/2030sp_pp_final.pdf. Accessed June 24, 2022.	

The most recent version of the ARB's Scoping Plan, the 2022 Scoping Plan for Achieving Carbon Neutrality (2022 Scoping Plan), was adopted in 2022 to address new State milestones included in AB 1279. This plan builds upon previously adopted Scoping Plans, including the 2017 Scoping Plan which originally addressed the emission reduction goals in SB 32, and provides a detailed sector-by-sector guide to address climate change by cutting greenhouse gas emissions by 85 percent and achieving carbon neutrality in 2045, with the main focus of emission reductions efforts being the transportation and energy sectors.[53]

Regarding goals for 2045 under the 2022 Scoping Plan, at this time it is not possible to quantify the emissions savings from future regulatory measures, as they have not yet been developed; nevertheless, it can be anticipated that operation of the project would comply with whatever measures are enacted that State lawmakers decide would lead to an 85 percent reduction below 1990 levels by 2045. In its 2008 Scoping Plan, ARB acknowledged that the "measures needed to meet the 2050 are too far in the future to define in detail." In the First Scoping Plan Update;

[53] California Air Resources Board (ARB). 2022. The 2022 Scoping Plan for Achieving Carbon Neutrality. December.

however, ARB generally described the type of activities required to achieve the 2050 target: "energy demand reduction through efficiency and activity changes; large scale electrification of on-road vehicles, buildings, and industrial machinery; decarbonizing electricity and fuel supplies; and rapid market penetration of efficiency and clean energy technologies that requires significant efforts to deploy and scale markets for the cleanest technologies immediately.

Accordingly, taking into account the proposed project's compliance with the GHG Reduction Plan Update, as required by General Plan PEIR Mitigation Measure GHG-1.1, and the progress being made by the State toward reducing emissions in key sectors such as transportation, industry, and electricity, the project would be consistent with State GHG Plans and would further the State's goals of reducing GHG emissions 40 percent below 1990 levels by 2030, and 80 percent below 1990 levels by 2050, and does not obstruct their attainment.

In summary, the operation of the proposed project would generate an increase in population and employment, and would contribute to an increase in wastewater generation, water demand, and vehicle trips. New buildings would be more energy efficient, but there would be an overall increase in energy usage due to the magnitude of new building space that would be constructed. Per the GHG Plan Update guidance, the environmental impact of the proposed project related to GHG emissions is significant, because emissions from the proposed project would not be able to be feasibly mitigated to a level equal to or lesser than the emissions from the existing land uses. As a result, the proposed project is not consistent with the GHG Plan Update, and the proposed project's contribution to environmental impacts related to GHG emissions are significant.

The guiding principles, design guidelines, and proposed land use designations for the Plan Area would contribute to minimizing emissions to the extent feasible, however there is no mitigation feasible to reduce the GHG emissions of the proposed project to less than significant levels. Compliance with GHG reduction measures included in the GHG Plan, as required through the implementation of General Plan PEIR Mitigation Measure GHG-1, would ensure that the proposed project support State and regional plans to reduce GHG emissions and obtain GHG reduction targets.

Level of Significance Before Mitigation

Significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in Section 3.8.3, Regulatory Framework, the following mitigation measures from the General Plan PEIR are applicable to the project.

MM GHG-1.1 Prior to the City's approval of subsequent discretionary projects, the Director of the City Planning and Development Department, or designee, shall confirm that development projects are consistent with the Recirculated GHG Reduction Plan Update (2021) and shall implement all measures deemed applicable to the project through the GHG Reduction Plan Update-Project Consistency Checklist (Appendix B to the GHG Reduction Plan Update).

Project Specific Mitigation Measures

No feasible mitigation available.

Level of Significance After Mitigation

Significant and unavoidable.

In accordance with the City of Fresno GHG Reduction Plan Update-Project Consistency Checklist, because the emissions from the proposed project would be greater than the emissions expected to occur from the existing land uses currently included in the Plan Area, and because those emissions could not be feasibly mitigated to be equal to or less than those emissions, the GHG impacts of the proposed project are significant and unavoidable.

3.8.6 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for energy use is the Plan Area and portions of the City of Fresno, City of Clovis, and unincorporated Fresno County adjacent to the Plan Area. This analysis evaluates whether impacts of the proposed project, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to GHG emissions. This analysis then considers whether incremental contribution of the impacts associated with implementation of the proposed project would be significant. Both conditions must apply for cumulative effects to rise to the level of significance. Based on this analysis, there is a potentially significant cumulative effect resulting from the proposed project.

As previously discussed, no single land use project could generate enough GHG emissions to noticeably change the global average temperature. Cumulative GHG emissions, however, contribute to global climate change and its significant adverse environmental impacts.

The GHG Plan Update considered GHG emission reductions necessary to be achieved in the City of Fresno to support State policy and legislation, including SB 32, and outlines measures that development projects can implement to reduce their contribution to climate change. The proposed project would result in an expansion of the City of Fresno boundaries and would contribute to population growth in the region that was not included in the GHG Plan Update emissions projections, which demonstrate conformity with State GHG reduction goals. The proposed project would generate a significant net increase in GHG emissions and would have a “significant” GHG impact per the City of Fresno GHG Reduction Plan Update. As the proposed project would have a significant impact per the guidance included in the GHG Plan Update, the project has a potentially significant level of cumulative significance.

Level of Cumulative Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM GHG-1.1.

Project Specific Mitigation Measures

None available.

Level of Cumulative Significance After Mitigation

Significant and unavoidable.

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3.9 - Hazards and Hazardous Materials

3.9.1 - Introduction

This section describes the existing hazards and hazardous materials setting and potential effects from project implementation on the site and its surrounding area. Descriptions and analysis in this section are based, in part, on the Fresno General Plan (General Plan) and the Fresno Southeast Development Area (SEDA) Specific Plan, as well as research on various hazardous materials websites. As further discussed in Chapter 1, Introduction, nine comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to hazards and hazardous materials were received:

- Requests that the Draft PEIR acknowledge the potential for historic or future activities to result in the release of hazardous waste/substances.
- Recommends that all future development under the proposed project collect soil samples for lead analysis prior to performing any intrusive activities.
- Recommends that all future development under the proposed project conduct surveys for the presence of lead-based paints (LBP), mercury, asbestos-containing materials (ACMs), and polychlorinated biphenyl caulk before demolishing any buildings.
- Requests that Draft PEIR require any future development under the proposed project that requires the importation of soil to backfill any excavated areas to conduct the proper sampling to ensure that the imported soil is free of contamination.
- Requests that the Draft PEIR require any future development under the proposed project that is developed on land containing agricultural uses, weed abatement activities, or related activities to conduct a proper investigation for organochlorinated pesticides.
- Recommends that the current and former agricultural lands in the Plan Area be evaluated in accordance with the California Department of Toxic Substances Control (DTSC) 2008 Interim Guidance for Sampling Agricultural Properties, Third Addition.
- States that any future development under the SEDA Specific Plan that would use or handle hazardous materials would be required to meet the requirements set forth in the California Health and Safety Code, Division 20, Chapter 6.95, and the California Code of Regulations Title 22, Division 4.5. Any businesses handling hazardous waste must submit a Hazardous Materials Business Plan pursuant to the Health and Safety Code, Division 20, Chapter 6.95, Section 25507.
- States that an underground storage tank (UST) Removal Permit from the Fresno County Department of Public Health, Environmental Health Division must be obtained if any petroleum USTs are discovered during construction.
- States that all water wells and septic systems identified at a future development site that are not intended to be used should be properly removed with a licensed contractor.

3.9.2 - Environmental Setting

Hazards

This description of existing conditions focuses on hazards from fire and overhead power lines, as well as hazardous materials and wastes. A hazard is a situation that poses a level of threat to life, health, property, or the environment. Hazards can be dormant or potential, with only a theoretical risk of harm. However, once a hazard becomes active, it can create an emergency. A hazardous situation that has already occurred is called an incident. Emergency response is action taken in response to an unexpected and dangerous occurrence in an attempt to mitigate its impact on people, structures, or the environment. Emergency situations can range from natural disasters to hazardous materials problems and transportation incidents.

Hazards Materials and Wastes

Hazardous materials include but are not limited to hazardous materials, hazardous substances, and hazardous wastes, as defined in Section 25501 and Section 25117, respectively, of the California Health and Safety Code. A hazardous material is any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released; and any material that a handler or an administering regulatory agency under Section 25501 has a reasonable basis for believing would be injurious to the health and safety of persons or harmful to the environment. Various properties may cause a substance to be considered hazardous, including:

- Toxicity—causes human health effects;
- Ignitability—has the ability to burn;
- Corrosivity—causes severe burns or damage to materials; and
- Reactivity—causes explosions or generates toxic gases.

Hazardous Building Materials

Many older buildings contain building materials consisting of hazardous materials. These materials include LBP, ACM, and polychlorinated biphenyls (PCBs).

Prior to the United States Environmental Protection Agency (EPA) ban in 1978, LBP was commonly used on interior and exterior surfaces of buildings. Disturbances such as sanding and scraping activities, renovation work, gradual wear and tear, old peeling paint, and paint dust particulates have been found to contaminate surface soils or cause lead dust to migrate and affect indoor air quality. Exposure to residual lead can cause severe health effects, especially in children.

Asbestos is a naturally occurring fibrous material that was extensively used as a fireproofing and insulating agent in building construction materials before such uses were banned by the EPA in the 1970s. In addition, many types of electrical equipment contained PCBs as an insulator, including transformers and capacitors. After PCBs were determined to be a carcinogen in the mid to late 1970s, the EPA banned PCB use in new equipment and began a program to phase out certain existing PCB-containing equipment. For example, fluorescent lighting ballasts manufactured after

January 1, 1978, do not contain PCBs, and are required to have a label clearly stating that PCBs are not present in the unit.

Hazardous Substances

A hazardous substance can be any biological, natural, or chemical substance, whether solid, liquid, or gas, which may cause harm to human health. Hazardous substances are classified based on their potential health effects, whether acute (immediate) or chronic (long-term). Dangerous goods are classified based on immediate physical or chemical effects, such as fire, explosion, corrosion, and poisoning. An accident involving dangerous goods could seriously harm human health or damage property or the environment. Harm to human health may happen suddenly (acute), such as dizziness, nausea, and itchy eyes or skin; or it may happen gradually over years (chronic), such as dermatitis or cancer. Some people can be more susceptible than others. Hazardous substances and dangerous goods can include antiseptic used for a cut, paint for walls, a cleaning product for the bathroom, chlorine in a pool, carbon monoxide from a motor vehicle, fumes from welding, vapors from adhesives, or dust from cement, stone, or rubber operations. Such hazardous substances can make humans very sick if they are not used properly.

Hazardous Wastes

Hazardous waste is any hazardous material that is to be discarded, abandoned, or recycled. The criteria that define a material as hazardous also define a waste as hazardous. Specifically, materials and waste may be considered hazardous if they are poisonous (toxic); can be ignited by open flame (ignitable); corrode other materials (corrosive); or react violently, explode, or generate vapors when mixed with water (reactive). Soil or groundwater contaminated with hazardous materials above specified regulatory State or federal thresholds is considered hazardous waste if it is removed from a site for disposal. If handled, disposed, or otherwise handled improperly, hazardous materials and hazardous waste can result in public health hazards if released into the soil or groundwater or through airborne releases in vapors, fumes, or dust. Soil and groundwater having concentrations of hazardous constituents higher than specific regulatory levels must be handled and disposed of as hazardous waste when excavated or pumped from an aquifer. The California Code of Regulations, Title 22, Sections 66261.20–24 contains technical descriptions of toxic characteristics that could cause soil or groundwater to be classified as hazardous waste.

Hazardous Materials Sites

The Cortese List is a list of known hazardous materials or hazardous waste facilities that meet one or more of the provisions of Government Code Section 65962.5, including:

- The list of hazardous waste and substances sites from the DTSC EnviroStor database.[1]
- The list of Leaking Underground Storage Tank (LUST) sites by county and fiscal year from the California State Water Resources Control Board (State Water Board) GeoTracker database.[2]

[1] California Department of Toxic Substances Control (DTSC). "Cortese" list of DTSC's EnviroStor database list of Hazardous Waste and Substances sites. DTSC's Hazardous Waste and Substances Site List—Site Cleanup (Cortese List). Website: https://www.envirostor.dtsc.ca.gov/public/. Accessed May 17, 2022.

[2] California State Water Resources Control Board (State Water Board). "Cortese" List of Leaking Underground Storage Tank Sites by County (San Francisco County). Website: https://geotracker.waterboards.ca.gov/sites_by_county. Accessed May 17, 2022

- The list of solid waste disposal sites identified by the State Water Board with waste constituents exceeding hazardous waste levels outside the waste management unit.[3]
- The list of active cease-and-desist orders and cleanup and abatement orders from the State Water Board.[4]
- The list of hazardous waste facilities subject to corrective action pursuant to Section 25187.5 of the Health and Safety Code, as identified by the DTSC.[5]

Envirostor

The EnviroStor database, maintained by the DTSC, tracks cleanup, permitting, enforcement and investigation efforts at hazardous waste facilities, sites with known contamination, and sites where there may be reasons to investigate further. The database includes federal Superfund sites (from the National Priorities List); State response sites, voluntary cleanup sites; school investigation and cleanup sites; corrective action sites; and tiered California permit sites. It also includes sites that are being investigated for contamination where contamination has not been confirmed. According to an EnviroStor search performed on May 17, 2022, a total of three sites are located within the Plan Area. See Table 3.9-1 for more information.

Table 3.9-1: Facilities Listed on the DTSC EnviroStor Database

Site No.	Site Name; Address	Site Description; Size	Contaminants of Concern	Cleanup Status
1	Fourth Educational Center Site; 2660 Leonard Avenue	Former agricultural site with residences and above ground storage tank; 160.5 acres.	Arsenic, pesticides	Inactive–Action Required as of 5/18/09.
2	Clovis USD–Proposed K-6 School; SE Intersection of Temperance and Clinton Avenues	Former agricultural site that is currently fallow. Formerly contained farm residence/buildings that have been removed; 20 acres.	Metals, pesticides, PCBs	No further action as of 4/17/2014.
3	T H Agriculture and Nutrition, LLC; 7183 East McKinley Avenue	Formerly a plant and warehouse for agricultural chemicals.	Pesticides; VOCs	Certified by DTSC/in Operation and Maintenance Agreement as of 1/12/2006. Removed from the National Priorities List of Superfund and hazardous waste sites

[3] California Environmental Protection Agency (Cal/EPA). 2020. Site Portal. Website: https://siteportal.calepa.ca.gov/nsite/map/results. Accessed May 17, 2022.
[4] Ibid.
[5] California Environmental Protection Agency (Cal/EPA). "Cortese" list of sites subject to Corrective Action pursuant to Health and Safety Code 25187.5. Website: https://www.calepa.ca.gov/sitecleanup/corteselist/section-65962-5a/. Accessed May 17, 2022.

Site No.	Site Name; Address	Site Description; Size	Contaminants of Concern	Cleanup Status
				but subject to continued monitoring. Land use restrictions apply.

Notes:
DTSC = California Department of Toxic Substances Control
PCB = polychlorinated biphenyl
VOC = volatile organic compound
Source: California Department of Toxic Substances Control (DTSC) EnviroStor. 2022.

Geotracker

GeoTracker is the State Water Board data management system for sites that impact, or have potential to impact, water quality in California, with emphasis on groundwater. GeoTracker contains records for sites that require cleanup, such as LUST Sites, Cleanup Program Sites, and Department of Defense Sites. GeoTracker also contains records for various unregulated projects, as well as permitted facilities including operating Permitted USTs, Irrigated Lands, Oil and Gas production, and Land Disposal Sites (landfills). According to a GeoTracker search performed on May 17, 2022, a total of two open sites are located within the Plan Area. See Table 3.9-2 for more information.

Table 3.9-2: Geotracker Sites in the Plan Area

Site No.	Site Name; Address	Site Description; Size	Contaminants of Concern	Cleanup Status
1	Pipco Ranch; 5414 North East Fresno	LUST Cleanup Site	Gasoline	Completed–Case Closed as of 7/1/07.
2	Baggie Farms; 6731 North Avenue East	LUST Cleanup Site	Diesel	Completed–Case Closed as of 10/15/1991.
3	Tri-Boro Fruit Co. Inc.; 2500 South Fowler Avenue	LUST Cleanup Site	Gasoline	Completed–Case Closed as of 8/29/1996.
4	Tri-Boro Fruit Co. Inc.	LUST Cleanup Site	Diesel	Completed–Case Closed as of 1/18/1995.
5	Demirjian, Mike; 5408 East Jensen Avenue	Cleanup Program Site	Petroleum, fuels, oils	Open–Site Assessment as of 11/1/1990.
6	Sunnyside Sierra; 5895 East Jensen Avenue	LUST Cleanup Site	Gasoline	Completed–Cased Closed as of 1/7/1997.
7	Bonner Packing; 568 South Temperance Avenue	LUST Cleanup Site	Gasoline	Completed–Case Closed as of 9/13/1988.
8	Narlian Residence; 7910 Kings Canyon East	LUST Cleanup Site	Gasoline	Completed–Case Closed as of 9/15/1995.

Site No.	Site Name; Address	Site Description; Size	Contaminants of Concern	Cleanup Status
9	Than; 7183 East McKinley Avenue	Cleanup Program Site	Pesticides, Herbicides, VOCs	Completed–Case Closed as of 5/12/2010. DTSC continues to provide regulatory oversite for maintenance of site cap and for submittal of annual groundwater monitoring reports.
10	Private Residence	LUST Cleanup Site	Gasoline	Open–Site Assessment as of 11/15/2011.
11	Private Residence; 9337 McKinley Avenue	LUST Cleanup Site	Gasoline	Completed–Case Closed as of 9/18/1996.

Notes:
VOC = volatile organic compound
DTSC = California Department of Toxic Substances Control
LUST = Leaking Underground Storage Tank
Source: California State Water Resources Control Board (State Water Board). Geotracker. 2022.

Summary

As outlined above, the Plan Area contains various contaminated sites that have released hazardous materials and required remediation and involvement from local, State, and federal agencies. A search of the EnviroStor and GeoTracker databases conducted on May 17, 2022, in the Plan Area found the sites listed in Tables 3.9-1 and 3.9-2. The Plan Area has an several cases of leaking underground stork tanks, but cleanup is complete for nearly all of these sites.

Hazardous Materials Incidents Emergency Response

The unauthorized releases of hazardous materials into the environment could create many environmental impacts including impacts to properties, natural environment, and human health. The significance of these impacts could vary according to the location and quantity of the substance released. Hazardous releases can occur in areas that treat, store, transport and use hazardous materials. In the event of an unauthorized release of hazardous materials/substances, emergency response measures must be implemented to ensure the protection of human and natural environmental health from risk.

The Plan Area contains agricultural, rural residential, as well as institutional and public facilities uses. Agriculture is the primary land use in the Plan Area and is a major industry in the City. The potential for hazardous materials incidents are heightened. Accidental releases of pesticides, fertilizers, and other agricultural chemical may be harmful to the public's health, safety, and the environment. In addition, the Plan Area contains State Route (SR) 180, which is a major State transportation route. This transportation route as well as the agricultural uses listed above, transports large quantities of hazardous materials through and into the Plan Area each year. Because of the rural nature of the Plan Area and its location along a route that regularly transports hazardous materials through and around the Plan Area, the area faces risks associated with the potential for hazardous materials

emergencies (accidental releases). The City of Fresno Fire Department recognizes the potential for a large chemical release to occur which could expose thousands of people to hazardous or toxic vapors.

In addition, prior to the banning of lead additives in vehicle fuel in 1992, tailpipe emissions from automobiles using leaded gasoline contained lead and resulted in aerially deposited lead (ADL) being deposited in and along roadways throughout the State. ADL-contaminated soils still exist along roadsides and medians and can also be found underneath some existing road surfaces due to past construction activities.

The City of Fresno Fire Department Hazardous Materials Response Team (HMRT) has embraced an all-hazards approach to emergency response to ensure that the Planning Area receives effective protection from the risk of hazardous materials releases.

Emergency Response

In addition to emergency response to hazardous materials incidents, both the City of Fresno and the County of Fresno implement programs to facilitate emergency preparedness for other types of incidents within the Plan Area. Specifically, the City of Fresno has an Emergency Operations Plan that describes what the City's actions will be during a response to an emergency. This plan also describes the role of the Emergency Operations Center (EOC) and the coordination that occurs between the EOC, City Departments, and other response agencies. The plan establishes a requirement for the emergency management organization to mitigate any significant emergency disaster affecting the City. The plan also identifies the policies, responsibilities, and procedures required to protect the health and safety of City communities, public and private property, and the environmental effects of natural or technological disasters. In addition, the plan establishes the operation concepts and procedures associated within initial response operations (field response) to emergencies, the extended response operations (City of Fresno EOC Activities), and the recovery process. Furthermore, the plan complies with the State of California Emergency Operations Plan "Cross Walk" checklist for determining whether an emergency plan has addressed critical elements of California's Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS).

The County of Fresno has a Multi-Jurisdictional Hazard Mitigation Plan, which is a plan that aims to reduce or eliminate long-term risk to people or property natural from hazards. The plan, which covers all territory within Fresno County's jurisdictional boundaries, was adopted by the City of Fresno in 2009, and an update was adopted by the City of Fresno in 2020. The plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 so that Fresno County and the jurisdictions within it would be eligible for the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Assistance Grants.

Existing Schools

Presently, the Lone Star Elementary School, located in the southern portion of the Plan Area, is the only school in the Plan Area. However, Clovis Unified School District is constructing an educational center for middle and high school students in the northern portion of the Plan Area on a site along

the Clinton Avenue alignment between Leonard and Highland Avenues, with phased opening expected in 2025.

Airport Hazards

There are three airports located within the City of Fresno: Fresno Yosemite International Airport, Fresno Chandler Executive Airport, and Sierra Sky Park. None of the airports are located in the Plan Area.

Fresno Yosemite International Airport is located approximately 2 miles from the Plan Area, along East Clinton Way. The airport is a joint use civilian/military airport. It is used by commercial air carriers, air cargo operators, charter operators, the State of California, general aviation, and the United States Military. The California Air National Guard occupies a 58-acre area adjacent to East McKinley Avenue in the southeast portion of the airport. A helicopter repair and maintenance unit of the Army National Guard, the California Department of Forestry and Fire Protection (CAL FIRE), and a number of corporate aviation businesses occupy facilities north of the runways. About 250 general aviation aircraft are based at Fresno Yosemite International Airport and two Fixed Base Operators (FBOs) offer a wide range of aeronautical services.

According to the Fresno Yosemite International Airport Safety Compatibility Zones Map,[6] a small portion of the Plan Area is located within the 60 decibel (dB) Community Noise Equivalent Level (CNEL) contour.[7] A larger portion of the Plan Area is located within the Traffic Pattern Zone.[8]

Wildland Fire Hazard

CAL FIRE designates the Plan Area as a Local Responsibility Area (LRA).[9] There are no wildlands located within or adjacent to the Plan Area.[10]

The Plan Area is located within the Central Valley and is relatively flat. The majority of the Plan Area is located within agricultural lands. Similar uses surround the Plan Area with and mostly agricultural properties and rural residential uses to the north, west, and south. The Sierra Nevada foothills to the north and east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the topography and the distance between the developed portions of the City and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

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6 Fresno Council of Government (COG). 2018. Fresno County Airport Land Use Compatibility Plan. Website: https://ceqanet.opr.ca.gov/2018081025/2. Accessed November 29, 2022.

7 Fresno Council of Governments (COG). Airport Land Use Compatibility Plan. Exhibit D2 Future Noise Contours. Fresno Yosemite International Airport. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/04/ALUCP-Fresno-Yosemite-International-Airport.pdf. Accessed May 17, 2022.

8 Fresno Council of Governments (COG). Airport Land Use Compatibility Plan. Exhibit D1- Fresno Yosemite Intl. – Airport Influence Area and Safety Zones. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/04/ALUCP-Fresno-Yosemite-International-Airport.pdf. Accessed May 17, 2022.

9 California Department of Forestry and Fire Protection (CAL FIRE). 2007. Draft Fire Hazard Severity Zones in LRA. Fresno County. Website: https://osfm.fire.ca.gov/media/6673/fhszl06_1_map10.pdf. Accessed May 17, 2022.

10 City of Fresno. 2018. Fresno County Multi-Hazard Mitigation Plan. Figure 4.52 Fresno County's Wildfire Severity Zones. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/12/FresnoCountyHMPFinal.pdf. Accessed March 21, 2023.

3.9.3 - Regulatory Framework

Federal

Toxic Substances Control Act

Established in 1976 and amended on December 31, 2002, the Toxic Substances Control Act (TSCA) (15 United States Code [USC] Section 2601-2692) grants the EPA power to require proper reporting, recordkeeping, and testing requirements related to chemical substances and/or mixtures. Specifically, the TSCA addresses the production, importation, use, and disposal of specific chemicals, including PCBs, asbestos, radon, and LBP. The TSCA establishes the EPA's authority to require the notification of the use of chemicals, require testing, maintain a TSCA inventory, and require those importing chemicals under Sections 12(b) and 13 to comply with certification and/or other reporting requirements. This federal legislation also phased out the use of ACMs in new building materials and sets requirements for the use, handling, and disposal of ACMs. Disposal standards for LBP wastes are also detailed in the TSCA.

Occupational Health and Safety Act

The Occupational Safety and Health Administration (OSHA) of the United States Department of Labor is responsible for implementing and enforcing federal laws and regulations that address worker health and safety. OSHA requires specific training for hazardous materials users and handlers, provision of information (procedures for personal safety, hazardous materials storage and handling, and emergency response) to employees who may be exposed to hazardous materials, and acquisition of material safety data sheets from materials manufacturers. Material safety data sheets describe the risks, as well as proper handling and procedures, related to particular hazardous materials. Employee training must include response and remediation procedures for hazardous materials releases and exposures. Construction workers and operational employees at the project site would be subject to these requirements.

Code of Federal Regulations, Titles 29 and 40

Regulations in Code of Federal Regulations Title 29 include requirements to manage and control exposure to LBP and ACMs. In California, these requirements are implemented by the California Division of Occupational Safety and Health (Cal/OSHA) under California Code of Regulations Title 8 (see further discussion of California Code of Regulations Title 8 below). The removal and handling of ACMs is governed primarily by EPA regulations under Code of Federal Regulations Title 40. The regulations require that the appropriate State agency be notified before any demolition, or before any renovations, of buildings that could contain asbestos or ACMs above a specified threshold.

Resource Conservation and Recovery Act and Comprehensive Environmental Response, Compensation, and Liability Act

The EPA is responsible for implementing and enforcing federal laws and regulations pertaining to hazardous materials. The primary legislation includes the Resource Conservation and Recovery Act of 1976 (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) and the Emergency Planning and Community Right-to-Know Act (known as SARA Title III). RCRA and the 1984 RCRA Amendments regulate the treatment, storage, and disposal of hazardous and nonhazardous

wastes and mandate that hazardous wastes be tracked from the point of generation to their ultimate fate in the environment, including detailed tracking of hazardous materials during transport and permitting of hazardous material handling facilities. As permitted by RCRA, in 1992, the EPA approved California's program called the Hazardous Waste Control Law (HWCL), administered by DTSC, to regulate hazardous wastes in California, as discussed further below. The purpose of CERCLA is to identify and clean up chemically contaminated sites that pose a significant environmental health threat, and the Hazard Ranking System is used to determine whether a site should be placed on the National Priorities List for cleanup activities. SARA relates primarily to emergency management of accidental releases and requires annual reporting of continuous emissions and accidental releases of specified compounds that are compiled into a nationwide Toxics Release Inventory. Finally, SARA Title III requires formation of State and local emergency planning committees that are responsible for collecting material handling and transportation data for use as a basis for planning and provision of chemical inventory data to the community at large under the "right-to-know" provision of the law.

Hazardous Materials Transportation Act

Under the Hazardous Materials Transportation Act of 1975, the United States Department of Transportation (USDOT), Office of Hazardous Materials Safety regulates the transportation of hazardous materials on water, rail, highways, through air, or in pipelines, and enforces guidelines created to protect human health and the environment and reduce potential impacts by creating hazardous material packaging and transportation requirements. It also includes provisions for material classification, packaging, marking, labeling, place-carding, and shipping documentation. The USDOT provides hazardous materials safety training programs and supervises activities involving hazardous materials. In addition, the USDOT develops and recommends regulations governing the multimodal transportation of hazardous materials.

Aboveground Petroleum Storage Act, and Spill Prevention, Control, and Countermeasure Rule

The Aboveground Petroleum Storage Act of 1990, and the Spill Prevention, Control, and Countermeasure (SPCC) Rule (amended 2010) of the Oil Pollution Prevention regulation (40 Code of Federal Regulations [CFR] 112) require the owner or operator of a tank facility with an aggregate storage capacity greater than 1,320 gallons to notify the local Certified Unified Program Agency (CUPA) and prepare an SPCC plan. The SPCC plan must identify appropriate spill containment measures and equipment for diverting spills from sensitive areas and must discuss facility-specific requirements for the storage system, inspections, recordkeeping, security, and training.

Clean Water Act

The Clean Water Act (CWA) (Title 33 § 1251 *et seq*. of the United States Code [33 USC 1251, *et seq*.]) is the major federal legislation governing water quality. The CWA established the basic structure for regulating discharges of pollutants into waters of the United States (not including groundwater). The objective of the act is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA establishes the basic structure for regulating the discharge of pollutants into waters of the United States. Responsibility for administering the CWA resides with the State Water Board and nine Regional Water Quality Control Boards (RWQCBs); the Central Valley RWQCB administers the CWA for Fresno County. Section 404 of the CWA regulates temporary and permanent

fill and disturbance of waters of the United States, including wetlands. The United States Army Corps of Engineers (USACE) requires that a permit be obtained if a project proposes to place fill in navigable waters and/or to alter waters of the United States below the ordinary high-water mark in non-tidal waters. Section 401 of the CWA requires compliance with State water quality standards for actions within State waters. Compliance with the water quality standards required under Section 401 is a condition for issuance of a Section 404 permit. Under Section 401 of the CWA, every applicant for a permit or license for any activity that may result in a discharge to a water body must obtain a State water quality certification from the RWQCB to demonstrate that the proposed activity would comply with State water quality standards.

Federal Air Regulations, Part 77

The Federal Aviation Administration (FAA) is charged with the review of construction activities that occur in the vicinity of airports. Its role in reviewing these activities is to ensure that new structures do not result in a hazard to navigation. The regulations in the Federal Air Regulations (14 CFR, Part 77) are designed to ensure that no obstructions in navigable air space are allowed to exist that would endanger the public. Proposed structures are also evaluated against Terminal En Route Procedures, which ensure that a structure does not adversely impact flight procedures. Tall structures, including buildings, construction cranes, and cell towers in the vicinity of an airport can be hazardous to the navigation of airplanes. Federal Air Regulations Part 77 identifies the maximum height at which a structure would be considered an obstacle at any given point around an airport. The extent of the off-airport coverage that needs to be evaluated for tall structure impacts can extend miles from an airport facility. In addition, Federal Air Regulations Part 77 establishes standards for determining whether objects constructed near airports will be considered obstructions in navigable airspace, sets forth notice requirements of certain types of proposed construction or alterations, and provides for aeronautical studies to determine the potential impacts of a structure on the flight of aircraft through navigable airspace.

Federal Insecticide, Fungicide, and Rodenticide Act

The Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) (7 USC 136 *et seq*.) was originally passed in 1947. It has been amended several times, most extensively in 1972 and in 1996 by the Food Quality Protection Act of 1996, and in 2012 by the Pesticide Registration Improvement Extension Act. The purpose of FIFRA is to establish federal jurisdiction over the distribution, sale, and use of pesticides. It also gives EPA the authority to study the effects of pesticide use. Other key provisions of FIFRA require pesticide applicators to pass a licensing examination for status as "qualified applicators," create a review and registration process for new pesticide products and ensure thorough and understandable labeling that includes instructions for use.

State

California Hazardous Waste Control Law

The HWCL is the primary hazardous waste statute in the State of California, and implements RCRA as a "cradle-to-grave" waste management system for handling hazardous wastes in a manner that protects human health and the environment and would reduce potential resulting impacts. The law specifies that generators have the primary duty to determine whether their waste is hazardous and to ensure proper management. The HWCL also establishes criteria for the reuse and recycling of

hazardous waste used or reused as raw materials. The law exceeds federal requirements by mandating source reduction planning, and a much broader requirement for permitting facilities that treat hazardous waste. It also regulates a number of types of waste and waste management activities that are not covered by federal law.

California Health and Safety Code

The California Health and Safety Code (HSC § 25141) defines hazardous waste as a waste or combination of waste that may:

> . . . because of its quantity, concentration, or physical, chemical, or infection characteristics:
> (1) Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitation-reversible illness.
> (2) Pose a substantial present or potential hazard to human health or the environment, due to factors including, but not limited to, carcinogenicity, acute toxicity, chronic toxicity, bioaccumulative properties, or persistence in the environment, when improperly treated, stored, transported, or disposed of or otherwise managed.

These regulations establish criteria for identifying, packaging, and labeling hazardous wastes; prescribe management practices for hazardous wastes; establish permit requirements for hazardous waste treatment, storage, disposal, and transportation; and identify hazardous waste that commonly would be disposed of in landfills.

Under both the RCRA and the HWCL, hazardous waste manifests must be retained by the generator for a minimum of 3 years. The generator must match copies of the manifests with copies of manifest receipts from the treatment, disposal, or recycling facility.

In accordance with Chapter 6.11 of the California Health and Safety Code (HSC § 25404, *et seq*.), local regulatory agencies enforce many federal and State regulatory programs through the CUPA program, including:

- Hazardous materials business plans (HMBPs) (HSC § 25501, *et seq*.).
- State Uniform Fire Code (UFC) requirements (UFC § 80.103, as adopted by the State Fire Marshal pursuant to HSC § 13143.9).
- Underground storage tanks (HSC § 25280, *et seq*.)
- Aboveground storage tanks (HSC § 25270.5(c)).
- Hazardous waste generator requirements (HSC § 25100, *et seq*.).

The Fresno County Health Department's CUPA is responsible for implementing a unified hazardous materials and hazardous waste management regulatory program. The agency provides oversight of businesses that:

- Require Hazardous Materials Business Plans;
- Require California Accidental Release Prevention plans or Federal Risk Management Plans;
- Operate Underground Storage Tanks;
- Operate Aboveground Storage Tanks;
- Generate Hazardous Waste(s);
- Have On-site Treatment of Hazardous Waste(s)/Tiered Permits.

Compliance is achieved through routine inspections of all regulated facilities, and investigation of citizen-based complaints and inquiries regarding improper handling and/or disposal of hazardous materials and/or hazardous wastes. Hazardous waste source reduction is a primary goal of the CUPA. Additionally, the agency provides oversight for the remediation of contaminated sites.

California Code of Regulations, Title 8

Cal/OSHA assumes primary responsibility for developing and enforcing workplace safety regulations. These regulations concern the use of hazardous materials in the workplace, including requirements for employee safety training; availability of safety equipment; accident and illness prevention programs; hazardous substance exposure warnings; and preparation of emergency action and fire prevention plans.

Cal/OSHA also enforces hazard communication program regulations, including procedures for identifying and labeling hazardous substances, and requires that safety data sheets (formerly known as material safety data sheets) be available for employee information and training programs. Cal/OSHA standards are generally more stringent than federal regulations. Construction workers and operational employees at the project site would be subject to these requirements.

California Code of Regulations, Title 8, Section 1529 authorizes Cal/OSHA to implement the survey requirements of Code of Federal Regulations Title 29 relating to asbestos. These federal and State regulations require facilities to take all necessary precautions to protect employees and the public from exposure to asbestos. Workers who conduct asbestos abatement must be trained in accordance with federal and State OSHA requirements. The Bay Area Air Quality Management District (BAAQMD) oversees the removal of regulated ACMs (see "Asbestos Demolition, Renovation, and Manufacturing Rule" below).

California Code of Regulations, Title 8, Section 1532.1 includes requirements to manage and control exposure to LBP. These regulations cover the demolition, removal, cleanup, transportation, storage, and disposal of lead-containing material. The regulations outline the permissible exposure limit, protective measures, monitoring, and compliance to ensure the safety of construction workers exposed to lead-based material. Loose and peeling LBP must be disposed of as a State and/or federal hazardous waste if the concentration of lead equals or exceeds applicable hazardous waste thresholds. Federal and State OSHA regulations require a supervisor who is certified with respect to identifying existing and predictable lead hazards to oversee air monitoring and other protective measures during demolition activities in areas where LBP may be present. Special protective measures and notification of Cal/OSHA are required for highly hazardous construction tasks related to lead, such as manual demolition, abrasive blasting, welding, cutting, or torch burning of structures, where LBP is present.

California Code of Regulations Title 22, Division 4.5

California Code of Regulations, Title 22, Division 4.5, contains the Environmental Health Standards for the Management of Hazardous Waste, which includes California waste identification and classification regulations. California Code of Regulations, Title 22, Chapter 11, Article 3, "Soluble Threshold Limits Concentrations/Total Threshold Limits Concentration Regulatory Limits," identifies the concentrations at which soil is determined to be a California hazardous waste. California's Universal Waste Rule (22 California Code of Regulations [CCR] § 66273) provides an alternative set of management standards in lieu of regulation as hazardous wastes for certain common hazardous wastes, as defined in California Code of Regulations, Title 22, Section 66261.9. Universal wastes include fluorescent lamps, mercury thermostats, and other mercury-containing equipment. Existing structures may contain fluorescent light ballasts that could contain mercury or lead. The Alternative Management Standards for Treated Wood Waste (22 CCR § 67386) were developed by the DTSC to allow for disposal of treated wood as a nonhazardous waste, to simplify and facilitate the safe and economical disposal of such waste. Chemically treated wood can contain elevated levels of hazardous chemicals (e.g., arsenic, chromium, copper, pentachlorophenol, or creosote) that equal or exceed applicable hazardous waste thresholds. The Alternative Management Standards provide for less stringent storage requirements and extended accumulation periods, allow shipments without a hazardous waste manifest and a hazardous waste hauler, and allow disposal at specific nonhazardous waste landfills.

Porter-Cologne Act

The Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act) is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The RWQCBs are required to formulate and adopt water quality control plans (also known as Basin Plans) for all areas of the region and establish water quality objectives in the plans. The Porter-Cologne Act sets forth the obligations of State Water Board and RWQCBs to adopt and periodically update water quality control plans that recognize and reflect the differences in existing water quality, the beneficial uses of the region's groundwater and surface water, and local water quality conditions and problems. It also authorizes the State Water Board and RWQCBs to issue and enforce waste discharge requirements and to implement programs for controlling pollution in State waters. Finally, the Porter-Cologne Act also authorizes the State Water Board and RWQCBs to oversee site investigation and cleanup for unauthorized releases of pollutants to soils and groundwater and in some cases to surface waters or sediments.

California Emergency Response Plan

California has developed an emergency response plan to coordinate emergency services provided by federal, State, and local governments and private agencies. Responding to hazardous materials incidents is one part of this plan. The plan is administered by the California Governor's Office of Emergency Services, which coordinates the responses of other agencies. Emergency response team members respond and work with local fire and police agencies, emergency medical providers, the California Highway Patrol (CHP), CAL FIRE, California Department of Fish and Wildlife (CDFW), and California Department of Transportation (Caltrans).

California Department of Forestry and Fire Protection

CAL FIRE has mapped fire threat potential throughout California. CAL FIRE maps fire threat based on the availability of fuel and the likelihood of an area burning (based on topography, fire history, and climate). The threat levels include no fire threat, moderate, high, and very high fire threat. Additionally, CAL FIRE produced a 2010 Strategic Fire Plan for California, which contains goals, objectives, and policies to prepare for and mitigate the effects of fire on California's natural and built environments. CAL FIRE's Office of the State Fire Marshal provides oversight of enforcement of the California Fire Code as well as overseeing hazardous liquid pipeline safety.

California Building Code

The State of California provided a minimum standard for building design through the 2016 California Building Standards Code (CBC), which is located in Part 2 of Title 24 of the California Code of Regulations. The 2016 CBC is based on the 2015 International Building Code, but has been modified for California conditions. It is generally adopted on a jurisdiction by-jurisdiction basis, subject to further modification based on local conditions. Commercial and residential buildings are plan-checked by local City and County building officials for compliance with the CBC. Typical fire safety requirements of the CBC include the installation of sprinklers in all new high-rise buildings and residential buildings; the establishment of fire resistance standards for fire doors, building material; and particular types of construction.

California Public Resources Code

The California Public Resources Code includes fire safety regulations that restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors[11] on construction equipment that use an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided on-site for various types of work in fire-prone areas.

These regulations include the following:

- Earthmoving and portable equipment with internal combustion engines would be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (Public Resources Code [PRC] § 4442);
- Appropriate fire suppression equipment would be maintained during the highest fire danger period—from April 1 to December 1 (PRC § 4428);
- On days when a burning permit is required, flammable materials would be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor would maintain the appropriate fire suppression equipment (PRC § 4427); and
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines would not be used within 25 feet of any flammable materials (PRC § 4431).

[11] A spark arrestor is a device that prohibits exhaust gases from an internal combustion engine from passing through the impeller blades where they could cause a spark. A carbon trap is commonly used to retain carbon particles from the exhaust.

Local

Fresno General Plan

The General Plan outlines a long-range vision for the physical development of the City that reflects the community's vision to preserve the desirable qualities of the existing community while encouraging the aspirations of the community. The General Plan includes the following objectives and policies related to hazards and hazardous materials:

Public Utilities and Services Element

Objective PU-2 Ensure that the Fire Department's staffing and equipment resources are sufficient to meet all fire and emergency service level objectives and are provided in an efficient and cost effective manner.

Policy PU-2-a **Unify Fire Protection.** Pursue long-range transfer of fire protection service agreements with adjacent fire districts that, in concert with existing automatic aid agreements, will lead to the eventual unification of fire protection services in the greater Fresno area.

Policy PU-2-b **Maintain Ability.** Strive to continually maintain the Fire Department's ability to provide staffing and equipment resources to effectively prevent and mitigate emergencies in existing and new high-rise buildings and in other high-density residential and commercial development throughout the City.

Policy PU-2-c **Rescue Standards.** Develop appropriate standards, as necessary, for rescue operations, including, but not limited to, confined space, high angle, swift water rescues, and the unique challenges of a high speed train corridor.

Policy PU-2-d **Station Siting.** Use the General Plan, community plans, Specific Plans, neighborhood plans, and Concept Plans, the City's Geographic Information Systems (GIS) database, and a fire station location program to achieve optimum siting of future fire stations.

Policy PU-2-e **Service Standards.** Strive to achieve a community wide risk management plan that include the following service level objectives 90 percent of the time:

- First Unit on Scene–First fire unit arriving with minimum of three firefighters within 5 minutes and 20 seconds from the time the unit was alerted to the emergency incident.
- Effective Response Force–Provide sufficient number of firefighters on the scene of an emergency within 9 minutes and 20 seconds from the time of unit alert to arrival. The effective response force is measured as 15 firefighters for low risk fire incidents and 21 firefighters for high risk fire incidents and is the number of personnel necessary to complete specific tasks required to contain and control fire minimizing loss of life and property.

Objective PU-3 Enhance the level of fire protection to meet the increasing demand for services from an increasing population.

Policy PU-3-a **Fire Prevention Inspections.** Develop strategies to enable the performance of annual fire and life safety inspection of all industrial, commercial, institutional, and multi- family residential buildings, in accordance with nationally recognized standards for the level of service necessary for a large Metropolitan Area, including a self-certification program.

Policy PU-3-b **Reduction Strategies.** Develop community risk reduction strategies that target high service demand areas, vulnerable populations (e.g., young children, older adults, non-English speaking residents, persons with disabilities, etc.), and high life hazard occupancies.

Policy PU-3-d **Review All Development Applications.** Continue Fire Department review of development applications, provide comments and recommend conditions of approval that will ensure adequate on-site and off-site fire protection systems and features are provided.

Policy PU-3-e **Building Codes.** Adopt and enforce amendments to construction and fire codes, as determined appropriate, to systematically reduce the level of risk to life and property from fire, commensurate with the City's fire suppression capabilities.

Policy PU-3-f **Adequate Infrastructure.** Continue to pursue the provision of adequate water supplies, hydrants, and appropriate property access to allow for adequate fire suppression throughout the City.

Policy PU-3-g **Cost Recovery.** Continue to evaluate appropriate codes, policies, and methods to generate fees or other sources of revenue to offset the ongoing personnel and maintenance costs of providing fire prevention and response services.

Noise and Safety Element

Objective NS-4 Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.

Policy NS-4-a **Processing and Storage.** Require safe processing and storage of hazardous materials, consistent with the California Building Standards Code and the Uniform Fire Code, as adopted by the City.

Policy NS-4-b **Coordination.** Maintain a close liaison with the Fresno County Environmental Health Department, Cal/EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining hazardous material business plans, inventory statements, risk management prevention plans, and contingency/emergency response action plans.

Policy NS-4-c **Soil and Groundwater Contamination Reports.** Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or

groundwater contamination is identified or could be encountered during site development.

Policy NS-4-d **Site Identification.** Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.

Policy NS-4-e **Compliance with County Program.** Require that the production, use, storage, disposal, and transport of hazardous materials conform to the standards and procedures established by the County Division of Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.

Policy NS-4-f **Hazardous Materials Facilities.** Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.

Policy NS-4-g **Hazmat Response.** Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.

Policy NS-4-h **Household Collection.** Continue to support and assist with Fresno County's special household hazardous waste collection activities, to reduce the amount of this material being improperly discarded.

Policy NS-4-I **Public Information.** Continue to assist in providing information to the public on hazardous materials.

Objective NS-5 Protect the safety, health, and welfare of persons and property on the ground and in aircraft by minimizing exposure to airport-related hazards.

Policy NS-5-a **Land Use and Height.** Incorporate and enforce all applicable Airport Land Use Compatibility Plans (ALUCPs) through land use designations, zoning, and development standards to support the continued viability and flight operations of Fresno's airports and to protect public safety, health, and general welfare.

- Limit land uses in airport safety zones to those uses listed in the applicable ALUCPs as compatible uses, and regulate compatibility in terms of location, height, and noise.
- Ensure that development, including public infrastructure projects, within the airport approach and departure zones complies with Part 77 of the Federal Aviation Administration Regulations (Objects Affecting Navigable Airspace), particularly in terms of height.

Policy NS-5-b **Airport Safety Hazards.** Ensure that new development, including public infrastructure projects, does not create safety hazards such as glare from direct or reflective sources, smoke, electrical interference, hazardous chemicals, fuel storage, or from wildlife, in violation of adopted safety standards.

Policy NS-5-c **Aviation Easements.** Employ aviation easements in order to secure and protect airspace required for unimpeded operation of publicly owned airports.

Policy NS-5-d **Disclosure.** As a condition of approval for residential development projects, require sellers to prepare and provide State Department of Real Estate Disclosure statements to property buyers notifying of noise and safety issues related to airport operations.

Policy NS-5-e **Planned Expansion.** Allow for the orderly expansion and improvement of publicly owned airports, while minimizing adverse environmental impacts associated with these facilities.

- Periodically update airport facility master plans in accordance with FAA regulations.
- Require land use within the boundaries of the Fresno-Yosemite International Airport and Chandler Downtown Airport to conform to designations and policies specified in adopted City of Fresno compatible land use plans.
- Provide local jurisdictions surrounding the City's publicly owned airports with specific guidelines for effectively dealing with the presence and operation of these airports.

Objective NS-6 Foster an efficient and coordinated response to emergencies and natural disasters.

Policy NS-6-a **County Multi-Jurisdiction Hazard Mitigation Plan.** Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex.

Policy NS-6-b **Disaster Response Coordination.** Maintain coordination with other local, State, and federal agencies to provide coordinated disaster response.

Policy NS-6-c **Emergency Operations Plan.** Update the City’s Emergency Operations Plan periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.

Policy NS-6-d **Evacuation Planning.** Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies.

Policy NS-6-e **Critical Use Facilities.** Ensure critical use facilities (e.g., City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and

other structures that are important to protecting health and safety in the community remain operational during an emergency.

- Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions.
- Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.

Policy NS-6-f **Emergency Vehicle Access.** Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

Policy NS-6-g **Emergency Preparedness Public Awareness Programs.** Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to hazards and hazardous materials: Urban Form Element

Objective UF-5 Provide a well-balanced transportation network accessible to all users.

Policy UF-5.1 **Circulation Plan and Street Standards.** Implement a circulation plan which provides a variety of transportation options necessary to meet the needs of residents and employees within the SEDA.

In order to promote connectivity throughout the Plan Area, all SEDA street rights-of-way shall be publicly accessible and shall not include gates or access controls, except where permitted through special review by the City of Fresno.

Policy UF-5.6 **Performance Standards and Evaluation.** The following criteria shall guide the evaluation of facilities within the SEDA.

- **Transit:** Transit will be provided as demand warrants. Upon Plan buildout or when warranted, 10-minute peak-period headways will be provided along the BRT corridor (e.g., Kings Canyon), and 15-minute peak-period headways shall be provided for high-priority transit routes (e.g., De Wolf, Clovis).

  In addition, all other transit routes in the planning area shall be operated at 30-minute headways upon Plan completion. Extended hour or late-night service shall be provided at 60-minute headways.

- Bus stop locations are generally placed at ¼ mile spacing. Bus stop placement will be prioritized at:
  1. Schools and medical facilities.
  2. Libraries, parks, senior centers, and recreation facilities.
  3. Concentrated commercial areas.
  4. Concentrated residential and employment areas.

- **Bicycles:** A user-friendly bicycle network will be provided to welcome all riders throughout the entire Plan Area. Bicycle lanes including Class II and Class IV facilities should be provided on all Super Arterials, Arterials, and Local Streets. A Bicycled network should be designated on Neighborhood or Local Streets. Ensuring the safety of vulnerable users will be an important priority, as the Plan will seek to create a network of easy to use, lower stress amenities that provide the ability to connect riders to key designations throughout the City, as described in the Fresno Active Transportation Plan (2017).
- **Pedestrians:** A first-class pedestrian system shall be provided, including sidewalks on all streets, bicycle/pedestrian trails, and other design elements that prioritize safety and convenience for pedestrians, as described in the Fresno Active Transportation Plan (2017).
- **Vehicles:** A highly connected, grid-based roadway system shall be provided for efficient vehicular travel. Please see the Streets and Circulation Standards in the Development Code and the City of Fresno's Department of Public Works Standard Drawings.

Policy UF-5.7 **Level of Service (LOS).** To promote complete streets and provide safe mobility for all users throughout the entire SEDA, streets will be designed with no more than four through lanes and a continuous two-way left-turn land (portions of Jensen and Temperance Avenues may have more than four lanes). In addition, these LOS standards are complemented by several other transportation related policies to reduce overall vehicle miles traveled (such as complete streets and transportation demand management). The following LOS standards apply to SEDA roadways:

- LOS 'E' for Arterials, Collectors, and Local (both intersection and segment operations) during peak traffic hours.
- LOS 'F' Exception. LOS 'F' in areas with ample transit, pedestrian, and/or bicycle options, including in and around the Mixed-Use Districts of the SEDA, particularly if achieving a LOS with less delay would violate the four-lane maximum as described above.

Open Space Element

Objective OS-11 Provide the necessary levels of police and fire services in accordance with the City of Fresno General Plan.

Policy OS-11.1 **Provision of Police Services.** Provide police services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can make adjustments to these policies.

Policy OS-11.2 **Provision of Fire Services.** Provide fire services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can make adjustments to these policies.

Policy OS-11.3 **Coordination with Police and Fire Departments**. The City of Fresno Planning and Development Department shall work with the Police and Fire departments as appropriate to promote safe environments throughout the SEDA and ensure that services can be provided in a manner that is sensitive and responsive to the needs of the community. Coordination may address:

- Evaluation of design features for safety and crime prevention
- Siting of police and fire substations
- Facilitation of citizen involvement processes

Conservation Element

Objective RC-1 Meet statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.5 **Waste Diversion, Recycling, and Energy Recovery.** Establishing programs and actions that promote recycling and diversion of waste from landfills can reduce energy consumed in the transport and handling of waste material and can reduce the greenhouse gases that are emitted during the decomposition of organic waste.

The State of California has adopted increasingly stringent mandates for the percentage of solid waste that can be disposed in landfills. In addition, certain landfills have been mandated to install methane capture systems to result in greenhouse gas reductions from these sources. The effects of methane are powerful – as it is 21 times more effective than carbon dioxide in retaining heat in the atmosphere. Methane can be flared, producing mainly carbon dioxide or used in combustion devices to generate heat or power that can be used for productive purposes displacing the use of fossil fuels. The following policies are recommended in the SEDA to reduce GHGs and conserve energy:

1. Maintain current targets for recycling and re-use of all types of waste material in the City and enhance waste and wastewater management practices to reduce natural resource consumption, including the following measures:
   a) Continue to require recyclable material collection and storage areas in all residential development.

b) Establish recycling collection and storage area standards for commercial and industrial facilities to size the recycling areas according to the anticipated types and amounts of recyclable material generated.
c) Provide educational materials to residents on how and what to recycle and how to dispose of hazardous waste.
d) Provide recycling canisters and collection in public areas where trash cans are also provided.
e) Institute a program to evaluate major waste generators and identify recycling opportunities for their facilities and operations.
f) Continue to partner with the California Integrated Waste Management Board on waste diversion and recycling programs and the CalMax (California Materials Exchange) program.
g) Evaluate the feasibility of a residential, restaurant and institutional food waste segregation and recycling program, to reduce the amount of organic material sent to landfill and minimize the emissions generated by decomposing organic material.
h) Evaluate the feasibility of "carbon footprinting" for the City's wastewater treatment facilities, biomass and composting operations, solid waste collection and recycling programs.
i) Expand yard waste collection to divert compostable waste from landfills.
j) Study the feasibility and cost-benefit analysis of a municipal composting program to collect and compost food and yard waste, including institutional food and yard waste, using the resulting compost matter for City park and median maintenance.

2. Create a strategic and operations plan for fulfilling the City Council resolution committing the City of Fresno to a Zero Waste goal.
3. Continue to pursue opportunities to reduce air pollution by using methane gas from the old City landfill and the City's wastewater treatment process.

Objective RC-5 Protect surface and groundwater supplies from major sources of pollution.

Policy RC-5.2 **Hazardous Materials**. Prevent contamination of the groundwater table and surface water resources and discourage all pesticide use for agricultural and landscaping uses within the SEDA.

- **Signage:** Install appropriate signage to deter the discharge of hazardous materials into storm drains.
- **Pollution Prevention:** Provide information to SEDA residents on appropriate ways to dispose of hazardous materials and chemicals.
- **Pesticide Reduction:** Discourage all pesticide use for agricultural and landscaping uses within the SEDA.
- **Remediation:** Encourage rapid clean-up of contaminated groundwater consistent with applicable laws and regulations.

City of Fresno Municipal Code

Chapter 15 Article 25 of the Municipal Code outlines performance standards related to site and facility maintenance, noise, air contaminants, waste, and fire hazards to provide control measures to protect the community form nuisances, hazards, and objectionable conditions.

Chapter 15 Article 27 of the Municipal Code establishes standards for specific uses and activities. It provides regulations for the use and storage of pesticides, fertilizers, and hazardous materials, and for hazardous waste management facilities, and for use of hazardous materials in residences. It requires the preparation of a Hazardous Materials Plans for some uses.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan Program Environmental Impact Report (General Plan PEIR) contains the following mitigation measures that are applicable to the proposed project.

MM HAZ-6.1 The City shall establish an alternative Emergency Operations Center in the event the current Emergency Operations Center is under redevelopment or inaccessible.

3.9.4 - Methodology

Impacts related to hazards and hazardous materials resulting from implementation of the Specific Plan are discussed below. The following impact analysis is based on an assessment of baseline conditions for the Plan Area, including locations of hazardous materials use and storage through a review of various databases identifying existing contaminated sites and City emergency response and evacuation plan requirements. This analysis identifies potential impacts based on the interaction between the affected environment and construction, operation, and maintenance activities related to future development that could occur under the proposed project.

3.9.5 - Thresholds of Significance

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts hazards and hazardous materials are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would be considered significant if the project would:

a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.

b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.

c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment.

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard or excessive noise for people residing or working the project area.

f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.

g) Expose people or structures, either directly or indirectly to a significant risk of loss, injury, or death involving wildland fires.

3.9.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the project and provides mitigation measures where appropriate.

Routine Transport, Use, or Disposal of Hazardous Materials

Impact HAZ-1:	**The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.**

Impact Analysis

Buildout under the proposed project would include new development, infill development, and intensification of land uses within the Plan Area. Therefore, existing structures within the Plan Area may need to be demolished and new buildings will be constructed. Identification of hazardous materials or conditions would occur during subsequent CEQA review of any future discretionary projects.

Construction

Construction activities, including demolition and grading, could expose persons working or living in the Plan Area to potentially hazardous materials including but not limited to asbestos and lead from LBP as well as known or potentially unknown hazardous substances present in the soil or groundwater. Various federal, State, and local regulations and guidelines pertaining to the abatement of, and protection from, exposure to hazardous materials during construction activity. These requirements include San Joaquin Valley Air Pollution Control District (Valley Air District) requirements for demolitions and renovations; Construction Safety Orders 1529 (pertaining to asbestos) and 1532.1 (pertaining to lead) from Title 8 of the California Code of Regulations, Part 61, Subpart M of the Code of Federal Regulations (pertaining to asbestos); and lead exposure guidelines

provided by the Department of Housing and Urban Development (HUD). Asbestos and lead abatement must be performed and monitored by contractors with appropriate certifications from the State Department of Health Services. In addition, Cal/OSHA has regulations concerning the use of hazardous materials, including requirements for safety training, availability of safety equipment, hazardous materials exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA enforces the hazard communication program regulations, which include provisions for identifying and labeling hazardous materials, describing the hazards of chemicals, and documenting employee training programs. All demolition that could result in the release of lead and/or asbestos must be conducted according to Cal/OSHA standards.

As described above in Section 3.9.2, there are sites containing hazardous materials located throughout the Plan Area, which pose potential health hazards. However, new development on contaminated areas that would occur as a result of the proposed project would be required to be remediated (i.e., cleaned up) prior to the commencement of construction activities. These activities would be under the supervision of DTSC, the City and County of Fresno, and/or RWQCB, depending on the site characteristics. Potential soil contamination in these areas must be properly identified and cleaned up prior to any development activities on any of these sites to prevent exposure of people and the environment to these hazards. Similarly, if groundwater contamination has been identified, remediation activities would be required by the RWQCB, DTSC, or other appropriate regulatory agency prior to the start of any new construction activities.

Operation

As described above, hazardous materials related to the agriculture industry and agriculture related businesses are routinely transported and used within the Plan Area. Residential and public facilities use small quantities of hazardous materials, such as paints or cleaning supplies. Federal, State, and local agencies maintain records of facilities that use large quantities of hazardous materials or generate hazardous waste. The use of certain hazardous materials necessitates a risk management plan to prevent hazardous materials from impacting the surrounding area.

Implementation of the proposed project would result in the continued use and storage of hazardous materials, including common cleaning products, building maintenance products, paints and solvents, and other similar items. However, these items would not be used in large enough quantities to pose a significant risk to the public or the environment. Furthermore, the quantity of large agricultural operations and associated hazardous materials would be reduced as a result of the proposed project.

Additionally, pursuant to Health and Safety Code, Division 20, Chapter 6.95, Section 25507, a hazardous materials business plan would be required for facilities that store, use, or handle high quantities of hazardous materials. In general, hazardous materials business plans provide guidance to firefighters, health officials, planners, public safety officers, and health care providers in the event of an emergency. Implementation of a hazardous materials business plan would prevent hazards from impacting the public or the environment in the event that a hazardous material is released. The Fresno County Health Department's CUPA is responsible for monitoring compliance with hazardous materials business plans, as well as other regulatory programs such as the operation of USTs and hazardous waste treatment and disposal.

All future development under the Specific Plan must also adhere to applicable General Plan policies intended to reduce potential project-specific impacts regarding routine transport, use, or disposal of hazardous materials, including Objective NS-4, Policies NS-4-a through NS-4-g, and Policy NS-4-I, as described in Section 3.9.3, Regulatory Framework, above.

Additionally, the Specific Plan contains proposed policies that would further minimize risk to the public or environment resulting from the transportation, use, or disposal of hazardous materials. For example, Policy RC-5.2 aims to prevent contamination of the groundwater table and surface water resources and discourage all pesticide use for agricultural and landscaping uses within SEDA through the use of signage, provision of pollution prevention information to SEDA residents and remediation actions.

Any future individual development projects that involve the transport, use, or disposal of hazardous materials would be subject to existing federal, State, and local regulations outlined in Section 3.9.3 Regulatory Framework. Regulatory programs overseen/administered by the local CUPA, as well as compliance with applicable laws, regulations, and policies, would ensure hazardous impacts associated with the routine transport, use, or disposal of hazardous materials are less than significant. Thus, at the programmatic level, impacts would be less than significant. Consistent with the General Plan and the proposed Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific measures to reduce any potential impacts and ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Risk of Upset

Impact HAZ-2:	**The proposed project would not create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the likely release of hazardous materials into the environment.**

Impact Analysis

Implementation of the Specific Plan would result in continued use and storage of hazardous materials, including household cleaning products, paints, solvents, building maintenance products, etc. Furthermore, as illustrated in Table 3.9-1 and Table 3.9-2, some sites within the Plan Area have residual contamination that may require remediation. In addition, if existing structures are demolished to accommodate new development, hazardous building materials such as ACM or LBP could be encountered. Transport of hazardous materials is likely to continue to occur on SR-180. Therefore, there is a potential for accidental release of hazardous materials within the Plan Area.

The Fresno Fire Department (FFD) has a Hazardous Materials Response Team (HMRT) that handles hazardous materials incidents within the City and consists of 60 personnel.[12] The FFD HMRT ensure that the community receives a robust, competent level of service provided in the event of an accidental hazardous material release. Furthermore, all new development resulting from the proposed project that would handle, store, produce, or dispose of hazardous materials would be subject to federal, State, and local regulations outlined in Section 3.9.3, Regulatory Framework. Furthermore, the SEDA Specific Plan proposes primarily residential and mixed-use land uses that are not expected to use and store large quantities of hazardous materials.

Additionally, future development under the Specific Plan would be required to adhere to applicable General Plan policies intended to reduce potential project-specific impacts, including Objective NS-4, Policies NS-4-a through NS-4-g, and Policy NS-4-I, as described in Section 3.9.3, Regulatory Framework, above.

However, the sites identified in Table 3.9-1 and Table 3.9-2 includes contaminated properties owned by multiple property owners. Contaminated properties within the Plan Area would be remediated and developed in accordance with regulatory requirements. However, the cleanup process also would be subject to case-by-case considerations, with regulatory actions and oversight subject to agency-owner interactions and negotiations. While compliance with applicable federal, State, and local standards (including the hazardous materials policies under General Plan Objective NS-4) requires sites contaminated with hazardous materials to be cleaned up, the redevelopment of these or other future sites where hazardous materials are unknown could create a significant impact to future occupants of the Plan Area and/or construction workers. Therefore, the following project-specific mitigation measures regarding hazardous materials would reduce potential impacts regarding the creation of a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving release of hazardous materials into the environment: Mitigation Measure (MM) HAZ-2a through MM HAZ-2h.

MM HAZ-2a requires new development to prepare a Phase I Environmental Site Assessment (Phase I ESA), which would identify Recognized Environmental Conditions (RECs) and become the basis for potential recommendations for follow-up investigation. MM HAZ-2b requires a Phase II ESA to be prepared to further evaluate RECs determined in the Phase I ESA. MM HAZ-2c requires additional Phase II ESAs to be prepared in the event that the initial Phase II ESA describes site characteristics that require further investigation. MM HAZ-2d requires site remediation in the event that the Phase II ESA(s) find concentrations of hazardous materials exceeding regulatory thresholds. MM HAZ-2e requires the use of an Environmental Site Management Plan (ESMP), when applicable. MM HAZ-2f provides requirements for sites with potential residual volatile organic compounds (VOCs) in soil, soil gas, or groundwater that are planned for redevelopment with an overlying occupied building. MM HAZ-2g provides requirements for demolitions when ACM and LBP may be present. Finally, MM HAZ-2h provides requirements that must be followed in the event that soils with toxic or hazardous materials concentrations that exceed applicable Environmental Screening Levels are found.

[12] City of Fresno. Fire Suppression. Website: https://www.fresno.gov/fire/fire-suppression/. Accessed May 19, 2022.

In addition to the above referenced MM HAZ-2a through MM HAZ-2h, any future individual development projects that involve the transport, use, or disposal of hazardous materials would be subject to existing federal, State, and local regulations outlined in Section 3.9.3 Regulatory Framework as well as regulatory programs overseen/administered by the local CUPA. Compliance with the laws and regulations referenced above under Impact HAZ-1, would ensure hazardous impacts from development of the proposed Plan related to the creation of a possible hazard to the public or environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment are anticipated to be less than significant. Consistent with the General Plan and proposed Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific measures to reduce any potential impacts and ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Potentially significant.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM HAZ-2a Prior to the issuance of a grading permit, the property owners and/or developers of properties shall ensure that a Phase I Environmental Site Assessment (Phase I ESA) (performed in accordance with the current Airborne Toxic Control Measures [ATCM] Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process [E 1527]) shall be conducted for each individual property prior to development or redevelopment to ascertain the presence or absence of Recognized Environmental Conditions (RECs), Historical Recognized Environmental Conditions (HRECs), and Potential Environmental Concerns (PECs) relevant to the property under consideration. The findings and conclusions of the Phase I ESA shall become the basis for potential recommendations for follow-up investigation, if found to be warranted.

MM HAZ-2b In the event that the findings and conclusions of the Phase I Environmental Site Assessment (Phase I ESA) for a property result in evidence of Recognized Environmental Conditions (RECs), Historical Recognized Environmental Conditions (HRECs) and/or Potential Environmental Concerns (PECs) warranting further investigation, the property owners and/or developers of properties shall ensure that a Phase II ESA shall be conducted to determine the presence or absence of a significant impact to the subject site from hazardous materials. The Phase II ESA may include but may not be limited to the following: (1) Collection and laboratory analysis of soils and/or groundwater samples to ascertain the presence or absence of significant concentrations of constituents of concern; (2) Collection and laboratory analysis of soil vapors and/or indoor air to ascertain the presence or absence of significant concentrations of volatile constituents of concern; and/or (3)

Geophysical surveys to ascertain the presence or absence of subsurface features of concern such as underground storage tanks (USTs), drywells, drains, plumbing, and septic systems. The findings and conclusions of the Phase II ESA shall become the basis for potential recommendations for follow-up investigation, site characterization, and/or remedial activities, if found to be warranted.

MM HAZ-2c In the event the findings and conclusions of the Phase II Environmental Site Assessment (Phase II ESA) reveal the presence of significant concentrations of hazardous materials warranting further investigation, the property owners and/or developers of properties shall ensure that site characterization shall be conducted in the form of additional Phase II ESAs in order to characterize the source and maximum extent of impacts from constituents of concern. The findings and conclusions of the site characterization shall become the basis for formation of a remedial action plan and/or risk assessment.

MM HAZ-2d If the findings and conclusions of the Phase II Environmental Site Assessment (Phase II ESA), site characterization and/or risk assessment demonstrate the presence of concentrations of hazardous materials exceeding regulatory threshold levels, prior to the issuance of a grading permit, property owners and/or developers of properties shall complete site remediation and potential risk assessment with oversight from the applicable regulatory agency including, but not limited to, the California Environmental Protection Agency (Cal/EPA) Department of Toxic Substances Control (DTSC) or Regional Water Quality Control Board (RWQCB), and Fresno County Environmental Health Division (FCEHD). Potential remediation could include the removal or treatment of water and/or soil. If removal occurs, hazardous materials shall be transported and disposed at a hazardous materials permitted facility.

MM HAZ-2e Prior to the issuance of a building permit for an individual property within the Plan Area with residual environmental contamination, the agency with primary regulatory oversight of environmental conditions at such property ("Oversight Agency") shall have determined that the proposed land use for that property, including proposed development features and design, does not present an unacceptable risk to human health, if applicable, through the use of an Environmental Site Management Plan (ESMP) that could include institutional controls, site-specific mitigation measures, a risk management plan, and deed restrictions based upon applicable risk-based cleanup standards. Remedial action plans, risk management plans and health and safety plans shall be required as determined by the Oversight Agency for a given property under applicable environmental laws, if not already completed, to prevent an unacceptable risk to human health, including workers during and after construction, from exposure to residual contamination in soil and groundwater in connection with remediation and site development activities and the proposed land use.

MM HAZ-2f For those sites with potential residual volatile organic compounds (VOCs) in soil, soil gas, or groundwater that are planned for redevelopment with an overlying occupied

building, a vapor intrusion assessment shall be performed by a licensed environmental professional. If the results of the vapor intrusion assessment indicate the potential for significant vapor intrusion into the proposed building, the project design shall include vapor controls or source removal, as appropriate, in accordance with Regional Water Quality Control Board (RWQCB), the Department of Toxic Substances Control (DTSC) or the Fresno County Environmental Health Division (FCEHD) requirements. Soil vapor mitigations or controls could include passive venting and/or active venting. The vapor intrusion assessment as associated vapor controls or source removal can be incorporated into the Environmental Site Management Plan (ESMP) (Mitigation Measure HAZ4-4e).

MM HAZ-2g In the event of planned renovation or demolition of residential and/or commercial structures on the subject site, prior to the issuance of demolition permits, asbestos and lead-based paint (LBP) surveys shall be conducted in order to determine the presence or absence of asbestos-containing materials (ACM) and/or LBP. Removal of friable ACM, and non-friable ACMs that have the potential to become friable, during demolition and/or renovation shall conform to the standards set forth by the National Emissions Standards for Hazardous Air Pollutants (NESHAPs).

The San Joaquin Valley Air Pollution Control District (Valley Air District) is the responsible agency on the local level to enforce the NESHAPs and shall be notified by the property owners and/or developers of properties (or their designee(s)) prior to any demolition and/or renovation activities. If asbestos-containing materials are left in place, an Operations and Maintenance Program (O&M Program) shall be developed for the management of asbestos-containing materials (ACM).

MM HAZ-2h Prior to the import of a soil to a particular property within the Plan Area as part of that property's site development, such soils shall be sampled for toxic or hazardous materials to determine whether concentrations exceed applicable Environmental Screening Levels for the proposed land use at such a property, in accordance with Regional Water Quality Control Board (RWQCB), the Fresno County Environmental Health Division (FCEHD), and the Department of Toxic Substances Control (DTSC), including but not limited to the California Department of Toxic Substances Control (DTSC) 2001 DTSC Information Advisory Clean Imported Fill Material Fact Sheet, which identifies land use activities appropriate for a fill material source area and provides guidelines for types of analyses to be performed, prior to importing to such a property.

Level of Significance After Mitigation

Less than significant impact.

Hazardous Emissions Proximate to a School

Impact HAZ-3: **The proposed project could emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.**

Impact Analysis

Presently, the Lone Star Elementary School, located in the southern portion of the Plan Area, is the only school in the Plan Area. However, Clovis Unified School District is constructing an educational center for middle and high school students in the northern portion of the Plan Area on a site along the Clinton Avenue alignment between Leonard and Highland Avenues, with phased opening expected in 2025.

The SEDA Specific Plan proposes to build schools within Neighborhood Town Centers, which are shown in Chapter 2, Project Description, Exhibit 2-2. The proposed project aims to provide nearly all homes to be within walking distance of an elementary school. However, the exact location of future school developments is not known at this time.

As illustrated in Table 3.9-1 and Table 3.9-2, some sites within the Plan Area have residual contamination that may require remediation. Therefore, development under the proposed project could include land uses, or could include disturbance of existing hazardous cleanup sites, which have the potential to emit hazardous emissions or handle hazardous materials and substances. It is anticipated that future development under the proposed project could occur within 0.25 mile of an existing or future school.

However, any future individual development projects that involve the transport, use, or disposal of hazardous materials would be subject to existing federal, State, and local regulations outlined in Section 3.9.3, Regulatory Framework. Future individual projects would be subject to City review and an environmental site assessment would be required for proposed projects sited near schools.[13]

Additionally, future development under the Specific Plan would be required to adhere to applicable General Plan policies intended to reduce potential project-specific impacts, including Objective NS-4, Policies NS-4-a through NS-4-g, and Policy NS-4-I, as described in Section 3.9.3, Regulatory Framework, above. The Specific Plan contains proposed policies that would further minimize risk of emissions of hazardous materials near schools. For example, Policy RC-5.2 aims to prevent contamination of the groundwater table and surface water resources and discourage all pesticide use for agricultural and landscaping uses within SEDA through the use of signage, provision of pollution prevention information to SEDA residents and remediation actions.

Moreover, implementation of the project-specific mitigation measures discussed under Impact HAZ-2, MM HAZ-2a through MM HAZ-2h, would further reduce impacts to schools. As stated in the discussions of Impacts HAZ-1 and HAZ-2, all future development under the proposed project would be required to achieve compliance with existing federal, State, and local regulations, procedures, and

[13] California Department of Education. School Site Selection and Approval Guide. Website: https://www.cde.ca.gov/ls/fa/sf/schoolsiteguide.asp#emissions. Accessed May 19, 2022.

policies would avoid potential impacts associated with hazardous materials handling, use, and storage in the Plan Area. Compliance with these regulations, procedures, and policies would ensure that hazardous materials are properly handled, thereby reducing potential risks to nearby schools. At the programmatic level, impacts related to the handling of hazardous materials near a school would be reduced to a less than significant level with the implementation of MM HAZ-2a through MM HAZ-2h.

Level of Significance Before Mitigation

Potentially significant.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Implementation of MM HAZ-2a through MM HAZ-2h.

Level of Significance After Mitigation

Less than significant impact.

Government Code Section 65962.5 Sites

Impact HAZ-4:	**The proposed project could be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment.**

Impact Analysis

As illustrated in Table 3.9-1 and Table 3.9-2, some sites within the Plan Area have residual contamination, including contamination from VOCs, diesel, gasoline, various metals, pesticides, herbicides, PCBs, and other chemicals. For a majority of these properties, remediation to mitigate potential impacts is complete and the cases are marked as closed. However, some of the sites have open cases and additional action is recommended. Remediation is meant to clean up contaminated sites and reduce concentrations of chemicals to a level to a certain human health risk threshold. For a site to be developed, a regulatory agency must confirm that the site has been remediated properly and the contamination has been reduced to a safe level.

Contaminated sites are regulated on an individual basis in accordance with applicable federal, State, and local procedures and standards. However, regulatory actions are subject to agency-owner negotiations. Additionally, future development resulting from the Specific Plan could occur on sites where hazardous materials are unknown. This would create a potentially significant impact.

However, as further discussed under Impact HAZ-2, implementation of the project-specific mitigation measures discussed under Impact HAZ-2, MM HAZ-2a through MM HAZ-2h, would reduce impacts related to these sites to a less than significant level. Consistent with the General Plan and proposed Specific Plan policies, individual development projects would be required to undergo project-specific

environmental review, which may require additional site-specific measures to reduce any potential impacts and ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Implementation of MM HAZ-2a through MM HAZ-2h.

Level of Significance After Mitigation

Less than significant impact.

Proximity to Public Airport Safety Hazard

Impact HAZ-5:	**For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, the proposed project would not result in a safety hazard or excessive noise for people residing or working the project area.**

Impact Analysis

As described above, Fresno Yosemite International Airport is located approximately 2 miles from the Plan Area, along East Clinton Way. According to the Fresno Yosemite International Airport Safety Compatibility Zones Map, a small portion of the Plan Area is located within the 60 dB CNEL contour.[14] A Larger portion of the Plan Area is located within the Traffic Pattern Zone.[15]

The Fresno County Airport Land Use Commission (ALUC) adopted the Fresno Yosemite International Airport Comprehensive Land Use Plan (ACLUP) on June 4, 2012. It establishes that the ALUC is a review authority for new land use plans in the Airport Influence Area (AIA). Therefore, ALUC review of the Specific Plan is required. The ALUC shall advise the City on land use designations in terms of noise, safety, and airspace hazards. While a portion of the Plan Area is located within the Fresno Yosemite International Airport AIA, the ALUC would review the Specific Plan and make recommendations to limit hazards within the Plan Area. This is a condition of approval of the Specific Plan. Therefore, at the programmatic level, impacts to the Plan Area would be reduced to a less than significant level. Consistent with the General Plan and SEDA Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project- specific measures to reduce any potential impacts and ensure that impacts remain less than significant.

[14] Fresno Council of Governments (COG). Airport Land Use Compatibility Plan. Exhibit D2 Future Noise Contours. Fresno Yosemite International Airport. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/04/ALUCP-Fresno-Yosemite-International-Airport.pdf. Accessed May 17, 2022.

[15] Fresno Council of Governments (COG). Airport Land Use Compatibility Plan. Exhibit D1- Fresno Yosemite Intl. – Airport Influence Area and Safety Zones. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/04/ALUCP-Fresno-Yosemite-International-Airport.pdf. Accessed May 17, 2022.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Emergency Response and Evacuation

Impact HAZ-6:	**The proposed project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.**

Impact Analysis

The Fresno Police Department (FPD) and FFD are the lead agencies for all local emergency response efforts. In addition, the City's full-time Emergency Preparedness Officer (EPO) is responsible for ensuring that Fresno's emergency response plans are up-to-date and implemented properly. The EPO also facilitates cooperation between City departments and other local, State, and federal agencies that would be involved in emergency response operations.[16]

Development of the Plan Area would increase the development of residential, mixed use, research and development, institutional, and office land uses. These types of land uses are not expected to impair implementation of or physically interfere with adopted emergency response plans or emergency evacuations plans in the City.

Furthermore, the Specific Plan includes various proposed policies that would reduce impacts in case of an emergency. Policy UF-5.1 requires implementation of the Major Circulation Plan, which would improve traffic circulation within the Plan Area in case of an emergency. Policy UF-5.6 sets criteria for vehicle travel facilities. Policy UF-5.7 sets Level of Service (LOS) standards. Policy OS-11.1, and Policy OS-11.2, and Policy OS-11.3 require the provision of adequate police and fire services in the SEDA in accordance with the policies of the General Plan and require that the Planning Department work with police and fire departments during buildout of the SEDA Specific Pan to ensure services are responsive to community needs.

At the programmatic level, impacts to the Plan Area would be less than significant. Consistent with the General Plan and SEDA Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts and ensure that impacts remain less than significant.

[16] City of Fresno. Mayor's Office. Emergency Preparedness. Website: https://www.fresno.gov/mayor/emergency-preparedness/. Accessed May 19, 2022.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Wildland Fires

Impact HAZ-7:	**The proposed project would not expose people or structures, either directly or indirectly to a significant risk of loss, injury or death involving wildland fires.**

Impact Analysis

CAL FIRE designates the Plan Area as an LRA.[17] There are no wildlands located within or adjacent to the Plan Area.[18] The San Joaquin River Bluffs area is identifies as having a high fire risk because it is steep terrain. However, the Plan Area is located approximately 9 miles southeast of this area.

Although portions of the City or nearby areas are designated as having high fire hazard severity, the primarily agricultural land in the Plan Area is actively managed and cultivated and therefore does not pose a high fire risk. Development of the Plan Area would result in more paved areas, thereby reducing wildfire risks. Therefore, impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.9.7 - Cumulative Impacts

The geographic context for an analysis of cumulative impacts related to hazards and hazardous materials is the Plan Area as well as the rest of the City and adjacent communities in the City of Clovis and unincorporated Fresno County. This analysis evaluates whether the impacts of the proposed project, together with the impacts of cumulative development, would result in a cumulatively significant impact related to hazards and hazardous materials. This analysis then considers whether incremental contribution to cumulative impacts associated with the

[17] California Department of Forestry and Fire Protection (CAL FIRE). 2007. Draft Fire Hazard Severity Zones in LRA. Fresno County. Website: https://osfm.fire.ca.gov/media/6673/fhszl06_1_map10.pdf. Accessed May 17, 2022.

[18] City of Fresno. 2018. Fresno County Multi-Hazard Mitigation Plan. Figure 4.52 Fresno County's Wildfire Severity Zones. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/12/FresnoCountyHMPFinal.pdf. Accessed March 21, 2023.

implementation of the proposed project would be significant. Both conditions must apply for a project's cumulative effects to rise to a level of significance.

Hazards and Hazardous Materials

Cumulative projects would be subject to the requirements and regulations set forth by the EPA, OSHA, USDOT, DTSC, Caltrans, CHP, and the San Joaquin Valley Air Pollution Control District (Valley Air District) related to transport, use, and disposal of hazardous materials. Accordingly, cumulative development would not result in physical changes that would result in a significant environmental effect. Cumulative projects will also be required to comply with the California Code of Regulations during construction, site grading, excavation operations, and building demolition. For these reasons, cumulative projects would have a less than significant cumulative effect.

Moreover, the Specific Plan's incremental contribution to the less than significant cumulative impacts would not be significant. As previously discussed, development under the Specific Plan would result in additional residential and nonresidential development, as well as other private and public improvements throughout the Plan Area, which could result in an increase in the routine transportation, use, and disposal of hazardous materials. Potential impacts would be reduced to below a level of significance, as discussed above, because construction must comply with the California Code of Regulations and implement a Storm Water Pollution Prevention Plan (SWPPP) to prevent hazardous materials spills and protect public safety, and all future development would implement project-specific MM HAZ-2a through MM HAZ-2h.

To ensure that development consistent with the Specific Plan results in a less than significant contribution to cumulative impacts, applications for development would be reviewed by the City for compliance with existing General Plan policies and actions and the proposed Specific Plan policies to further reduce potential impacts related to sites with known hazardous materials to less than significant.

Accordingly, development under the Specific Plan would not result in physical changes that would incrementally contribute to a significant environmental effect. For these reasons, the proposed project's contribution to cumulative impacts would be considered less than significant.

Airport Safety Hazards

Cumulative projects would be subject to the requirements and regulations set forth by the Fresno Yosemite International Airport ALUCP and Federal Aviation Administration related to the exposure of people residing or working in the area to a safety hazard or excessive noise. Cumulative projects would also be required to comply with the existing General Plan policies, proposed Specific Plan policies, and Municipal Code regulations related to interior noise standards and maximum building heights. For these reasons, cumulative projects would have a less than significant effect.

Moreover, the Specific Plan's incremental contribution to cumulative impacts would not be significant. As previously discussed, development under the Specific Plan would result in additional residential and nonresidential development, as well as other private and public improvements throughout the Plan Area, which could result in an increase in the exposure of people residing or

working in the area to a safety hazard or excessive noise. Potential impacts would be reduced to below a level of significance, as discussed above, because future projects would be required to comply with the policies and actions within the General Plan and the Municipal Code regarding interior noise standards and maximum building heights permitted under Federal Aviation regulations. To ensure a less than significant contribution to cumulative impacts, development consistent with the Specific Plan will be required to implement all applicable policies during the design review process. As the City receives development applications for subsequent development under the Specific Plan, those applications would be reviewed by the City for compliance with General Plan policies and actions as well as the Municipal Code to further reduce potential impacts related to the exposure of people residing or working in the area to a safety hazard or excessive noise.

Emergency Response and Evacuation Plan

Cumulative impacts related to emergency response and evacuation plans would be less than significant. The City's Police and Fire Departments manage and maintain emergency plans and training of City staff and community members and focuses on activities that will prepare the community to take care of itself in the period immediately following a local disaster. Adjacent jurisdictions also have emergency response plans and emergency evacuation plans. Furthermore, larger regional and statewide resource areas are regulated by State agencies to address larger-scale statewide issues. For these reasons, cumulative impacts associated with emergency response and evacuation plans are less than significant.

Moreover, the Specific Plan's incremental contribution to these less than significant cumulative impacts would not be significant. To ensure a less than significant contribution to cumulative impacts, development consistent with the Specific Plan would be required to implement all applicable policies and actions during the design review process. As the City receives development applications for subsequent development under the Specific Plan, those applications would be reviewed by the City for compliance with the policies and actions of the General Plan related to emergency response plans and emergency evacuation plans. Therefore, the proposed project's contribution to cumulative impacts would be considered less than significant.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Implementation of MM HAZ-2a through MM HAZ-2h.

Level of Cumulative Significance After Mitigation

Less than significant impact.

3.10 - Hydrology and Water Quality

3.10.1 - Introduction

This section describes the existing hydrology and water quality setting and potential effects of project implementation on the Plan Area and its vicinity. Descriptions and analysis in this section are based, in part, on the 2020 Urban Water Management Plan (UWMP), the Fresno Metropolitan Flood Control District (FMFCD) 2016 District Services Plan, and the 2019 North Kings Groundwater Sustainability Plan (North Kings GSP).

As further discussed in Chapter 1, Introduction, 36 public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to the project's potential hydrologic impacts:

- Identifies locations within the Plan Area that are within Special Flood Hazard Areas, which would be subject to Fresno County Ordinance Code Title 15, Chapter 15.48 as well as Federal Emergency Management Agency (FEMA) flood elevation requirements as applicable.
- States that any construction within or near a stream will require a clearance from the California Department of Fish and Wildlife (CDFW) and Streambed Alternation Agreement if buildout would result in alteration or degradation.
- Recommends that any improvements constructed within or near a canal should be coordinated with the owners of the canal/appropriate agency.
- Recommends that the FMFCD be consulted regarding future development near flood drainage basins.
- Identifies that any future development under the Southeast Development Area (SEDA) Specific Plan that would be greater than 1 acre would be required to obtain a National Pollutant Discharge Elimination System (NPDES) permit and produce a Storm Water Pollution Prevention Plan (SWPPP).
- States that any grading will require either an engineered grading and drainage plan, road improvement plan, permit, or voucher and must comply with the City of Fresno (City) standards/requirements.
- States that Fresno County (County) has a water--providing Community Service Area (CSA) (CSA 14) which is interested in connecting to the City's water system and that the County has several road CSAs within the Plan Area.
- Identifies the Fresno Irrigation District (FID) canals in the Plan Area.
- States that many of the existing facilities will need to be upgraded to meet the current urban standards or relocated by the developer to accommodate new urban developments, which will require new pipelines and new exclusive easements.
- Requires that all open channels and existing pipelines impacted by the project area development be upgraded to meet FID's current standards for urban, rural, and industrial areas.

- Requires that development impacts to large canal crossings be designed to protect the canal's integrity for an urban setting, including the need for access and full right-of-way widths for FID's operations and maintenance needs.
- Identifies that the FID facilities within the Plan Area carry irrigation water for FID users, recharge water for the City, and flood waters during winter months.
- Requires that development within the Plan Area will not result in an increase in the City's surface water allocation from FID.
- Requests that the Draft PEIR evaluate whether the City's Water Master Plan needs to be updated and how the Cooperative Agreement between the City and FID may impact development within the Plan Area.
- Requests that the Draft PEIR evaluate whether previous projects proposed under the City's Water Master Plan resulted in the benefits anticipated.
- Requests that the Draft PEIR require that any future development minimize water demand and/or reduce impacts to groundwater.
- Requires that if any future development under SEDA that uses treated surface water during a period where the City has a deficit water supply or groundwater levels continue to drop, then the City must acquire additional water from a water purveyor as to not impact water supplies or exacerbate the deficit.
- Identifies that groundwater overdraft is an issue in the City and requires that the Draft PEIR evaluates the SEDA Specific Plan's impact on groundwater resources.
- States that approximately 4,200 acres of the Plan Area is outside the current FMFCD boundary and thus the FMFCD's Sphere of Influence (SOI) will be adjusted to include the Plan Area.
- Requires that all impacts to stormwater runoff created by increasing densities in developed area that affect the capacity of the existing Master Planned storm drainage system must be fully mitigated.
- States that FMFCD has studied the areas not currently located within a Master Planned Area and has located the tentative basin facilities in an attached Exhibit that must be incorporated in the SEDA Proposed Land Use Plan.
- States that the City, FMFCD, and the County are all currently covered as co-permittees for the Municipal Separate Storm Sewer System (MS4) discharges through the NPDES Permit and discusses procedure for future projects under SEDA for permitting.
- Requests that all future California Environmental Quality Act (CEQA) review within the City, including the SEDA area, utilize the Guidance for Addressing Stormwater Quality for CEQA Review document.
- States that existing FMFCD policy requires post-development requirements for areas not served by stormwater basins or areas that discharge to sensitive waterbodies. Should future development under SEDA include sustainable infrastructure, coordination between the City and FMFCD must take place to ensure plans are suited to meet stormwater quality regulatory objectives and are compatible with drainage standards in the Fresno area.

- Recommends that the Draft PEIR evaluate impacts related to the construction of Master Planned storm drainage facilities to the extent feasible to prevent duplicate CEQA processing.
- States that future development under SEDA would be subject to drainage fees pursuant to the Drainage Fee Ordinance prior to approval of any final maps and/or issuance of building permits at the rates in effect at the time of such approval.
- Requires that the grading of proposed development within the Plan Area shall be designed such that there are not adverse impacts to the passage of major storm flow through that development.
- Requires that future development provide any surface flowage easements or covenants for any portions of the developing area that cannot convey stormwater to public right-of-way without crossing private property.
- Requires that FMFCD review and approve the final improvement plans for all development (i.e., grading, street improvement, and storm drain facilities) within the boundaries of the proposed project to ensure consistency with the future Storm Drainage Master Plan.
- Requires that a storm drain easement is obtained whenever storm drain facilities are located on private property. No encroachments into the easement will be permitted, including, but not limited to, foundations, roof overhangs, swimming pools, and trees.
- Requires that all future development verify that permanent drainage service is available with FMFCD to ensure that runoff can be safely conveyed to existing Master Plan facilities.
- Encourages but does not require that roof drains from nonresidential development be constructed such that they are directed onto and through a landscaped grassy swale area to filter out pollutants from roof runoff.
- Requires that runoff from areas where industrial activities, product, or merchandise come into contact with and thus contaminate stormwater must be directed through landscaped areas or otherwise treated before discharging it off-site or into a storm drain.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.10.2 - Environmental Setting

Surface Hydrology

The City of Fresno is located in the Upper Dry Subbasin of the Tulare-Buena Vista Lakes Watershed. The Tulare-Buena Vista Lakes Watershed generally consists of the drainage area of the San Joaquin Valley south of the San Joaquin River. This includes major population centers such as Fresno,

Bakersfield, Porterville, Hanford, Tulare, and Visalia. Encompassing approximately 10.5 million acres, water primarily flows through the watershed from the northeast to the southwest, from the Sierra Nevada to the San Joaquin Valley. Rivers in the basin typically end at the Tulare Lake and Buena Vista Lake in the western San Joaquin Valley, but some surface water can drain north to the San Joaquin River during years of extreme rainfall. The main rivers that produce surface waters within the basin include the Kings, Kaweah, Tule, and Kern Rivers. Additional suppliers of surface water in the basin area include the San Luis Canal/California Aqueduct System, Friant-Kern Canal, and the Delta-Mendota Canal, which contribute imported surface waters to the basin.[1]

The Upper Dry Subbasin is approximately 2,126 square miles in area and encompasses much of western Fresno County and small portions of Kings and San Benito Counties.[2] There are several streams that run throughout both the basin and subbasin, of which the major ones include Dry Creek, Dog Creek, and Fancher Creek.[3] Drainage in much of the subbasin area has been utilized as agricultural irrigation supply through the engineering and construction of numerous canal and conveyance systems.

The San Joaquin River and the Kings River are the principal rivers that influence the hydrology in Fresno. The Kings River is connected to the San Joaquin River by the James Bypass, a manmade canal. Floodwater from the Kings River is diverted to the San Joaquin River; three dams control the flows on the two rivers. The Friant and Mendota Dams are located on the San Joaquin River. While these two dams provide some flood control, that was not their designed purpose; they were designed as reservoirs for municipal and agricultural irrigation supply. The Pine Flat Dam on the Kings River, however, was designed for flood control. There are also multiple reservoirs and detention basins that have been constructed to prevent flooding. These facilities include the Redbank Dam, Big Dry Creek Dam, Fancher Creek Dam, Redbank Creek, Pup Creek, and the Alluvial Drain Detention Basins. These facilities, along with the numerous canals, convey discharges throughout the City. These facilities were designed to protect developed areas from a 200-year storm event.[4]

Surface Water Uses

Municipal Use

The City began using surface water as a source of potable water in 2004 with the activation of the Northeast Surface Water Treatment Facility (NESWTF). The facility, located at Chestnut and Behymer Avenues, is designed for a 30 million gallons per day (mgd) capacity and is planned to be expanded to a total of 60 mgd as development in the City continues. Surface water starts as snow melt in the Sierra Nevada before traveling down the San Joaquin and Kings Rivers via Millerton Lake and Pine Flat Reservoir. These serve as temporary storage locations before the surface water is delivered via the Enterprise Canal to the NESWTF, where the water is treated to drinking water standards. In 2017, the Friant-Kern Pipeline was completed, which allows water from the San Joaquin River to be

[1] Central Valley Regional Water Quality Control Board (Central Valley RWQCB) Water Quality Control Plan for the Tulare Lake Basin. Third Edition, May 2018.

[2] California Department of Fish and Wildlife (CDFW). 2020. Biogeographic Information and Observation System (BIOS). Website: https://wildlife.ca.gov/Data/BIOS. Accessed July 5, 2022.

[3] United States Geological Survey (USGS). 2020. The National Map Advanced Viewer. Website: https://viewer.nationalmap.gov/advanced-viewer/. Accessed July 5, 2022.

[4] Fresno Metropolitan Flood Control District (FMFCD). 2016. 2016 District Services Plan.

delivered directly to the NESWTF. This allows improved water quality, increased reliability, and greater flexibility in operating the facility. The City also completed construction of the Southeast Surface Water Treatment Facility (SESWTF), which is a 54 mgd facility with an ultimate capacity of 80 mgd.[5] This included a 72-inch raw water transmission main to convey surface water from the FID's Fresno Canal to the SESWTF.

Agricultural Use

FID serves a 383-square-mile area in the County, centered on metropolitan Fresno, with surface water from the Kings and San Joaquin Rivers for agricultural irrigation use.[6] FID has historically diverted an average of 453,800 acre-feet per year (AFY) from 1964 to 2019 depending on type of hydrologic year.[7]

Project Site

As the Plan Area is located within the City's SOI, it experiences similar surface hydrology. The Friant Dam is approximately 14 miles north and upstream from the Plan Area; the Mendota Dam is approximately 37 miles west and downstream from the Plan Area; and the Pine Flat Dam is approximately 16 miles east and upstream from the Plan Area.

There are a number of existing FID facilities that cross the Plan Area, including canals and pipelines; these include, from northeast to southwest: Redbank Creek, the Gould Canal, the Gray Colony Canal, Dog Creek, the Mill Canal, the Temperance Canal, the Fancher Creek Canal, the Briggs Canal, the East Branch West Branch Canal, the Hansen Canal, and the Armstrong Canal.

Some portions of the Plan Area are encompassed within FMFCD's service area; however, a majority of the area is outside of the service boundary.

Surface Water Quality

San Joaquin River

The primary surface water feature in the City is the San Joaquin River, which generally serves as the City's northern boundary. The San Joaquin River is 366 miles long, making it the largest river in Central California. Much of the water that flows through the San Joaquin River is used for irrigation. The San Joaquin River has been identified by the Central Valley Regional Water Quality Control Board (Central Valley RWQCB) as having numerous beneficial uses, including municipal and domestic water supply, agricultural, industrial, recreational, freshwater and wildlife habitats, and migration and spawning grounds. Water quality in the San Joaquin River is affected by both natural and anthropogenic sources, including soil erosion, stormwater runoff, wastewater discharges, industrial, residential, and agricultural runoff, recreational activity, and flora and fauna. While the segment of the San Joaquin River in the City is not considered substantially impaired, downstream portions of the River throughout the Central Valley and near the Sacramento-San Joaquin Delta are affected by various constituents and pollutants, usually as a result of agricultural runoff.[8] However, the portion

[5] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan.
[6] Fresno Irrigation District (FID). 2022. From 850 to Now. Website: https://www.fresnoirrigation.com/history. Accessed July 5, 2017.
[7] Water Systems Consulting, Inc. 2021. 2020 Urban Water Management Plan. Website: https://www.fresno.gov/publicutilities/wp-content/uploads/sites/16/2021/06/Fresno-2020-UWMP_Public-Draft_2021-06-29.pdf. Accessed July 5. 2022.
[8] City of Fresno. 2020. City of Fresno General Plan Program Environmental Impact Report.

of the San Joaquin River in Fresno does appear on the California State Water Resources Control Board (State Water Board) 2018 Impaired Water Bodies/303(d) List for invasive species (non-native fish species) and pH levels.[9]

Kings River

The Kings River is also a significant source of surface water for the Central Valley. It is located approximately 25 miles south of the City on the southern border of Fresno County. The Kings River drains from the Sierra Nevada westward toward the City. The river is approximately 126 miles long and mainly supports agriculture and groundwater recharge operations in the Central Valley. Pine Flat Dam/Reservoir supports the regulation of flows from the river. The Kings River provides water to the City and its vicinity via FID infrastructure, including a system of weirs, canals, and channels. The water quality in the Kings River is generally of high quality in its upper reaches due to its origin within the Sierra Nevada mountains. The lower reaches, however, have elevated levels of salinity, molybdenum, toxaphene, chlorpyrifos, and additional unknown toxicities, as listed in the Clean Water Act 303(d) List maintained by the State Water Board.[10] The likely sources of the contaminants, according to the Water Quality Control Plan for the Tulare Lake Basin, are either surface or subsurface agricultural drainage. The Basin Plan recommends several Best Management Practices (BMPs) to address the water quality issues.

Millerton Lake

Another prominent surface water feature in the Fresno area is Millerton Lake, which is located upstream and to the northeast of Fresno. Millerton Lake was created by the construction of Friant Dam on the San Joaquin River by the United States Bureau of Reclamation (USBR) in 1942. While Millerton's secondary uses include recreation, hydroelectric power generation, and flood control, the primary purpose is the storage of irrigation water for the San Joaquin Valley. Millerton Lake is also included on the 2016 Impaired Water Bodies/303(d) List for mercury.[11]

Other Surface Waters

A network of agricultural canals and flood control channels traverse through the City and the Plan Area. Numerous agricultural ponds, recharge basins, and other similar features are also located throughout the City.[12]

Project Site

The Plan Area will be supplied by the same surface water sources from the City's water supply system and, therefore, would be subject to the same surface water quality conditions for potable water supplies.

There are a number of FID and other canals and bodies of water located throughout the Plan Area, including Redbank Creek, the Gould Canal, the Gray Colony Canal, Dog Creek, the Mill Canal, the

[9] California State Water Resources Control Board (State Water Board). 2018 California Integrated Report (Clean Water Act Section 303(d) List and 305(b) Report). Website: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2018_integrated_report.html. Accessed June 10, 2022.

[10] Kings Basin Water Authority. 2018. Kings Basin Integrated Regional Water Management Plan.

[11] City of Fresno. 2020. City of Fresno General Plan Program Environmental Impact Report.

[12] Ibid.

Temperance Canal, the Fancher Creek Canal, the Briggs Canal, the East Branch West Branch Canal, the Hansen Canal, and the Armstrong Canal. A portion of the Redbank Basin is located in the northwestern portion of the Plan Area, and the Fancher Creek Basin is located just outside the northeastern boundary of the Plan Area. No surface water bodies in or near the Plan Area are listed on the 303(d) List.[13]

Groundwater Basin Hydrology

The City is within the Kings River Subbasin, which, along with six other subbasins, form the San Joaquin Valley Groundwater Basin. The San Joaquin Valley Groundwater Basin is located within the Tulare Lake Hydrologic Region, which spans approximately 10.9 million acres and includes most of Fresno County. The region encompasses the southern one-third of the Central Valley RWQCB. The Kings River Subbasin extends from the Sierra Nevada foothills on the east to the San Joaquin Valley trough on the west and from the San Joaquin River in the north to roughly the Fresno County line on the south.[14]

Historically, the City has relied heavily on groundwater pumped from the underground basin and aquifers to meet its water demands. The City has a network of over 270 municipal water wells and operates approximately 202 active municipal supply wells that access groundwater from said basin.[15] The production capacity from the active wells is approximately 403 mgd, and the total capacity including inactive wells is approximately 487 mgd.[16] The wells are located around the City, and most are directly connected into the water distribution system. The City's water system depended completely on groundwater as a water source until 2004, when the first Surface Water Treatment Facility (SWTF) was commissioned. Today, groundwater is still heavily relied upon as a primary water source for the City; however, the City is working to maximize the use of its surface water supplies to reduce future dependance on groundwater.[17]

The City is located within the North Kings Groundwater Sustainability Agency (North Kings GSA), which is working to reach groundwater sustainability in accordance with the Sustainable Groundwater Management Act (SGMA). SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040; the Kings River Subbasin was identified as a critically overdrafted basin. As a result, the City has placed a higher priority on developing its surface water supply and decreasing its reliability on groundwater to allow the basin to recharge. The City actively works to recharge the groundwater basin. As a result of the City's investment in other water supplies, groundwater levels in the City have begun to stabilize.[18]

The City replenishes groundwater by three methods: natural recharge, subsurface inflow, and intentional recharge.

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[13] California State Water Resources Control Board (State Water Board). 2018 California Integrated Report (Clean Water Act Section 303(d) List and 305(b) Report). Website: https://www.waterboards.ca.gov/water_issues/programs/water_quality_assessment/2018_integrated_report.html. Accessed June 10, 2022.

[14] City of Fresno. 2020. City of Fresno General Plan Program Environmental Impact Report.

[15] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan.

[16] Ibid.

[17] Ibid.

[18] Ibid.

Natural recharge occurs as precipitation, irrigation, canal, and/or stream flows infiltrate the soils and seep down to the water table to replenish the aquifer. Per the 2020 UWMP, the Kings Basin Integrated Groundwater and Surface Water Model (IGSM), completed in 2007, provides the best available information on the City's groundwater yield. As such, the annual natural recharge from 1964 to 2004 was determined to be 42,700 AFY; however, this was projected to decline steadily from 2005 to General Plan buildout within the City's SOI due to increased urbanization and development and a reduction in pervious surfaces. It can be noted though that, as future growth areas are annexed, the amount of natural recharge may increase. The UWMP estimated a total of 24,970 acre-feet (AF) of natural recharge for 2020, and projects that natural recharge will total 26,280 AF in the General Plan buildout year of 2035 and 26,790 AF by 2045, assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[19]

Subsurface recharge occurs from the movement of groundwater from external sources moving into the local aquifer. Subsurface water tends to flow from surrounding areas with a higher groundwater table than the City's into the aquifer within the City's SOI, including the Plan Area. It is likely that the subsurface inflow would increase with future annexation and development as the SOI is built out. Per the 2020 UWMP, net subsurface inflow into the City's SOI was determined to be 64,800 AFY annually for the period of 1964–2004. The UWMP estimated a total subsurface inflow for 2020 of 47,510 AF and projects that the total would reach 54,720 AF in 2035 and 59,530 AF in 2045, assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[20]

Intentional recharge occurs by directing surface water into the underground aquifer with the use of groundwater recharge basins or wells. Fresno mainly uses recharge basins, which are located throughout the City, in an effort to offset declining groundwater levels and overdraft conditions. The City's primary recharge facility is Leaky Acres, located northwest of the Fresno-Yosemite International Airport. It consists of 26 basins covering approximately 225 acres. Additionally, the City has agreements with the FMFCD and the FID to utilize their facilities (basins, canals, etc.) for additional groundwater recharge activities. According to the 2020 UWMP, the City recharged an average of approximately 60,000 AFY from 2000 to 2019. However, the amount has not historically been consistent and can fluctuate based on available surface water. This amount dropped to 34,700 AF in 2014 and to 19,800 AF in 2015. In 2019 though, the City recharged 82,993 AF, the highest amount within this measurement period. Per the City's 2020 UWMP, the City will plan on increasing the amount of groundwater to be recharged gradually by 540 AFY each year moving forward when possible. During wet years, the City will recharge more water when it is available to help offset potential increased reliance on groundwater during dry years. The UWMP projects a total recharge volume of 60,000 AF starting in 2020, increasing to 68,100 AF in 2035 and 73,500 AF in 2045 during normal water years.

The total groundwater recharge amount for 2020 was 132,480 AF (24,970 AF of natural recharge, 47,510 AF of subsurface inflow, and 60,000 AF of intentional recharge); the total projected groundwater recharge amount for 2035 is 149,100 AF (26,280 AF of natural recharge, 54,720 AF of

[19] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan, Table 6-1, Components to Groundwater Yield for Normal Years.

[20] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan.

subsurface inflow, and 68,100 AF of intentional recharge) and for 2045 is 159,820 AF (26,790 AF of natural recharge, 59,530 AF of subsurface inflow, and 73,500 AF of intentional recharge) during normal water years and assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[21] Groundwater pumping has been greatly reduced since the activation of the first SWTF in 2004 and has only further declined as a result of a second SWTF; per the 2020 UWMP, groundwater pumping has decreased from 165,200 AFY in 2003 to 55,000 AF in 2020.[22] Surface water has allowed the City to reduce its dependance on groundwater as a water supply. Prior to 2004, 100 percent of Fresno's water demand was met with groundwater. In 2004, the City's first SWTF, the NESWTF, was constructed and activated; it provided 10–15 percent of the City's potable water demand from 2005–2014, and 15 percent from 2016–2020. With the addition of the T-3 Water Storage and modular Surface Water Treatment Facility (T-3 SWTF) in 2015 and the SESWTF in 2018, the City was able to provide greater than 50 percent of its potable water supply with surface water in 2019 and 2020.[23] The City plans on expanding surface water treatment capacities and groundwater recharge activities to maintain the reduction in groundwater reliance.

Plan Area

The City Metropolitan Water Resources Management Plan (Metro Plan) and UWMP include several objectives, goals, and policies to improve and develop water infrastructure as development progresses in the City.[24] The critical focal points of the water system development are the implementation of further water conservation measures, installation of new municipal groundwater wells, increased groundwater recharge efforts to bring the City's groundwater pumpage into balance with its recharge rate, maximized use of available surface water, increased use of recycled water for landscape irrigation and other nonpotable uses, and the acquisition of future water supplies when available.

At the time of preparation of this Draft PEIR, the City is updating the Metro Plan to include revised and updated recommendations for water supply facilities for the Plan Area. Among these proposed improvements are new municipal groundwater wells to be drilled in the Plan Area, recharge inter-ties to FMFCD basins to facilitate groundwater recharge in the Plan Area, expansion of SWTFs, new water storage and booster pump sites, and new water mains.

Groundwater Quality

Groundwater quality throughout the Tulare Lake Hydrologic Region is generally suitable for most urban and agricultural uses and meets primary and secondary drinking water standards for municipal use. However, local impairments are found in the groundwater supply with high total dissolved solids (TDS), nitrate, arsenic, and organic compounds acting as the primary constituents of concern within the region. With the exception of the western portion of the Tulare Lake Hydrologic Region, the region lacks any substantial low permeability units that would isolate deep from shallow

[21] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan, Table 6-1, Components to Groundwater Yield for Normal Years.
[22] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan, Figure 6-7, Historic Groundwater Production.
[23] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan.
[24] City of Fresno. 2014. Fresno Metropolitan Water Resources Management Plan Update.

aquifers; as such, most of the aquifer underlying Fresno is unconfined.[25] As a single, unconfined aquifer, the groundwater basin within the City has been designated as a Sole Source Aquifer as authorized by Section 14246 of the Federal Safe Drinking Water Act of 1974.[26] This designation means that Fresno is dependent on a single source of groundwater and that this sole source must be protected from contamination.

While the groundwater supply within the Kings River Subbasin generally meets drinking water standards, extensive contamination occurs throughout the City with eight major contaminant plumes present. Of the City's 270 groundwater wells, 60 of the active wells currently have wellhead treatment systems.[27] Several different types of pollutants have contaminated the groundwater in portions of the City. Major contaminant plumes include dibromochloropropane (DBCP), ethylene dibromide (EDB), trichloropropane (TCP), other volatile organic compounds (VOCs) like trichlorethylene (TCE), tetrachloroethylene (PCE), nitrate manganese, radon, chloride, and iron. Nitrate, pesticides, and nutrients in agricultural drainage are currently found within much of the City's groundwater supply, and their levels exceed some drinking water standards established by the State. While nitrates may occur naturally, their presence is often attributed to anthropogenic reasons. Leaking septic tanks, which are prevalent in the less dense southeast portion of the City, are also a substantial source of nitrate contamination.[28]

Another major problem facing the City's groundwater supply is the presence of DBCP in groundwater wells. This fumigant was widely used in the 1960s to control nematodes in vineyards and is now present in down gradient groundwater wells. TCP has also been detected in 42 of the City's municipal wells. As of early 2020, the City is currently in litigation with pesticide manufacturers that have been linked to this contamination.[29]

Plan Area

While there are no wells currently in operation within the Plan Area, several wells adjacent to the Plan Area have active wellhead treatment systems for DBCP and TCP contaminants. There are also portions of TCP (5 parts per trillion [ppt]), DBCP (0.2 parts per billion [ppb]) and nitrate (5 milligrams per liter [mg/L]) contaminant plumes within the Plan Area on the western border near State Route (SR) 180.

It is expected that some portion of any new groundwater wells to be installed in the Plan Area will require wellhead treatment systems for various contaminants.

Stormwater Runoff

Stormwater Collection System

Stormwater drainage facilities within the Fresno-Clovis Metropolitan area are planned, implemented, operated, and maintained by the FMFCD. The storm drain facilities are documented in

[25] City of Fresno. 2020. City of Fresno General Plan Program Environmental Impact Report.
[26] United States Environmental Protection Agency (EPA). 2021. Summary of the Safe Drinking Water Act 42 USC Section300f et seq. (1974). Website: https://www.epa.gov/laws-regulations/summary-safe-drinking-water-act. Accessed June 10, 2022.
[27] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan.
[28] City of Fresno. 2020. City of Fresno General Plan Program Environmental Impact Report.
[29] Ibid.

the Storm Drainage and Flood Control Master Plan (Storm Drain Master Plan), which is developed and updated by FMFCD. FMFCD's Storm Drain Master Plan divides the service area into many local drainage areas of 1–2 square miles throughout Fresno. Drainage area boundaries are determined by geographic and topographic features and the economics of providing storm drainage service to the watershed. Storm drainage facilities within a drainage area typically consist of storm drain inlets, pipelines, retention basins, urban detention (water quality) basins, and stormwater pump stations. Surface grading improvements such as streets, curbs, gutters, and valley gutters are part of the City of Fresno infrastructure, but the general grading of these features is governed by the Storm Drain Master Plan to provide a coherent implementation of drainage within Fresno.

All inlets, pipes, and pump stations within each drainage area are maintained by the FMFCD. The gutters, along with public streets and sidewalks, are maintained by the City's Street Maintenance Division. It is assumed that this maintenance agreement will remain in place for the foreseeable future. The FMFCD's Storm Drain Master Plan includes 164 adopted or proposed drainage areas, most served by a retention or detention facility.[30] FMFCD basins have been sized for capacities of 2-year storms and for at least 60 percent of average rainfall;[31] FMFCD allows a 20 percent change in volume before basins need to be resized or relocated.

Stormwater collection in the City begins with street gutters that collect and convey stormwater runoff to storm drain inlets. The runoff is collected in these inlets and delivered to FMFCD's pipe networks, pump stations, and infiltration basins for groundwater recharge. Most runoff is discharged into recharge basins, but during heavy rainfall events, excess runoff overflows into a system of relief channels and canals that discharge to the San Joaquin River, its tributary streams, local agricultural canals, and FID facilities.

Storm drain inlets are located at low points in the topography as determined by the Storm Drain Master Plan. Pipeline alignments and sizes are also shown on the Storm Drain Master Plan. Pipeline alignments are subject to change as development proposals are put forward by development projects. Retention basin and urban detention basin locations and sizes are part of the Storm Drain Master Plan as well. Basins are sited in the topographic low point of the drainage area. All of the storm drainage pipelines within the drainage area are directed to the basin for that area. Retention basins store and percolate stormwater from the drainage area if time between storms permits; otherwise, the water is pumped to designated irrigation canals. Urban detention basins provide quiescent (still) conditions for the removal or settling out of suspended solids prior to discharge of the stormwater to the San Joaquin River.

The Fresno-Clovis Metropolitan area consists of drainage areas that are completed (e.g., all Master Planned facilities are constructed and functional) or in the process of being completed (e.g., portions of the retention basin, pipelines, and inlets are constructed and other portions are not). For the drainage areas that are in the planning stage, the planning area may be planned and documented and the retention basin land may be purchased, but no construction has occurred; other areas may not have the land purchased for the basins yet. Implementation of the Storm Drain Master Plan

[30] Fresno Metropolitan Flood Control District (FMFCD). 2016. 2016 District Services Plan.
[31] Ibid.

occurs in response to development activity in newly developing areas and through Capital Improvement Projects (CIPs) in previously developed areas.

Plan Area

In accordance with the Storm Drain Master Plan and other planning documents, the FMFCD is developing improvements for the Plan Area for storm drain facilities. The Plan Area encompasses all or part of the following existing drainage areas: BG, BL, BM, BS, CS, DS and, DV. Proposed drainage areas for SEDA include DT, DU, DW, DX, DY, and DZ. Most of the existing drainage areas include existing storm drain collection facilities, but the proposed drainage areas generally have no existing storm drain facilities. Areas DS and DV are the exceptions in that they are existing drainage areas with basins but have not been built out to Master Plan conditions. FMFCD improvements include storm drain inlets and piping, which are being analyzed and developed in conjunction with the proposed land uses for the Plan Area. Those portions of the Plan Area encompassed in existing drainage areas include Master Planned utilities designed by FMFCD.

There are seven existing basins contributing to stormwater collection for the Plan Area and six proposed basins within the Plan Area. There are also two existing basins outside of the Plan Area that are not part of existing drainage areas, including the Redbank Basin and the Fancher Creek Basin, which may contribute to additional drainage capacity; however, these two basins were not considered in the analyses completed as part of the Storm Drain Technical Study prepared for this Draft PEIR (Appendix I). FMFCD basins are designed for a capacity of a 2-year storm and for at least 60 percent of average rainfall. Per the FMFCD, the proposed drainage areas for SEDA have not been adopted yet, and the basin locations have not been finalized. Table 3.10-1 shows the capacities of both existing basins that serve the Plan Area and proposed basins that will serve the Plan Area.

Table 3.10-1 Drainage Areas and Basin Capacities

Drainage Area Designation	Drainage Area Size [A] (acres)	Basin Volume [B] (AF)	Basin Design Use	Basin Type	Relief Line to FID Facility
Existing Drainage Areas/Basins					
BG	755	232.1	Nonresidential	Recharge	Yes; Washington Colony Canal
BL	782	301.1	Residential	Recharge	No; relief line to Basin BH
BM	1,519	390.4	Residential	Dual Use	No; relief line to Basin BH
BS	1,341	396.7	Nonresidential	Recharge	Yes; Mill Ditch
CS	854	346.5	Nonresidential	Recharge	Yes; Washington Canal
DS [C]	1,960	1,383.3	Residential	Undetermined [D]	Yes; Mill Ditch and Redbank Basin
DV [C]	505	230.0	Nonresidential	Undetermined [D]	Yes; Briggs Canal and Fancher Creek

Drainage Area Designation	Drainage Area Size [A] (acres)	Basin Volume [B] (AF)	Basin Design Use	Basin Type	Relief Line to FID Facility
Proposed Drainage Area/Basins					
DT	983	232.4	Residential	Undetermined [D]	Yes; Fancher Creek
DU	1,307	323.8	Residential	Undetermined [D]	No; relief line to Basin DV
DW	756	233.9	Residential	Undetermined [D]	Undetermined
DX	879	304.5	Residential	Undetermined [D]	Yes; Briggs Canal
DY	749	295.2	Nonresidential	Undetermined [D]	No; relief line to Basin DZ
DZ	698	263.6	Nonresidential	Undetermined [D]	No; relief line to Basin BG

Notes:
AF = acre-feet
FID = Fresno Irrigation District
FMFCD = Fresno Metropolitan Flood Control District
GIS = Geographic Information System
[A] Drainage area sizes obtained from GIS Shape Files provided by FMFCD.
[B] Basin volumes obtained from H&H calculation sheets provided by FMFCD.
[C] Existing drainage area and basin but not yet built out.
[D] Approved use of proposed basins will be determined via coordination between FMFCD and City.
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Storm Drain Technical Study. June 10, 2022.

Flooding and Inundation

The City of Fresno is located in the alluvial fans of numerous foothill stream sand creeks that drain the western slope of the Sierra Nevada foothills. These streams include Big Dry Creek, Alluvial Drain, Pup Creek, Dog Creek, Redbank Creek, Mud Creek, and Fancher Creek. Numerous smaller, unnamed drainage courses also drain into the City from the rural areas east of Fresno.

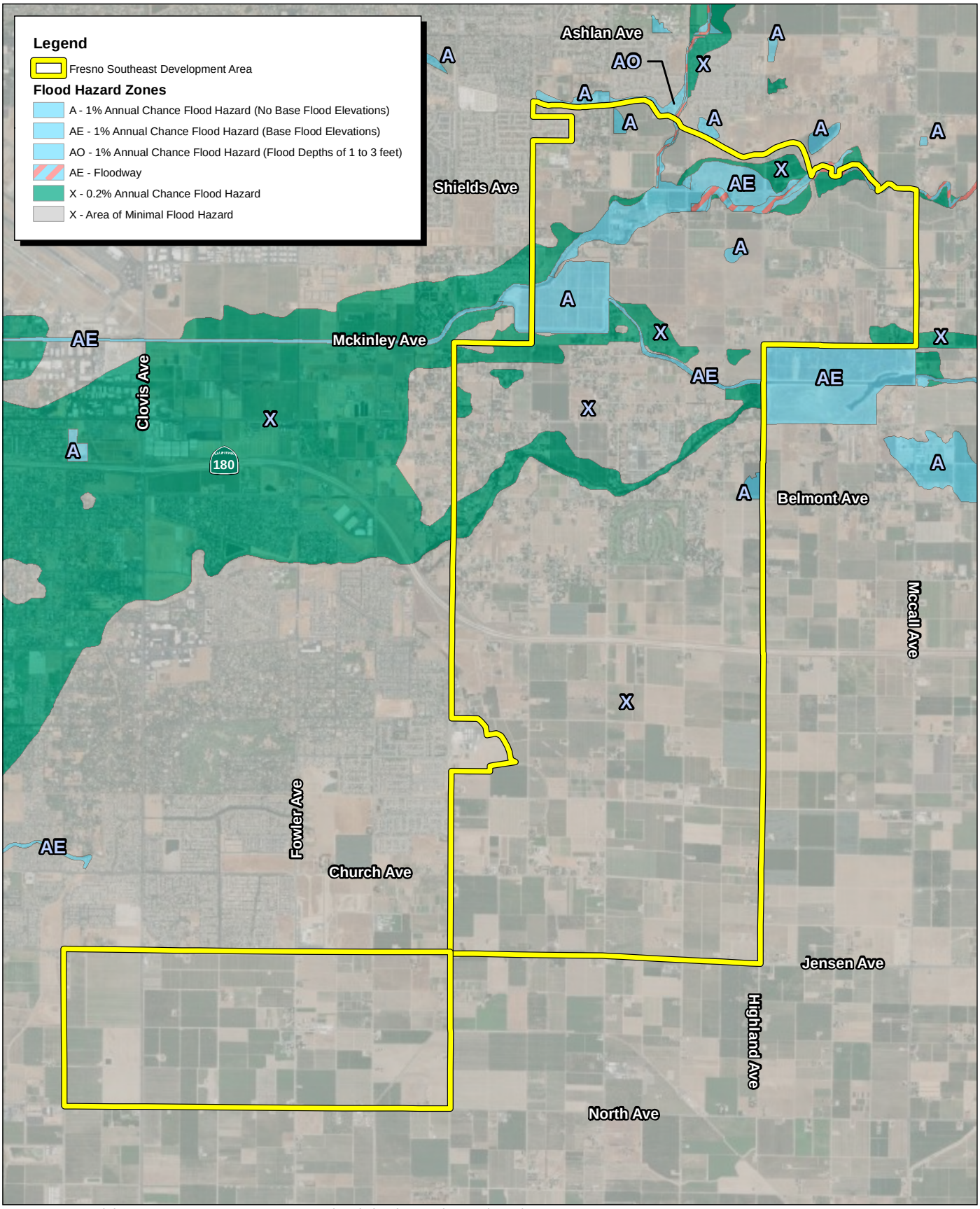
Based on a review of the FEMA Flood Insurance Rate Maps (FIRMs) for the City of Fresno,[32] there are areas that are subject to the 100-year flood frequency flood zone as shown in Exhibit 3.10-1. The primary area that is subject to the 100-year flood zone is along the San Joaquin River below the bluffs. There are additional areas in the vicinity of the Fresno International Airport, the SEDA Specific Plan Area in the vicinity of the Redbank Creek Dam, adjacent to SR-180 east of Clovis Avenue, and within an industrial area east of SR-99, south of California Avenue and north of Jensen Avenue. In addition, various detention basins are subject to the 100-year flood zone.

Project Site

According to the FIRMs that include SEDA, a majority of the SEDA Specific Plan Area is outside the 100-year flood zones; most areas are located within Zone X (unshaded) (outside the 500-year floodplain with minimal risk of flooding) as shown in Exhibit 3.10-1.

[32] Federal Emergency Management Agency (FEMA). 2021. National Flood Hazard Layer. Website: https://www.fema.gov/flood-maps/national-flood-hazard-layer. Accessed June 13, 2022.

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Source: ESRI Aerial Imagery. Fresno County. FEMA National Flood Hazard Layer (NFHL)

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Exhibit 3.10-1
Flood Hazard Map

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However, several areas in the northern portion of SEDA (north of SR-180) are within zones of higher flood chances, including Zones X (shaded) (between the 100-year and 500-year floodplain with moderate risk of flooding); Zone A (Special Flood Hazard Area [SFHA] within the 100-year floodplain with high risk of flooding, but base flood elevations have not been determined); Zone AE (SFHA within the 100-year floodplain with high risk of flooding and with determined base flood elevations); and Zone A/AE Regulatory Floodplains (SFHA with high risk of flooding, the channel of a waterway and adjacent area which must be reserved to discharge base flood without increasing surface water elevation). These areas are mainly adjacent to existing rivers, creeks, canals, or detention basins.

Per the FEMA FIRM, areas surrounding and along the Fancher Creek are within Zone X (shaded), the area containing the Redbank Detention Basin is within Zone A, areas surrounding and along the Mill Ditch and Redbank Creek are within Zone AE, and a portion of the Redbank Creek along the northern SEDA border is defined as a Regulatory Floodplain.

The Plan Area is located approximately 6 miles south of Big Dry Creek Dam. An expanded drain was installed at the base of the downstream side of the dam in 2014 to prevent potential damage to the dam from seepage under the dam. The dam is also inspected annually by the California Department of Water Resources (DWR) Division of Safety of Dams. Considering recent improvements and regular maintenance of the dam, the potential for dam failure is considered slight, and buildout of the SEDA Specific Plan would not exacerbate flood hazards due to dam inundation. No areas in the Plan Area are mapped as protected from 100-year floods by levees, and thus buildout of the SEDA Specific Plan would not place people or structures in the Plan Area at risk of flooding due to levee failure.

3.10.3 - Regulatory Framework

Clean Water Act

The Clean Water Act (CWA) (33 United States Code [USC] § 1251, *et seq*.) is the major federal legislation governing the water quality aspects of construction and operation of the project or variant. The CWA established the basic structure for regulating discharges of pollutants into waters of the United States (not including groundwater) and waters of the State. The objective of the CWA is "to restore and maintain the chemical, physical, and biological integrity of the nation's waters." The CWA establishes the basic structure for regulating the discharge of pollutants into waters of the United States.

The CWA authorizes the United States Environmental Protection Agency (EPA) to implement pollution control programs. Under the CWA, it is unlawful for any person to discharge any pollutant from a point source into navigable waters, unless an NPDES Permit is obtained. In addition, the CWA requires each state to adopt water quality standards for receiving water bodies and to have those standards approved by the EPA. Water quality standards consist of designated beneficial uses for a particular receiving water body (e.g., wildlife habitat, agricultural supply, fishing), along with water quality objectives necessary to support those uses.

Responsibility for protecting water quality in California resides with the State Water Board and nine RWQCBs. The State Water Board establishes Statewide policies and regulations for the implementation of water quality control programs mandated by federal and State water quality

statutes and regulations. The RWQCBs develop and implement water quality control plans (basin plans) that consider regional beneficial uses, water quality characteristics, and water quality problems. Water quality standards applicable to the project are listed in the Central Valley RWQCB Basin Plan.

Section 303—Water Quality Standards and Total Maximum Daily Loads

Section 303I(2)(b) of the CWA requires states to adopt water quality standards for all surface waters of the United States based on the water body's designated beneficial use (33 USC § 1251 *et seq*.). Where multiple uses exist, water quality standards must protect the most sensitive use. Water quality standards are typically numeric, although narrative criteria based on biomonitoring methods may be employed where numerical standards cannot be established or where they are needed to supplement numerical standards.

CWA Section 303(d) requires states and authorized Native American tribes to develop a list of water quality impaired segments of waterways. The list includes waters that do not meet water quality standards necessary to support a waterway's beneficial uses even after the minimum required levels of pollution control technology have been installed. Listed water bodies are to be priority ranked for development of a Total Maximum Daily Load (TMDL). A TMDL is a calculation of the total maximum daily load (amount) of a pollutant that a water body can receive on a daily basis and still safely meet water quality standards. The TMDLs include waste load allocations for urban stormwater runoff as well as municipal and industrial wastewater discharges, with allocations apportioned for individual MS4s and wastewater treatment plants. For stormwater, load reductions would be required to meet the TMDL waste load allocations within the 20 years required by the TMDLs.

The State Water Board, RWQCBs, and EPA are responsible for establishing TMDL waste load allocations and incorporating approved TMDLs into water quality control plans, NPDES permits, and Waste Discharge Requirements (WDRs) in accordance with a specified schedule for completion. The Central Valley RWQCB develops TMDLs for the San Joaquin River (dissolved oxygen, diazinon and chlorpyrifos, salt and boron, and selenium), the Sacramento-San Joaquin Delta (methylmercury, diazinon and chlorpyrifos), Cache Creek/Bear Creek/Harley Gulch (mercury), Clear Lake (mercury and nutrients), Grasslands Marshes (selenium), Sacramento and Feather Rivers (diazinon and chlorpyrifos), Sacramento County Urban Creeks (diazinon and chlorpyrifos), Sacramento River (cadmium, copper, and zinc), Salt Slough (selenium), Stockton Urban Waterbodies (pathogen), and Central Valley TMDLs (pesticides and pyethroid).[33]

Section 401—Water Quality Certification

Section 401 of the CWA requires compliance with State water quality standards for actions within State waters. Under CWA Section 401, an applicant for a Section 404 permit (to discharge dredged or fill material into waters of the United States) must first obtain a certificate from the appropriate agency stating that the fill is consistent with the State's water quality standards and criteria. In California, the State Water Board delegates authority to either grant water quality certification or

[33] Central Valley Regional Water Quality Control Board (Central Valley RWQCB). 2022. Total Maximum Daily Loads (TMDL) and Impaired Water Bodies 303(d) List. Website: https://www.waterboards.ca.gov/centralvalley/water_issues/tmdl/. Accessed June 13, 2022.

waive the requirements to the nine RWQCBs. The Central Valley RWQCB is responsible for the project site.

Section 402—National Pollution Discharge Elimination System Permits

The RWQCBs administer the NPDES stormwater permitting program, under Section 402(d) of the federal CWA, on behalf of the EPA (33 USC § 1251 *et seq*.). The objective of the NPDES program is to control and reduce levels of pollutants in water bodies from discharges of municipal and industrial wastewater and stormwater runoff. CWA Section 402(d) establishes a framework for regulating nonpoint-source stormwater discharges (33 USC 1251). Under the CWA, discharges of pollutants to receiving water are prohibited unless the discharge complies with an NPDES Permit. The NPDES Permit specifies discharge prohibitions, effluent limitations, and other provisions, such as monitoring deemed necessary to protect water quality based on criteria specified in the National Toxics Rule (NTR), the California Toxics Rule (CTR), and the basin plan.

Discharge prohibitions and limitations in an NPDES Permit for wastewater treatment plants are designed to maintain public health and safety, protect receiving water resources, and safeguard the water's designated beneficial uses. Discharge limitations typically define allowable effluent quantities for flow, biochemical oxygen demand, total suspended matter, residual chlorine, settleable matter, total coliform, oil and grease, pH, and toxic pollutants. Limitations also typically encompass narrative requirements regarding mineralization and toxicity to aquatic life. Under the NPDES permits issued to the city/county to operate the treatment plants, the city/county is required to implement a pretreatment program. This program must comply with the regulations incorporated in the CWA and the General Pretreatment Regulations (Code of Federal Regulations [CFR] Title 40, Part 403).

Section 401—Water Quality Certification

Section 404 of the CWA regulates temporary and permanent fill and disturbance of wetlands and waters of the United States. Under Section 404, the discharge (temporary or permanent) of dredged or fill material into waters of the United States, including wetlands, typically must be authorized by the United States Army Corps of Engineers (USACE) through either the Nationwide Permit (general categories of discharges with minimal effects) or the Individual Permit.

River and Harbors Act Section 10

Section 10 of the Rivers and Harbors Act of 1899 (33 USC § 401 *et seq.*) requires that regulated activities conducted below the ordinary high-water elevation of navigable waters of the United States be approved and permitted by the USACE. Regulated activities include the placement or removal of structures, work involving dredging, disposal of dredged material, filling, excavation, or any other disturbance of soils/sediments or modification of a navigable waterway. Navigable waters of the United States are those waters of the United States that are subject to the ebb and flow of the tide shoreward to the mean high-water mark and/or are presently used, or have been used in the past, or may be susceptible to use, to transport interstate or foreign commerce. Section 10 also regulates tributaries and backwater areas that are associated with navigable waters of the United States and are located below the ordinary high-water elevation of the adjacent navigable waterway.

A project proponent can apply for a permit/letter of permission for work regulated under Section 404 (CWA) and Section 10 (Rivers and Harbors Act) by completing and submitting one application form. An application for a USACE permit will serve as an application for both Section 404 and Section 10 permits.

Federal Antidegradation Policy

The Federal Antidegradation Policy (40 CFR 131.12) is designed to protect existing water uses, water quality, and national water resources. The federal policy directs states to adopt a Statewide policy that includes the following primary provisions:

- Existing instream uses and the water quality necessary to protect those uses shall be maintained and protected.
- Where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the State finds that allowing lower water quality is necessary for important local economic or social development.
- Where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

National Toxics Rule and California Toxics Rule

In 1992, the EPA promulgated the NTR under the CWA to establish numeric criteria for priority toxic pollutants for 14 states to bring all states into compliance with the requirements of CWA Section 303I(2)(B). The NTR established water quality standards for 42 pollutants not covered under California's Statewide water quality regulations at that time. As a result of the court-ordered revocation of California's Statewide basin plans in September 1994, the EPA initiated efforts to promulgate additional federal water quality standards for California. In May 2000, the EPA issued the CTR, which includes all the priority pollutants for which the EPA has issued numeric criteria not included in the NTR.

Executive Order 11988

Executive Order 11988, Floodplain Management, directs all federal agencies to avoid, to the extent possible, long- and short-term adverse impacts of occupancy and modification of floodplains and to avoid supporting development in a floodplain either directly or indirectly wherever there is a practicable alternative. Compliance requirements are outlined in 23 Code of Federal Regulations 650, Subpart A, Location and Hydraulic Design of Encroachment on Floodplains.

If a project involves substantial encroachment into the floodplain, the final environmental document must include:

- The reasons why the proposed action must be located in the floodplain.
- Alternatives considered and the reasons they were not practicable.
- A statement indicating whether the action conforms to applicable State or local floodplain protection standards.

National Flood Insurance and Flood Disaster Act

The National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973 were enacted to reduce the need for flood protection structures and limit disaster relief costs by restricting development in floodplains.[34] FEMA, established in 1979, is responsible for predicting hazards from flooding events and forecasting the level of inundation under various conditions. As part of its duty to develop standards for delineating fluvial and coastal floodplains, FEMA provides information on FIRMs about the potential for flood hazards and inundation and, where appropriate, designates regions as special flood hazard areas. Special flood hazard areas are defined as areas that have a 1 percent chance of flooding in a given year.

FEMA also administers the National Flood Insurance Program (NFIP), a federal program that enables property owners in participating communities to purchase insurance as protection against flood losses in exchange for state and community floodplain management regulations that reduce future flood damages.

State

Porter-Cologne Water Quality Control Act

The Porter-Cologne Water Quality Control Act of 1969 (Porter-Cologne Act)[35] is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The RWQCBs are required to formulate and adopt basin plans for all areas in the region and establish water quality objectives in the plans. The Porter-Cologne Act sets forth the obligations of the State Water Board and RWQCBs to adopt and periodically update basin plans. The Central Valley RWQCB is responsible for the project site.

Basin plans are the regional water quality control plans required by both the CWA and the Porter-Cologne Act that establish beneficial uses, water quality objectives, and implementation programs for each of the nine regions in California. The Porter-Cologne Water Quality Control Act also requires waste dischargers to notify the RWQCBs of their activities by filing reports of waste discharge and authorizes the State Water Board and RWQCBs to issue and enforce WDRs, NPDES permits, CWA Section 401 water quality certifications, or other approvals. The RWQCBs are also authorized to issue waivers to reports of waste discharge and WDRs for broad categories of "low threat" discharge activities that have minimal potential to cause adverse water quality effects when implemented according to prescribed terms and conditions.

National Pollutant Discharge Elimination System

The NPDES[36] permits all involve similar processes, which include submitting notices of intent for discharging to receiving waters and implementing BMPs to minimize those discharges. The Central

[34] National Flood Insurance Act of 1968 (1968) and Flood Disaster Protection Act of 1973 (1973). (1968, 1973). Website: https://www.fema.gov/sites/default/files/2020-07/national-flood-insurance-act-1968.pdf. Accessed July 6, 2022.
[35] California Porter-Cologne Water Quality Act, California Water Code Div. 7 § 13000, *et seq.* 1969.
[36] United States Environmental Protection Agency (EPA). National Pollutant Discharge Elimination System (NPDES). 1972.

Valley RWQCB may also issue site-specific WDRs, or waivers to WDRs, for certain waste discharges to land or waters of the State.

Construction Activity

The State Water Board Stormwater General Permit for Construction Activity (Order 2009-009-DWQ, as amended by Order Nos. 2010-0014-DWQ and 2012-0006-DWQ) applies to all construction activities that would disturb one acre of land or more. Construction activities subject to the general construction activity permit include clearing, grading, stockpiling, and excavation. Dischargers are required to eliminate or reduce non-stormwater discharges to storm sewer systems and other waters.

Through the NPDES and WDR processes, the State Water Board seeks to ensure that the conditions at a project site during and after construction do not cause or contribute to direct or indirect impacts on water quality (i.e., pollution and/or hydromodification) upstream and downstream. To comply with the requirements of the Construction General Permit, the project applicant must file a notice of intent with the State Water Board to obtain coverage under the permit; prepare a Stormwater Pollution Prevention Plan (SWPPP); and implement inspection, monitoring, and reporting requirements appropriate to the project's risk level as specified in the SWPPP. The SWPPP includes a site map, describes construction activities and potential pollutants, and identifies BMPs that will be employed to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources, such as petroleum products, solvents, paints, and cement. The permit also requires the discharger to consider using post-construction permanent BMPs that will remain in service to protect water quality throughout the life of the project. All NPDES permits also have inspection, monitoring, and reporting requirements.

Project sites served by the combined sewer system are not required to obtain coverage under the NPDES Construction General Permit.

Industrial General Stormwater Permit

The Statewide stormwater NPDES Permit for general industrial activity (Order 2014-0057-DWQ, superseding Order 97-03-DWQ) regulates discharges associated with 10 broad categories of industrial activities, such as operation of wastewater treatment works, and with recycling facilities. The industrial general permit requires the implementation of Best Available Technology Economically Achievable and Best Conventional Pollutant Control Technology to achieve performance standards. The permit also requires development of a SWPPP that identifies the site-specific sources of pollutants and describes the measures at the facility applied to reduce stormwater pollution. A monitoring plan is also required.

Stormwater

In November 1990, the EPA published regulations establishing NPDES Permit requirements for municipal and industrial stormwater discharges. Phase I of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase II of the NPDES stormwater permit regulations, which became effective in March 2003, required that NPDES permits be issued for construction activity for projects disturbing 1–5 acres. Phase II of the municipal permit system (known as the NPDES General Permit for Small MS4s, Order

No. 2003-0005-DWQ as amended by 2013-0001-DWQ) required small municipalities of fewer than 100,000 persons to develop stormwater management programs. This permit authorizes discharges of stormwater and some categories of non-stormwater that are not "significant contributors of pollutants."

California Toxics Rule and State Implementation Policy

The CTR (40 CFR § 131.38), presented in 2000 in response to requirements of EPA's NTR, establishes numeric water quality criteria for approximately 130 priority pollutant trace metals and organic compounds. The CTR criteria are regulatory criteria adopted for inland surface waters, enclosed bays, and estuaries in California that are on the CWA Section 303I list for contaminants. The CTR includes criteria for the protection of aquatic life and human health. Human health criteria (water- and organism-based) apply to all waters with a municipal and domestic water supply beneficial use designation as indicated in the basin plans. The Policy for Implementation of Toxics Standards for Inland Surface Waters, Enclosed Bays, and Estuaries of California, also known as the State Implementation Policy, was adopted by the State Water Board in 2000. It establishes provisions for translating CTR criteria, NTR criteria, and basin plan water quality objectives for toxic pollutants into:

- NPDES Permit effluent limits,
- Effluent compliance determinations,
- Monitoring for 2,3,7,8-tcdd (dioxin) and its toxic equivalents,
- Chronic (long-term) toxicity control provisions,
- Site-specific water quality objectives, and
- Granting of effluent compliance exceptions.

The goal of the State Implementation Plan is to establish a standardized approach for permitting discharges of toxic effluent to inland surface waters, enclosed bays, and estuaries throughout the State.

Local

Fresno General Plan

The General Plan contains the following goals, policies, and objectives relevant to the provision of drainage and flood control service and facilities:

Parks, Open Space, and Schools Element

Policy POSS-6-b Effects of Stormwater Discharge. Support efforts to identify and mitigate cumulative adverse effects on aquatic life from stormwater discharge to the San Joaquin River.

- Avoid discharge of runoff from urban uses to the San Joaquin River or other riparian corridors.
- Approve development on sites having drainage (directly or indirectly) to the San Joaquin River or other riparian areas only upon a finding that adequate measures for preventing pollution of natural bodies of water from their runoff will be implemented.

- Periodically monitor water quality and sediments near drainage outfalls to riparian areas. Institute remedial measures promptly if unacceptable levels of contaminant(s) occur.

Noise and Safety Element

Objective NS-2 Minimize risks of property damage and personal injury posed by geologic and seismic risks.

Policy NS-2-b **Soil Analysis Requirement**. Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.

Objective NS-3 Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.

Policy NS-3-a **Stormwater Drainage and Flood Control Master Plan.** Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.

Policy NS-3-b **Curb and Gutter Installation**. Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.

Policy NS-3-c **Dual Use Facilities.** Support multiple uses of flood control and drainage facilities as follows:

- Use, wherever practical, FMFCD facilities for groundwater management and recharge; and
- Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.

Policy NS-3-e **Pollutants.** Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.

Policy NS-3-f **Flooding Emergency Response Plans.** Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency

response plans for designated flood-prone areas, including the San Joaquin River bottom.

Policy NS-3-g **Essential Facilities Siting Outside of Floodplains**. Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.

Policy NS-3-h **Runoff Controls.** Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or floodproofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.

Policy NS-3-I **New Development Must Mitigate Impact.** Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project.

Policy NS-3-k **100-Year Floodplain Policy.** Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.

Policy NS-3-l **200-Year Floodplain Protection.** Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin River bottom.

Policy NS-3-m **Flood Risk Public Awareness.** Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.

Resource Conservation and Resilience Element

Objective RC-6 Ensure that Fresno has a reliable, long-range source of drinkable water.

Policy RC-6-a **Regional Efforts.** Support cooperative, multi-agency regional water resource planning efforts and activities on developing and implementing the Upper Kings Basin Integrated Regional Water Management Plan.

Policy RC-6-b **Water plans**. Adopt an implement ordinances, standards, and policies to achieve the intent of the City of Fresno Urban Water Management Plan, Fresno-Area Regional Groundwater Management Plan, and City of Fresno Metropolitan Water Resources Management Plan to ensure a dependable supply of water.

Policy RC-6-c **Land Use and Development Compliance**. Ensure that land use and development projects adhere to the objective of the Fresno Metropolitan Water Resources Management Plan to provide sustainable and reliable water supplies to meet the demand of existing and future customers through 2025.

Policy RC-6-d **Recycled Water**. Prepare, adopt, and implement a City of Fresno Recycled Water Master Plan.

Policy RC-6-e **Protect Aquifer.** Oppose urban development in unincorporated areas that are not served by a wastewater treatment/management system capable of preventing the buildup of compounds that would degrade the aquifer.

Policy RC-6-f **Regulate Sewage Disposal Facilities**. Oppose development of new sewage disposal facilities either within the Planning Area or upgradient (north and east) of the Planning Area, unless the treatment facilities produce effluent that:

- Will not degrade the aquifer in the long term;
- Will not introduce contaminants into surface water that would negatively affect its potential economic use for drinking water;
- Will not deleteriously affect downstream agricultural and urban uses; and
- Will not degrade sensitive riparian habitat.

Policy RC-6-g **Protect Recharge Areas.** Continue to protect areas of beneficial natural groundwater recharge by preventing uses that can contaminate soil or groundwater.

Policy RC-6-h **Conditions of Approval.** Include in the development code standards for imposing conditions of approval for development projects to ensure long-term maintenance of adequate clean water resources. Require findings that adequate water supply must exist prior to any discretionary project approval for residential and commercial development requiring annexation, as required by law.

Policy RC-6-I **Natural Recharge**. Support removal of concrete from existing canals and change the practice of lining new and existing canals with concrete to allow for natural recharge.

Objective RC-7 Promote water conservation through standards, incentives and capital investments.

Policy RC-7-a **Water Conservation Program Target**. Maintain a comprehensive conservation program to help reduce per capita water usage in the City's water service area to 243 gallons per capita per day (GPCD) by 2020 and 190 GPCD by 2035, by adopting conservation standards and implementing a program of incentives, design and operation standards, and user fees.

- Support programs that result in decreased water demand, such as landscaping standards that require drought-tolerant plants, rebates for water conserving devices and systems, turf replacement, xeriscape landscape for new homes, irrigation controllers, commercial/industrial/institutional water conserving programs, prioritized leak detection program, complete water system audit, landscape water audit and budget program, and retrofit upon resale ordinance.
- Implement the U.S. Bureau of Reclamation Best Management Practices for water conservation as necessary to maintain the City's surface water entitlements.
- Adopt and implement policies in the event that an artificial lake is proposed for development.
- Work cooperatively toward effective uniform water conservation measures that would apply throughout the Plan Area.
- Expand efforts to educate the public about water supply issues and water conservation techniques.

Policy RC-7-c **Best Practices for Conservation**. Require all City facilities and all new private development to follow U.S. Bureau of Reclamation Best Management Practices for water conservation, as warranted and appropriate.

Policy RC-7-d **Update Standards for New Development.** Continue to refine water saving and conservation standards for new development.

Policy RC-7-e **Retrofit City Facilities and Consider Incentives Programs to Encourage Retrofitting of Other Existing Public and Private Residential and Nonresidential Facilities and Sites**. Reduce water use in municipal buildings and City operations by developing a schedule and budget for the retrofit of existing municipal buildings with water conservation features, such as auto shut-off faucets and water saving irrigation systems. Prepare a comprehensive incentive program for other existing public and private residential and nonresidential buildings and irrigation systems.

Policy RC-7-f **Implementation and Update Conservation Program**. Continue to implement the City of Fresno Water Conservation Program, as may be updated, and periodically update restrictions on water uses, such as lawn and landscape watering and the

filling of fountains and swimming pools, and penalties for violations. Evaluate the feasibility of a 2035 conservation target of 190 GPCD in the next comprehensive update of the City of Fresno Water Conservation Program.

Policy RC-7-g **Educate on State Requirements.** Educate the residents and businesses of Fresno on the requirements of the California Water Conservation Act of 2009.

Policy RC-7-h **Landscape Water Conservation Standards**. Refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance and other State regulations.

- Evaluate and apply, as appropriate, augmented xeriscape, "waterwise," and "green gardening" practices to be implemented in public and private landscaping design and maintenance.
- Facilitate implementation of the State's Water Efficient Landscape Ordinance by developing alternative compliance measures that are easy to understand and observe.

Public Utilities and Services Element

Objective PU-8 Manage and develop the City's water facilities on a strategic timeline basis that recognizes the long life cycle of the assets and the duration of the resources, to ensure a safe, economical, and reliable water supply for existing customers and planned urban development and economic diversification.

Policy PU-8-c **Conditions of Approval**. Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.

Policy PU-8-f **Water Quality**. Continue to evaluate and implement measures determined to be appropriate and consistent with water system policies, including prioritizing the use of groundwater, installing wellhead treatment facilities, constructing aboveground storage and surface water treatment facilities, and enhancing transmission grid mains to promote adequate water quality and quantity.

Policy PU-8-g **Review Project Impact on Supply**. Mitigate the effects of development and Capital Improvement Projects on the long-range water budget to ensure an adequate water supply for current and future uses.

County of Fresno Revised 2000 General Plan

Goal PF-E To provide efficient, cost-effective, and environmentally sound storm drainage and flood control facilities that protect both life and property and to divert and retain stormwater runoff for groundwater replenishment.

Policy PF-E.1 **Flood Control Coordination**. The County shall coordinate with the agencies responsible for flood control or storm drainage to assure that construction and acquisition of flood control and drainage facilities are adequate for future urban growth authorized by the County General Plan and city general plans.

Policy PF-E.4 **Storm Drainage System Capacity**. The County shall encourage the local agencies responsible for flood control or storm drainage to require that storm drainage systems be developed and expanded to meet the needs of existing and planned development.

Policy PF-E.10 **Drainage Facility Design**. In growth areas within the jurisdiction of a local agency responsible for flood control or storm drainage, the County shall encourage that agency to design drainage facilities as if the entire areas of service were developed to the pattern reflected in the adopted general plans to assure that the facilities will be adequate as the land use intensifies.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to hydrology and water quality:

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.3 **Stormwater Management Features.** Maximize the use of green stormwater management infrastructure—such as ponds, basins, swales, and other low-impact systems—within the open space system.

- Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to incorporate green infrastructure within City parks and trails.

Objective OS-14 Provide water, stormwater, and wastewater infrastructure necessary to serve development in the SEDA.

Policy OS-14.1 **Provision of Water, Stormwater, and Wastewater Infrastructure.** Provide water, stormwater, and wastewater infrastructure in accordance with the policies of the Greenhouse Gas Reduction and Conservation Chapter.

Conservation Element

Objective RC-2 Integrate water supply, treatment and delivery, and flood control and stormwater planning in the Southeast Development Area.

Policy RC-2.2 **Shared Water Resources and Infrastructure.** Develop methods and systems to share water resources and infrastructure to capture the highest possible value for all planning, water delivery, and water-using agencies.

Objective RC-3 Promote water conservation and the long-term sustainability of water resources within the Southeast Development Area.

Policy RC-3.2 **Site and Building Efficiency Standards from Water Use.** Green building standards contain a spectrum of strategies to conserve water, including site measures to encourage the planting of species that require minimal water. All new construction in the SEDA is required to meet existing local and State laws with regard to water conservation and any additional measures needed locally to respond to drought conditions as determined by the City of Fresno Department of Public Utilities**.**

Policy RC-3.3 **Water Recycling.** Use treated wastewater for irrigation and other uses, consistent with applicable regulations, to minimize the required surface and groundwater needs of SEDA homes and businesses.

- **Public Facilities:** Require the use of tertiary-treated wastewater to irrigate parks, golf courses, and public landscaping, as specified in the Open Space, Schools and Public Facilities Chapter.
  - **Municipal purple pipe**. Establish a site- or district-wide purple pipe system that conveys recycled water.
  - **Water treatment facilities**. Available to serve the SEDA, the Southeast Service Water Treatment Facility was constructed in 2018 and is designed with the latest energy conservation and renewable energy technology.

- **Commercial Landscaping:** Require the use of treated wastewater to irrigate commercial landscaping, adhering to the standards included in the California Code of Regulations, Title 22.
- **Residential Landscaping:** Where appropriate, encourage the use of tertiary-treated wastewater to irrigate residential landscaping. Specific policy considerations should be addressed in the pending SEDA Infrastructure Financing Plan and EIR-related water infrastructure planning tasks.
- **Small Farms and Community Farming:** Use secondary- and tertiary-treated wastewater for agricultural irrigation in the SEDA and within the immediate vicinity, consistent with applicable laws and regulations. Specific policy considerations should be addressed in the pending SEDA Infrastructure Financing Plan and EIR-related water infrastructure planning tasks.

Policy RC-3.4 **Implementation and Monitoring.** Support and monitor water conservation policies and programs. Developer shall abide by all state and local requirements for water use efficiency standards.

Objective RC-4 Ensure that there will be no adverse effects on regional groundwater levels by minimizing groundwater extraction and replenishing groundwater used to serve the Southeast Development Area. Maximize multiple uses of open space by encouraging new recharge facilities to be accessible to the public.

Policy RC-4.1 **Minimizing Groundwater Extraction.** Use available surface water supplies to meet as much of the SEDA's potable water demand as possible, limiting groundwater extraction to extreme periods. The pending SEDA Infrastructure Financing Plan shall address this issue in detail.

Policy RC-4.2 **Replacement of Extracted Groundwater.** The North Kings Groundwater Sustainability Plan (approved in 2019) illustrates the decrease in groundwater levels in the region as a result of pumping. All groundwater drawn to serve development in the SEDA shall be replaced with at least an equal volume via infiltration, pumping, or other means. Recharge need not necessarily occur the same year as withdrawals, however, over time, total recharge must at least match total withdrawals. Recharge and withdrawals need not occur within the same groundwater aquifer but must be within the same groundwater basin. The pending SEDA Infrastructure Financing Plan shall address this issue in detail.

Policy RC-4.3 **Maximizing Groundwater Recharge.** Establish integrated systems within the SEDA open space network to maximize recharge using stormwater, treated wastewater, and excess surface water supplies. Facilitate increased porosity and stormwater recharge through the use of porous conveyance methods such as bioswales, naturalized channels, and layered basins. Recharge and related systems shall be addressed in the SEDA Infrastructure Financing Plan.

Policy RC-4.4 **Utilization of Recreation and Open Spaces as Groundwater Recharge Areas.** Support recreation opportunities with a range of parks and multiuse trails by establishing joint-use agreements with Fresno Metropolitan Flood Control District to allow access to storm drainage/recharge basins for recreational use, when appropriate (see the Open Space, Schools and Public Facilities Chapter).

Objective RC-5 Protect surface and groundwater supplies from major sources of pollution.

Policy RC-5.1 **Stormwater Runoff.** Implement stormwater management practices that minimize stormwater runoff impacts on the Tulare Lake Watershed.

- **Compact Development:** Limit impervious cover by clustering new, higher density development within the SEDA, directing growth away from undeveloped portions of the watershed.
  - **Compact development.** Reduce the building footprint and overall impervious surface in order to minimize lot coverage on a per unit basis.
  - **Parking demand management.** Reduce the demand for parking stalls to lower the amount of impervious surface (and environmental impacts).

- **Low Impact Development Practices:** Implement development practices such as natural conveyance, bioswales, raingardens and xeriscape that minimize, slow, and filter street runoff and remove pollutants, lowering peak volume and reducing the size and cost of stormwater infrastructure.

Policy RC-5.2 **Hazardous Materials and Pesticide Reduction.** Prevent contamination of the groundwater table and surface water resources and discourage all pesticide use for agricultural and landscaping uses within the SEDA.

- **Signage:** Install appropriate signage to deter the discharge of hazardous materials into storm drains.
- Pollution Prevention: Provide information to SEDA residents on appropriate ways to dispose of hazardous materials and chemicals.
- Pesticide Reduction: Discourage all pesticide use for agricultural and landscaping uses within the SEDA.
- Remediation**:** Encourage rapid clean-up of contaminated groundwater consistent with applicable laws and regulations.

Policy RC-5.3 **Construction Erosion.**

- **Erosion and Sedimentation Control Plan:** Require all construction projects to create and implement a plan using State and local Best Management Practices for erosion and sedimentation control.
- **Runoff Control:** Prevent loss of soil by stormwater runoff and sedimentation of storm sewers or receiving streams.

Objective RC-6 Develop sufficient wet utility infrastructure to meet the demand created by new development within the Southeast Development Area, applying cost-effective and low-impact strategies to the extent possible.

Policy RC-6.1 **Water Supply and Delivery.** Evaluate the potential surface water, groundwater resources and infrastructure needs necessary to meet the Southeast Development Area demand. Assessments shall be included in the pending SEDA Infrastructure Financing Plan and EIR-related water infrastructure planning tasks.

- **Site and Development-Level Water Supply:** Utilizing the pending SEDA Infrastructure Financing Plan as a basis, establish estimates for water supply and demand for all development proposals, reducing demand (as appropriate) through site design and efficiency measures.
- **Delivery Systems:** Proposed water supplies and delivery systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno. Systems must work within the schematic designs established in the pending EIR-related water infrastructure planning tasks, and the SEDA Infrastructure Financing Plan.

- **Water demand reductions.** The City of Fresno and the developer or builder will identify specific demand reduction measures required for the development proposal to move forward. Technical assistance will be provided by the City as needed.
- **Detailed engineering.** Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.

Policy RC-6.3 **Flood Control and Stormwater Management.** Evaluate and provide infrastructure to minimize community flood risk, enhance water quality, and provide locations for active recreation.

- **Sub-Area or Development Proposal Delivery:** Proposed stormwater systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno. Systems must work within the requirements established in the pending EIR-related water infrastructure planning tasks and the SEDA Infrastructure Financing Plan.
- **Stormwater runoff reductions.** The City of Fresno and the developer will identify specific reduction measures required for the development proposal to move forward.
- **Detailed engineering.** Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.

City of Fresno Municipal Code

Fresno Municipal Code, Chapter 6, Municipal Services and Utilities, Article 7, Urban Storm Water Quality Management and Discharge Control, includes provisions regarding stormwater discharge for the City. The purpose of the Storm Water Quality Management and Discharge Control Ordinance is to ensure the health, safety, and general welfare of citizens and protect the water quality of water courses and water bodies in accordance with the CWA by reducing pollutants in urban stormwater discharges to the maximum practicable extent and by prohibiting non-stormwater discharges to the storm drain system.

Chapter 11, Building Permits and Regulations, Article 6, Fresno Flood Plain Ordinance, establishes methods of reducing flood losses by: restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards or flood heights or velocities; requiring that uses vulnerable to floods be protected against flood damage at the time of initial construction; controlling filling, grading, dredging, and other development which may increase flood damage; preventing or regulating the construction of flood barriers which will unnaturally divert flood water or which may increase flood hazards in other areas; and controlling the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel flood waters.

Fresno Municipal Flood Control District Post-Development Standards Technical Manual

The FMFCD published a Post-Development Standards Technical Manual[37] in 2014 to provide development and redevelopment standards to address stormwater quality requirements for projects in areas that do not drain to the Regional Stormwater Management Basin System. Per the manual, five drainage areas in the FMFCD service area do not drain into a stormwater management basin and two areas outside the service area do not drain into a regional stormwater management basin. These post-development requirements were developed to comply with the MS4 Permit maintained for stormwater and non-stormwater discharges from MS4 to waters of the United States. The manual provides guidance and recommendations for implementing stormwater quality BMPs with the intention of improving water quality and mitigating potential water quality impacts from stormwater and non-stormwater discharges.

Fresno Municipal Flood Control District Standard Plans and Specifications

The FMFCD maintains a set of standard specifications and plans intended to serve as requirements for FMFCD improvements and projects. The specifications and plans are maintained and published by FMFCD for use by designers and contractors.

3.10.4 - Methodology

The potential project-related impacts related to hydrology and water quality were evaluated on a qualitative basis due to the programmatic nature of this Draft PEIR. Qualitative impacts were assessed by evaluating the project's potential for impacting hydrology and water quality within the Plan Area based on information regarding the current service commitments and capacities of public service providers within the Plan Area.

Technical studies were developed to analyze the impacts of development under the proposed Specific Plan versus the approved General Plan; the Storm Drain and Water Technical Studies are applicable to this section. General Plan land use classifications and Specific Plan land use classifications were provided by the City of Fresno Planning and Development Department in the form of Geographic Information System (GIS) and Shape files. GIS and Shape files were also obtained from the City of Fresno Department of Public Utilities for the existing facilities in Fresno, including the Plan Area.

The Water Technical Study (Appendix F) focused on the analysis of water demand in the Plan Area and how it may change based on Specific Plan development. For the General Plan land use case, the technical memorandum prepared by West Yost Associates for the City of Fresno General Plan Update Master EIR[38] was used in obtaining projected water demand data for SEDA. For the Specific Plan analysis, the water demand factors used were prepared by Akel Engineering as part of the Metro Plan Update.[39] The GIS files for the General and Specific Plan land uses were used to determine the total areas of each land use classification. The water demand factors were then used with the area of the corresponding land use classification to determine a total water demand for the Plan Area based

[37] Fresno Metropolitan Flood Control District (FMFCD). Post-Development Standards Technical Manual. June 2014.
[38] West Yost Associates. Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report. Table 2. Water Demand Comparison for General Land Use Plan Land Changes. January 21, 2013.
[39] Akel Engineering Group Inc. Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update. October 2020.

on the General Plan and the Specific Plan developments. The total water demand for the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in water demand for the Plan Area.

The Storm Drain Technical Study focused on comparing the changes in Equivalent Area for each drainage area of the General Plan to the Specific Plan to determine potential impacts to future storm drain collection systems. The methodology used to calculate the CA values for each case utilized land use data obtained from the City and design data from FMFCD. For the General Plan land use analysis, the FMFCD's "Recommended Design C-Factors for the City of Fresno" was used. Not all land uses described in the General Plan are listed in this table, so some C-Factors were estimated based on their description, while others were taken from FMFCD's hydraulic and hydrology spreadsheets when possible. The FMFCD is currently developing updated C-Factors for the SEDA Specific Plan land use classifications; a set of preliminary values have been developed, and these were used in completing the SEDA Specific Plan analysis. The Equivalent Area data was used to evaluate the required storage capacity for each drainage area, and how this compared to the existing/proposed drainage basins in the Plan Area.

The results from the Technical Studies, along with various City, State, and federal planning documents, were used to analyze and assess the impacts of all utilities systems within the Specific Plan Area and to determine the thresholds of significance for each impact.

3.10.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist as thresholds to determine whether hydrology and water quality impacts are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based, in part, on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would have significant impact on the environment if the proposed project would:

a) Violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality.

b) Substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

c) Substantially alter the existing drainage pattern of area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:
   (i) Result in substantial erosion or siltation on- or off-site;
   (ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;
   (iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or
   (iv) Impede or redirect flood flows.

d) In flood hazard, tsunami, or seiche zones, risk release of pollutants due to project inundation.

e) Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

3.10.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Surface and Groundwater Quality

Impact HYD-1:	**The proposed project could violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface or groundwater quality.**

Impact Analysis

Development of the proposed project would result in new industrial, commercial, residential, and mixed-use land uses that would increase the amount of paved impervious surfaces within the Plan Area. This increase in impervious surfaces would increase stormwater runoff at greater rates and volumes than what was predicted under the General Plan. FMFCD is responsible for developing and implementing the Storm Drain Master Plan for the City. As land is developed, the FMFCD works with developers and the City to implement the storm drainage system to collect and dispose of the increased runoff rates and volumes and prevent them from entering local surface waters, including the San Joaquin River, local creeks, and numerous irrigation canals that cross through the Plan Area.

Development within the Plan Area would be required to comply with the requirements of all applicable rules and regulations, including the NPDES Construction General Permit, which would reduce the effects of construction and operational activities on water quality.

Construction

Buildout of the Specific Plan would result in various construction activities in the Plan Area for new individual projects which could present risks to surface water quality. Ground-disturbing activities such as grading, excavation, placing fill, trenching, spoil pile storage, and backfilling of trenches would increase the potential for erosion and sedimentation, particularly during storm events. Construction vehicles and equipment could deposit constituents such as diesel fuel, hydraulic fuel, oil, and exhaust into the environment that could be conveyed within stormwater runoff to surface

waters or groundwater. Additionally, construction materials such as fuels, solvents, and paints may result in contamination of stormwater and present a risk to surface water quality.

New projects that are 1 acre or larger in size will be required to comply with the General Construction Permit, Order No. 2012-0006-DWQ, issued by the State Water Board, and will need to develop and implement a SWPPP to estimate sediment risk from construction activities to receiving waters, and specify BMPs that would be used by the project to minimize pollution of stormwater.

Future development would be required to prepare, implement, and be consistent with the Construction General Permit, including the SWPPP and BMPs, which would reduce project construction impacts on water quality to less than significant. Therefore, construction impacts associated with water quality standards and WDRs would be less than significant.

Operation

The Plan Area will eventually be under the jurisdiction of the FMFCD for stormwater and flood control management. (Portions of the Plan Area are currently within FMFCD boundaries, with the rest actively being developed and annexed.) Stormwater runoff is collected by FMFCD facilities and will typically end up in retention basins. These basins will sometimes be forced to discharge water to surface waters during periods of heavy or consistent rain. These discharges may increase the concentration of sediment and pollution found in stormwater.

Typically, stormwater runoff from urban development contains an array of constituents, such as automotive fluids (e.g., fuels, oils, antifreeze), combustion and exhaust byproducts (e.g., lead, cadmium, nickel), sediments, fertilizers, pesticides, herbicides, and nutrients and bacteria pollutants from domestic and agricultural animal waste. These constituents are expelled into the environment throughout the year, where they settle onto the ground surface. During the wet season, stormwater runoff conveys these pollutants downstream, resulting in polluted stormwater runoff, especially during the first storm events of the season.

Water quality treatment for post-construction discharges to stormwater in the FMFCD urban flood control system area is provided by retention basins. Development in the FMFCD Master Plan area is exempt from further water quality requirements as long as the FMFCD's Storm Water Quality Management Plan is implemented. Storm drainage improvements are funded by local drainage fees paid by developments and constructed by either FMFCD, developers, or both. Basins are effective at reducing average concentrations of a broad range of contaminants via filtration through soil and are built to design criteria exceeding Statewide Standard Urban Stormwater Mitigation Plan standards. There are seven existing basins contributing to stormwater collection for the Plan Area and six proposed basins within the Plan Area. FMFCD basins are designed for a capacity of a 2-year storm and for at least 60 percent of average rainfall.

The City is a co-permittee with the FMFCD, the County of Fresno, the City of Clovis, and California State University Fresno in the Phase 1 NPDES Permit for Stormwater Discharges from MS4s. This Phase 1 MS4 Permit requires that the City and its co-permittees implement water quality and watershed protection measures for all development projects. The WDRs contained in the NPDES Permit have been designed to be consistent with the water quality standards and goals established

in the Central Valley RWQCB's Basin Plan. The Phase 1 MS4 Permit prohibits discharges from violating applicable water quality standards or creating a nuisance or water quality impairment in receiving waters. Participation in the Phase 1 MS4 Permit and implementation of the FMFCD would reduce impacts to surface waters to acceptable levels and long-term project impacts to surface or groundwater quality would not exceed acceptable levels.

The General Plan and this proposed Specific Plan also include policies designed to reduce impacts to water quality. Future development would be required to prepare, implement, and be consistent with the NPDES Permit as well as continued implementation of General Plan and Specific Plan policies, which would reduce project operational impacts associated with water quality standards and wastewater discharge requirements to less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Groundwater Supply/Recharge

Impact HYD-2:	**The proposed project could substantially decrease groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.**

Impact Analysis

Implementation of the proposed Specific Plan would generate an additional 1.7 percent (0.33 MGD) of groundwater demand in the Plan Area than what was predicted by the General Plan; as such, impacts to groundwater could be significant without mitigation. The City's water system depended completely on groundwater as a water source until 2004, when the first SWTF was commissioned. Today, groundwater is still a primary water source for the City.

Total groundwater recharge in 2020 was 132,480 AF (24,970 AF of natural recharge, 47,510 AF of subsurface inflow, and 60,000 AF of intentional recharge); the total projected groundwater recharge for 2035 is 149,100 AF (26,280 AF of natural recharge, 54,720 AF of subsurface inflow, and 68,100 AF of intentional recharge) and for 2045 is 159,820 AF (26,790 AF of natural recharge, 59,530 AF of subsurface inflow, and 73,500 AF of intentional recharge) during normal water years and assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[40]

[40] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan, Table 6-1, Components to Groundwater Yield for Normal Years. July.

Per the FMFCD, six new basins are proposed for the Plan Area for stormwater runoff collection. These basins would likely function as retention basins and retain the stormwater runoff for percolation through the soil to the underlying groundwater aquifer. While impervious surfaces would increase, resulting in higher amounts of runoff volume, the basins would help with the capture and dispersal of the runoff, thereby assisting with the process of groundwater recharge.

The existing and proposed basins will facilitate stormwater collection, which will encourage groundwater recharge through collection. Of the seven existing basins encompassed by the Plan Area and the six proposed basins, two proposed basins will require revisions to their designs to accommodate the increase in runoff volume. Proposed Basin DW does not have sufficient capacity to accommodate the increased runoff (available volume is exceeded by 12.8 AF), and Basin DX experiences a change in volume of 25.4 percent (exceeds FMFCD's limit of 20 percent before basin must be revised in size/location).

Groundwater pumping has been greatly reduced since the activation of the first SWTF in 2004 and has only further declined as a result of a second SWTF; per the 2020 UWMP, groundwater pumping has decreased from 165,200 AFY in 2003 to 55,000 AF in 2020.[41] Surface water has allowed the City to reduce its dependance on groundwater as a water supply. Prior to 2004, 100 percent of Fresno's water demand was met with groundwater. In 2004, the City's first SWTF, the NESWTF, was constructed and activated; it provided 10–15 percent of the City's potable water demand from 2005–2014, and 15 percent from 2016–2020. With the addition of the T-3 Water Storage and modular SWTF (T-3 SWTF) in 2015 and the SESWTF in 2018, the City was able to provide greater than 50 percent of its potable water supply with surface water in 2019 and 2020.[42] The City plans on expanding surface water treatment capacities and groundwater recharge activities to further reduce groundwater reliance.

Currently, the Kings Groundwater Subbasin is in a state of overdraft as defined by the DWR. In November 2019, the North Kings GSA adopted the North Kings GSP (prepared by Provost & Pritchard) with the sustainability goal to ensure that by 2040 the Kings Groundwater Subbasin is being managed in a sustainable manner by balancing water demand with available water supply. Continued participation and compliance with the North Kings GSP by the City and other member agencies would ensure a balance of pumping and recharge in the basin by 2040. The GSP was submitted to the California DWR in January 2020. The DWR issued a response in January 2022 stating that the GSP was incomplete, after which the GSP was revised and resubmitted in July 2022. As of the preparation of this Draft PEIR, the DWR has issued a letter stating that they expect to recommend approval of the plan, along with a number of additional recommended corrective actions to be included per the DWR SGMA Portal GSP Status Summary.[43] This is incorporated as Mitigation Measure (MM) HYD-1. Impact to groundwater supplies and groundwater recharge will be less than significant with mitigation incorporated.

[41] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan, Figure 6-7, Historic Groundwater Production. July.
[42] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan. July 2021.
[43] California Department of Water Resources, SGMA Portal. GSP Status Summary. Website: https://sgma.water.ca.gov/portal/gsp/status.

The 2020 UWMP presents data available for actual water supply and demand for the year 2020, as well as projected water usage. For 2020, the projected potable water demand for the City in 2035 is 154,210 AF, but the actual total potable water demand for the City was 121,993 AF.[44] The projected nonpotable water demand for the City for groundwater recharge is 68,100 AF for 2035. The estimated groundwater yield for the City in 2035 is projected to be 149,100 AF, assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, indicating that groundwater alone will not be sufficient to meet future City demands, including those for SEDA. However, estimated surface water supplies for the City are projected to be 191,600 AF for 2035 (60,000 via USBR, 131,600 via FID) during normal water years, as well as 5,910 AF of recycled water.[45] Total projected water supply for the City in 2035 is 346,610 AF during normal water years, assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, and total projected demand is 222,310 AF. The estimated increase in total water use for SEDA in accordance with the Specific Plan selected alternative is 0.33 MGD, or 370 AF. This results in a modified projected potable demand for the City in 2035 of 154,580 AF, with a total water demand (potable and nonpotable) of 222,680 AF.

Assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, the estimated increase in water demand for the Plan Area could be met with current water supplies in normal year and dry year scenarios; however, securing additional water supplies would likely improve these chances. Therefore, impacts on groundwater supplies would be less than significant with mitigation incorporated.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM HYD-2a The City shall continue to be an active participant in the North Kings Groundwater Sustainability Agency (North Kings GSA) and the implementation of the North Kings Groundwater Sustainability Plan (North Kinds GSP) in order to ensure that the Kings Subbasin has balanced levels of pumping and recharge. The City shall confirm that each project for future development in the Plan Area has incorporated any resulting standards prior to issuing approval for any development applications that require discretionary approval.

MM HYD-2b Prior to exceeding existing water supply capacity, the City shall evaluate the water supply system and shall not approve development per the Specific Plan for the Plan Area until additional capacity is provided through water system improvements for

[44] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan, Table 4-6, Projected Demands for Water: Potable (DWR 4-2R), and Table 4-7, Projected Demands for Water: Nonpotable (DWR 4-2R). July.

[45] Water Systems Consulting, Inc. 2021. City of Fresno 2020 Urban Water Management Plan. July 2021.

the Specific Plan Area in accordance with the City Metropolitan Water Resources Management Plan (Metro Plan).

MM HYD-2c Prior to exceeding existing water demands, the City shall pursue the provision of adequate water supplies by securing additional water sources and shall not approve development per the Specific Plan for the Plan Area until additional water supply is provided.

MM HYD-2d The City shall develop new and expand existing groundwater recharge facilities to balance increased water demands resulting from the Project Area. New and expanded groundwater recharge facilities shall be in accordance with the City of Fresno General Plan and City Metro Plan. The City shall complete these measures prior to approving any new project applications for future development in the Project Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

Level of Significance After Mitigation

Less than significant with mitigation incorporated.

Drainage Leading to Erosion/Siltation, Flooding, Additional Sources of Polluted Runoff, or Impedance of Flood Flows

Impact HYD-3: **The proposed project could substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through the addition of impervious surfaces, in a manner which would:**

i) Result in substantial erosion or siltation on- or off-site;

(ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

(iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff; or

(iv) Impede or redirect flood flows?

Impact Analysis

i) Result in substantial erosion or siltation on- or off-site

Construction

Construction activities associated with buildout of the Specific Plan would result in ground-disturbing activities such as grading, excavation, placing fill, trenching, spoil pile storage, and backfilling of trenches. These activities could lead to silt-laden stormwater contributing to downstream surface water degradation. Development within the Plan Area could require the realignment of an existing stream or canal, which could result in the erosion of soils within the channel or channel banks during rainfall events that could result in siltation of stormwater runoff that leaves/enters the stream or canal. This silt-laden stormwater could contribute to downstream stormwater degradation.

Regulatory requirements such as the City's grading plan check process, the FMFCD Storm Drain Master Plan, and the NPDES Construction General Permit would reduce the impacts of construction activities on drainage patterns and erosion.[46]

Development within the Plan Area would be required to comply with the City's grading plan check process. Developers must submit grading plans in compliance with the California Building Standards Code (CBC), the Storm Drain Master Plan, and the NPDES Construction General Permit and obtain approval from the FMFCD.

The Storm Drain Master Plan includes proposed elevation of curbs in undeveloped areas, delineation of storm drain inlet watershed areas, collection system pipeline alignments and sizes, and retention basin or urban detention basin locations and sizing. Development in conformance with the Storm Drain Master Plan would ensure that the Plan Area is graded to drain into storm drainage facilities, which collect and dispose of stormwater from the planned development. Retention and urban detention basins intercept and remove silt from stormwater before it is discharged to surface water features.

The grading plan review process for future individual development projects in the Plan Area would identify any plan to alter the course of any creek, stream, or irrigation canal. In this case, the City would require additional other reviews, permits, and agreements with agencies such as the USACE, the United States Fish and Wildlife Service (USFWS), the CDFW, the Central Valley Flood Protection Agency, the State Water Board, the Central Valley RWQCB, the FMFCD, and the FID. Possible permits and agreements include the CWA Section 401 and 403 permits, Endangered Species or Habitat Plan, Section 1603 Streambed Alteration Agreement, and Irrigation Canal Encroachment permit. Agreements would need to be made prior to the issuance of grading permits.

The NPDES Construction General Permit program is administered for the City by the Central Valley RWQCB. It regulates sources of erosion at construction sites that would result in the discharge of silt-laden stormwater from the site and into subsequent receiving waters during both construction and operations activities.

Compliance with the grading plan check process along with other regulations described above would reduce project construction impacts on drainage patterns and erosion to acceptable levels. Therefore, construction impacts associated with erosion would be less than significant.

Operation

Implementation of the proposed project would result in new commercial, residential, employment, and mixed-use land uses. Grading and increases in impervious surfaces resulting from this development could alter alignments of existing creeks, streams, or irrigation canals and increase stormwater runoff rates. Higher rates of stormwater runoff would increase the potential for soil erosion. FMFCD works with developers and the City to collect and prevent silt-laden stormwater from entering local surface waters, including several irrigation canals that run through the Plan Area.

[46] City of Fresno Planning and Development Department Building and Safety Services Division. 2021. Grading Plan Process. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2021/09/GRADING_PLAN_REQUIREMENTS_2021.pdf. Accessed July 6, 2022.

As part of the Storm Drain Master Plan, new aboveground storm drainage infrastructure would direct runoff to underground pipelines, which would convey the stormwater to proposed retention and urban detention basins within the Plan Area. Discharges from the basins could increase the concentration of sediment in the receiving waters.

As described above, future individual development projects under the Specific Plan would be required to obtain a grading permit from the City and follow the grading plan check process. As a co-permittee in the Phase I NPDES Permit, development associated with the proposed Specific Plan would be reviewed to ensure coverage under the Construction General Permit.

Portions of the Plan Area are currently in agricultural use. At buildout of the proposed project, these areas may be developed with land uses consisting of buildings, paved area, and landscaping. Bare soil on farmland is more susceptible to erosion than developed urban land. Therefore, buildout of the proposed project is expected to cause some reduction in on-site erosion.

The General Plan and the proposed Specific Plan include objectives and policies that would reduce potential impacts related to erosion and siltation. Along with the grading plan check process, continued implementation of the proposed Specific Plan and approved General Plan would reduce project operational impacts associated with alteration of drainage patterns, streams or creeks, and erosion to less than significant levels.

ii) Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site

Construction

Construction activities associated with buildout of the Specific Plan would result in ground-disturbing activities such as grading, excavation, placing fill, trenching, spoil pile storage, and backfilling of trenches. These activities would change existing surface drainage patterns and increase the potential for flooding, particularly during storm events. While temporary, ground-disturbing construction activities that substantially compact the development site soils could increase runoff volumes that could result in flooding on or off the construction site.

Development within the Plan Area could propose realigning an existing stream or canal; doing so could result in the alteration of drainage patterns that could result in flooding on or off the construction site.

Regulatory mechanisms in place that would reduce the impacts of construction activities on drainage patterns that could result in flooding on or off the construction site include compliance with the City's grading plan check process, the Storm Drain Master Plan, and the NPDES Construction General Permit. Discussion of these regulatory processes is included in the above section for erosion and siltation. Compliance with these required regulations would reduce the project construction impacts on drainage patterns and flooding on and off the construction site to less than significant levels.

Operation

Development consistent with implementation of the proposed Specific Plan would result in new commercial, residential, employment, and mixed-use land uses that would regrade undeveloped land to new grading patterns, may propose to alter the alignments of existing creeks, streams, or irrigation canals, and would increase impervious surfaces, which would increase stormwater runoff rates. Higher runoff rates and greater volumes of stormwater runoff would increase the potential for flooding of the development site and off-site locations. Since the FMFCD is responsible for developing and implementing the Storm Drain Master Plan for the City, the FMFCD works with developers and the City to implement the storm drainage system to collect and dispose of the increased stormwater runoff rates and volumes and prevent flooding as a result of the development and grading of the land. The storm drainage system that would be implemented for the Plan Area would include street, curbs, and gutters that direct stormwater to storm drain inlets and underground pipelines. The pipelines convey the runoff to retention and urban detention basins to be located at strategic locations in the Plan Area. The basins dispose of the runoff through percolation into the soil and, in emergencies and in preparation for the next series of rain events, through pumping to designated irrigation canals. The urban detention basins discharge to the San Joaquin River.

Development under the proposed Specific Plan would be required to obtain a grading permit from the City and follow the grading plan check process as described above. Developments would also be required to be designed and graded so as to not impede the flow of flood waters through or around their sites. This process would reduce the potential for long-term flooding impacts to less than significant.

Additionally, the proposed Specific Plan and the approved General Plan include objectives and policies that would reduce potential flooding impacts. Along with the grading plan check process, continued implementation of the proposed Specific Plan and approved General Plan would reduce project operational impacts associated with flooding due to alterations of drainage patterns to less than significant levels.

iii) Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff

Construction

FMFCD implements the Storm Drain Master Plan and the District Services Plan. Local storm drainage Master Plan engineering of storm drain facilities analyzes the topography, planned land use, climatology, and geology to produce a detailed drainage hydrology for each local drainage area. Following these analyses, plans for preliminary pipeline or alternative conveyance systems are completed using runoff flow calculations based on planned land uses to guide retention basin size and location. System relief facilities are designed for use in major storm events. Land is assessed to ensure that there is no evidence of hazardous material or waste contamination that would enter the storm drainage system. Site-specific environmental studies are also conducted in compliance with CEQA review of discretionary projects. The change in land uses resulting from implementation of the proposed Specific Plan would slightly increase the sources of pollution in stormwater runoff by

converting General Plan land uses to Specific Plan land uses. The increase in sources would result from the increased number of landowners and uses that would occur within the Plan Area.

Operation

Development as part of the proposed project would increase impervious surfaces on-site and thus increase runoff from the Plan Area. The buildout of the proposed Specific Plan when compared to the General Plan would result in a net change of 248 AF in expected runoff; FMFCD allows a 20 percent change in required basin volumes before the basin must be modified. As illustrated in Table 3.10-2, buildout of the Specific Plan would not result in a change of volume of more than 20 percent or exceed the remaining basin volume for existing basins encompassed withing the Plan Area. As illustrated in Table 3.10-3, buildout of the proposed Specific Plan would result in a change in required volume of more than 20 percent in one proposed basin (Basin DX) and the exceedance of one proposed basin's capacity (Basin DW). This creates a potentially significant impact. However, Implementation of MM HYD-2 through 4, which includes revisions to Basin DX and Basin DW plans, would reduce impacts to a less than significant level.

Table 3.10-2 General Plan and Specific Plan Anticipated Runoff Volume for Existing Basins Encompassed within SEDA Specific Plan Area

Drainage Area	GP FMFCD Design Runoff Volume (AF)	SP Runoff Volume Increase (AF)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (AF)	Remaining Basin Volume (AF)
BG	213.2	8.50	4.0%	232.1	10.4
BL	274.0	4.00	1.5%	301.1	23.1
BM	379.3	0.46	0.1%	390.4	10.7
BS	332.2	5.34	1.6%	396.7	59.2
CS	310.4	4.75	1.5%	346.5	31.3

Notes:
AF = acre-feet
FMFCD = Fresno Metropolitan Flood Control District
GP = General Plan
SP = Specific Plan
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Storm Drain Technical Study. June 10, 2022.

Table 3.10-3 General Plan and Specific Plan Anticipated Runoff Volume for Proposed Basins within SEDA Specific Plan Area

Drainage Area	GP FMFCD Design Runoff Volume (AF)	SP Runoff Volume Increase (AF)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (AF)	Remaining Basin Volume (AF)
DS	433.8	85.2	19.6%	1,383.3	864.3
DT	207.3	18.7	9.0%	232.4	6.4
DU	305.0	3.8	1.3%	323.8	15.0

Drainage Area	GP FMFCD Design Runoff Volume (AF)	SP Runoff Volume Increase (AF)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (AF)	Remaining Basin Volume (AF)
DV	171.7	6.6	3.8%	230.0	51.7
DW	212.3	34.4	16.2%	233.9	-12.8
DX	215.7	54.8	25.4%	304.5	34.0
DY	279.9	10.4	3.7%	295.2	4.9
DZ	237.4	11.1	4.7%	263.6	15.1

Notes:
AF = acre-feet
FMFCD = Fresno Metropolitan Flood Control District
GP = General Plan
SP = Specific Plan
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Storm Drain Technical Study. June 10, 2022.

As discussed above, stormwater runoff from urban development contains an array of pollutants. Future individual development project would be required to comply with General Plan and the proposed Specific Plan policies and implement water quality and watershed protection measures for all development projects as part of its NPDES Phase 1 MS4 Permit. Furthermore, impacts associated with water quality standards and wastewater discharge requirements would be less than significant.

iv) Impede or redirect flood flows

Constructing buildings in floodplains puts those structures in danger of repeated flooding. The sources of flooding in the Plan Area include several irrigation canals, including Redbank Creek, the Gould Canal, the Gray Colony Canal, Dog Creek, the Mill Canal, the Temperance Canal, the Fancher Creek Canal, the Briggs Canal, the East Branch West Branch Canal, the Hansen Canal, and the Armstrong Canal.

FEMA prepares FIRMs to map flood zones in order to assist communities with floodplain management regulations and flood insurance requirements. FEMA has prepared multiple FIRMs for the City that show floodplain zones throughout Fresno and surrounding areas. According to the FIRMs that include SEDA, a majority of the Plan Area is outside the 100-year flood zones; most areas are located within Zone X (Unshaded) (outside of the 500-year (0.2 percent annual chance) floodplain with minimal risk of flooding). However, several areas in the northern portion of SEDA (north of SR-180) are within zones of higher flood chances, including Zones X (shaded) (between the 100-year and 500-year floodplain with moderate risk of flooding), Zone A (SFHA within the 100-year floodplain with high risk of flooding), Zone AE (SFHA within the 100-year floodplain with high risk of flooding and known base flood elevations), and Zone A/AE Regulatory Floodplains (SFHA within the 100-year [1 percent annual chance] floodplain with high risk of flooding with areas that must be reserved for base flood discharge); these areas are mainly adjacent to existing rivers, creeks, canals, or detention basins.

Per the FEMA FIRM, areas surrounding and along the Fancher Creek are within Zone X (shaded), the area containing the Redbank Detention Basin is within Zone A, areas surrounding and along the Mill Ditch and Redbank Creek are within Zone AE, and a portion of the Redbank Creek along the northern SEDA border is defined as a Regulatory Floodplain.

The City participates in the NFIP which adopts FIRMs, appoints a trained Floodplain Administrator, adopts a floodplain ordinance modeled after the Flood Insurance Program (FIP) model ordinance, and enforces the ordinance and the requirements of Title 40 of the Code of Federal Regulations (40 CFR-Protection of Environment), Subchapter D (Water Programs, Parts 100–149). The City enforces these requirements through Chapter 11, Article 6 of the Fresno Municipal Code (Fresno Flood Plain Ordinance), which outlines specific requirements for floodproofing of structures. The Specific Plan include developments that would be located within these SFHAs; development within these areas would require substantial floodproofing and any required review and approval of the developments by the City, FMFCD, FEMA, and any other governing body. If developments follow the floodplain ordinance and General Plan objectives and policies are implemented, impacts associated with flooding of developments within the 100-year floodplain would be less than significant.

Development as part of the proposed Specific Plan would increase the area of impervious surfaces within the Plan Area and thus increase runoff from the Plan Area. However, compliance with federal, State, and local regulations and requirements to prevent development within the 100-year floodplain, installation of flood protection mechanisms, and implementation of MM HYD-2 through 4 would reduce impacts to a less than significant level with mitigation incorporated.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Prior to approving any development in SEDA, the City shall implement the following mitigation measures and shall document the results of each.

MM HYD-3a The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in updating the Storm Drainage and Flood Control Master Plan for the Plan Area to include the proposed basins and the analysis necessary to provide adequate capacity for future stormwater runoff resulting from future development of the Southeast Development Area (SEDA) Specific Plan. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

MM HYD-3b The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in implementing the Storm Drainage and Flood Control Master Plan improvements for the proposed drainage areas within the Plan Area. Any new proposed development

in the Southeast Development Area (SEDA) shall be reviewed by the City and FMFCD to confirm that design and construction documents have incorporated the updated Storm Drainage and Flood Control Master Plan improvements, prior to approving any such development.

MM HYD-3c The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in reevaluating proposed Basins DW and DX for available capacities, and shall expand these basins or construct additional basins to accommodate the future stormwater capacities from development in the Southeast Development Area (SEDA) in accordance with the SEDA Specific Plan. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

Level of Significance After Mitigation

Less than significant with mitigation incorporated.

Risk of Pollutant Release Due to Inundation

Impact HYD-4: The proposed project would not be located in a flood hazard zone, tsunami, or seiche zone, or risk release of pollutants due to project inundation.

Impact Analysis

Development of structures in floodplains puts those structures at risk from flooding. The sources of flooding in the Plan Area include several irrigation canals, including Redbank Creek, the Gould Canal, the Gray Colony Canal, Dog Creek, the Mill Canal, the Temperance Canal, the Fancher Creek Canal, the Briggs Canal, the East Branch West Branch Canal, the Hansen Canal, and the Armstrong Canal. There are regulatory facilities that help control flooding in Fresno, including the Big Dry Creek Dam and Reservoir, the Fancher Creek Dam and Fancher Creek Detention Basin, and the Redbank Dam and Redbank Creek Detention Basin.

Construction

FEMA prepares FIRMs to map flood zones in order to assist communities with floodplain management regulations and flood insurance requirements. FEMA has prepared multiple FIRMs for the City that show floodplain zones throughout Fresno and surrounding areas. According to the FIRMs that include SEDA, a majority of the Plan Area is outside the 100-year flood zones; most areas are located within Zone X (unshaded), outside of the 500-year (0.2 percent annual chance) floodplain with minimal risk of flooding. However, several areas in the northern portion of SEDA (north of SR-180) are within zones of higher flood chances, including Zones X (shaded), between the 100-year and 500-year floodplain with moderate risk of flooding, Zone A (SFHA within the 100-year floodplain with high risk of flooding), Zone AE (SFHA within the 100-year floodplain with high risk of flooding and known base flood elevations), and Zone A/AE Regulatory Floodplains (SFHA within the 100-year [1 percent annual chance] floodplain with high risk of flooding with areas that must be reserved for base flood discharge); these areas are mainly adjacent to existing rivers, creeks, canals, or detention basins.

Per the FEMA FIRM, areas surrounding and along the Fancher Creek are within Zone X (shaded), the area containing the Redbank Detention Basin is within Zone A, areas surrounding and along the Mill Ditch and Redbank Creek are within Zone AE, and a portion of the Redbank Creek along the northern SEDA border is defined as a Regulatory Floodplain.

The City participates in the NFIP which adopts FIRMs, appoints a trained Floodplain Administrator, adopts a floodplain ordinance modeled after the FIP model ordinance, and enforces the ordinance and the requirements of Title 40 of the Code of Federal Regulations (40 CFR-Protection of Environment), Subchapter D (Water Programs, Parts 100–149). The City enforces these requirements through Chapter 11, Article 6 of the Fresno Municipal Code (Fresno Flood Plain Ordinance), which outlines specific requirements for floodproofing of structures. The proposed Specific Plan include developments that would be located within these SFHAs; development within these areas would require substantial floodproofing and any required review and approval of the developments by the City, FMFCD, FEMA, and any other governing body. If developments follow the floodplain ordinance, and General Plan objectives and policies are implemented, impacts associated with flooding of developments within the 100-year floodplain would be less than significant.

A tsunami is an ocean wave caused by a sudden displacement of the ocean floor, most often due to an earthquake. The Plan Area is approximately 115 miles inland from the Pacific Ocean and is at elevation ranging from about 308 feet above mean sea level (AMSL) at the southwest corner to 372 feet AMSL at the northeast corner of the Plan Area. According to the California Governor's Office of Emergency Services (Cal/OES) MyHazards website,[47] the Plan Area is not at risk of flooding due to a tsunami, and impacts would be less than significant.

A seiche is a surface wave created when an inland water body is shaken, usually by strong winds or an earthquake. It can occur in large bodies of water, such as bays and lakes, and may occur in any semi- or fully enclosed body of water. The nearest body of water capable of generating a seiche is Big Dry Creek Reservoir about 6 miles north of the Plan Area. Continued implementation of the proposed Specific Plan and the approved City General Plan would not introduce new land uses near the reservoir that could be inundated, and Big Dry Creek Reservoir is a relatively small reservoir that would not be subject to strong oscillations during an earthquake event. The Plan Area is not at risk of flooding due to a seiche, and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

[47] California Governor's Office of Emergency Services (Cal/OES). 2015. MyHazards. Website: https://myhazards.caloes.ca.gov/. Accessed June 13, 2022.

Water Quality Control or Sustainable Groundwater Management Plans Consistency

Impact HYD-5: The proposed project would not conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

Impact Analysis

SGMA requires that governments and water agencies located in high and medium priority basins halt groundwater overdraft and bring groundwater basins into balanced level of pumping and recharge. As described in this section, the City of Fresno is located in the North Kings GSA, which includes the FID, County of Fresno, City of Fresno, City of Clovis, City of Kerman, Biola Community Services District, Garfield Water District, and the International Water District. In November 2019, the North Kings GSA prepared the North Kings GSP with the sustainability goal to ensure that by 2040, the Kings Groundwater Subbasin is being managed in a sustainable manner to maintain a reliable water supply by balancing water demand with available water supply.[48]

The North Kings GSP determined that the North Kings GSA could reach sustainability by 2040 if groundwater flows from within the North Kings GSA to neighboring GSAs and basins are reduced and projects are developed to mitigate present and future projected impacts. The North Kings GSP relied on population projections and estimated water demand consistent with the City's UWMP in order to develop the projects and management actions needed to reach sustainability in 2040. Additionally, the City identified the following projects to meet the initial estimate of impact on groundwater:

- Residential Water Meter Retrofit Project (completed)
- T-3 Surface Water Treatment Facility (completed)
- Southwest Reclamation Facility and Distribution System (completed)
- Nielsen Recharge Facility (completed)
- Southeast Surface Water Treatment Facility (completed)
- Northeast Surface Water Treatment Facility Expansion
- Southeast Reclamation Facility and Distribution System

Additional projects identified by member agencies and those included in the North Kings GSP may be implemented in the future depending on cost. Implementation of the SEDA Specific Plan would not conflict with or obstruct implementation of projects and management actions included in the North Kings GSP. Therefore, impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

[48] North Kings Groundwater Sustainability Agency (North Kings GSA). Groundwater Sustainability Plan. Website: https://northkingsgsa.org/groundwater-sustainability-plan/. Accessed June 15, 2022.

Project Specific Mitigation Measures

None.

3.10.7 - Cumulative Impacts

The proposed Specific Plan would develop hydrological infrastructure within the Plan Area and, therefore, would generally eliminate cumulative impacts outside of it. The impacts of anticipated development and projects resulting from the Specific Plan have been analyzed in this Draft PEIR. Most impacts are localized and would occur at different times as the Specific Plan is built out. Therefore, by nature, the proposed project would generally not combine with other projects to cause cumulatively considerable impacts. Where there are regional impacts, they would occur on a scale and of a difficulty that cannot be addressed within a Specific Plan and are being addressed with long-term planning by regional groups and State agencies. However, some potential cumulative impacts were identified and are discussed below.

Groundwater

The Kings Subbasin is in overdraft condition due to substantial groundwater pumping. Growth in the Kings Subbasin would increase demands for groundwater pumping, potentially resulting in continued drawdown of water levels leading to localized cones of depression, changes in groundwater flow direction, concentration of contaminants, and land subsidence. This is a regional problem that is being addressed through several means, including the formation of GSAs and the development of GSPs. Implementation of the Specific Plan would generate an additional 1.7 percent (0.33 MGD) of groundwater demand in the Plan Area over what was predicted by the General Plan. However, as discussed above, this may be accommodated with full implementation of the proposed Specific Plan. The City has also placed a higher emphasis on surface water and groundwater recharge, supplying greater than 50% of its potable water supply with surface water in 2019 and 2020. The City is a member of the North Kings GSA; continued participation and compliance with the North Kings GSP and continued development of water conservation policies/programs and water supply infrastructure will reduce the cumulative impacts related to hydrology. This is incorporated as MM HYD-2 and will reduce impacts to a less than significant level with mitigations incorporated.

Hydrology and Water Quality

Buildout of the proposed project would increase the amount of paved impervious surfaces within the Plan Area. This increase in impervious surfaces would increase stormwater runoff rates and volumes over those that occur from development under the General Plan. This increase in runoff would have the potential to increase the amount of polluted runoff. However, as described above, additional stormwater detention basins and expanded capacity for stormwater is planned throughout the Plan Area. This is required by MM HYD-3a, MM HYD-3b, and MM HYD-3c. Furthermore, all development projects within the Fresno-Clovis area would be required to comply with the MS4 Permit that requires the implementation of water quality and watershed protection measures. Compliance with the MS4 Permit would reduce potential impacts from cumulative projects to less than significant. Since the development under the proposed Specific Plan would also need to comply with the MS4 Permit and includes specific policies of the proposed Specific Plan and

the approved City General Plan, the proposed project's contribution to potential cumulative impacts would be less than significant with mitigations incorporated.

Level of Cumulative Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Refer to MM HYD-2a-2d, and MM HYD-3a-3c.

Level of Cumulative Significance After Mitigation

Less than significant with mitigation incorporated.

3.11 - Land Use and Planning

3.11.1 - Introduction

This section describes the existing land use and potential effects from project implementation on the site and its surrounding area. Descriptions and analysis in this section are based, in part, on review of the Fresno General Plan (General Plan), Municipal Code, the proposed Fresno Southeast Development Area (SEDA) Specific Plan (Specific Plan), and aerial photos. As further discussed in Chapter 1, Introduction, three comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to land use and planning:

- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Planning Area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including state and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.11.2 - Environmental Setting

Land Use

Southeast Development Area Specific Plan

The nearly 9,000-acre Plan Area is characterized by residential, mixed use, office, public facilities, and open space uses. The predominant existing uses in the Plan Area are agricultural and rural residential uses. Agricultural lands consist of vineyards, orchards, vegetable farms, and agriculture-related and commercial operations, such as plant nurseries, wineries, and other various agricultural businesses. Rural residential development is primarily concentrated in the area between State Route (SR) 180 and McKinley Avenue. There are 700 residential parcels (approximately 2.6 acres each on average), which accommodate 713 single-family homes and 13 mobile homes.

The Fresno Model Farmland Conservation Program (MFCP) recognizes the Plan Area as a location for efficient and cost-effective urban development that serves to preserve and enhance strategic agricultural lands beyond the urban edge.

The current roadway network is mainly comprised of two-lane county roads at 0.5-mile intervals, interspersed with local streets. Major roadway access corridors include Temperance, Clovis, and Jensen Avenues.

Surrounding Land Uses

West

Locan, Temperance, and Minnewawa Avenues serve as the western boundary of the Plan Area. Portions of the western boundary are within the Fresno city limits. Land uses to the west of the Plan

Area are primarily Residential–Medium Density, Residential–Medium Low Density, and Residential–Low Density. Other land uses west of the Plan Area include commercial, industrial, public facilities, and open space.

North

Jensen Avenue, and the Fresno city limits are located along the southwestern portion of the Plan Area with Gould Canal running along the northern boundary. Land uses north of the Plan Area are within unincorporated Fresno County and within the City of Clovis limits and Sphere of Influence (SOI). City of Clovis land uses north of the Plan Area include AG–Agriculture, W–Water, VL–Very Low Density Residential (0.6-2.0 dwelling unit per acre [du/acre]) L–Low Density Residential (2.1-4.0 du/acre), and M–Medium Density Residential (7.1-15.0 du/acre).[1]

East

McCall and Highland Avenues form the eastern boundary of the Plan Area. Lands east of the Plan Area are within unincorporated Fresno County. According to the County of Fresno General Plan, Current Land Use Map, the land to the east of the Plan Area is predominately designated as Agriculture/Open Space and Public Lands. There are also small portions of the area to the east of the Plan Area that are designated as Residential and Rural Residential.[2]

South

Jensen and North Avenues form the southern boundary of the Plan Area. Lands south of the Plan Area are within unincorporated Fresno County. The predominant land uses south of the Plan Area are zoned as Exclusive Agricultural (AE-20) according to the County of Fresno General Plan.[3]

Land Use Designations

SEDA Specific Plan Area

Exhibit 3-11.1 summarizes the existing General Plan land use designations and zoning in the Plan Area. Chapter 2, Project Description, Exhibit 2-2, depicts the proposed land use designations for the Plan Area.

3.11.3 - Regulatory Framework

Federal

Code of Federal Regulations Part 77

Title 14 of the Code of Federal Regulations Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace, governs the Federal Aviation Administration (FAA) review of proposed construction exceeding certain height limits, defines airspace obstruction criteria, and provides for FAA aeronautical studies of proposed construction. The regulations contain three key elements: (1)

[1] City of Clovis. 2014. Clovis General Plan Figure LU-2, Land Use Diagram. Website: https://cityofclovis.com/wp-content/uploads/2018/10/Figure-LU-2.pdf. Accessed June 6, 2022.

[2] County of Fresno. 2000. Fresno County General Plan, Figure 1-5: Current Land Use Map. Website: https://www.co.fresno.ca.us/home/showpublisheddocument/8398/636379166183770000. Accessed January 17, 2023.

[3] County of Fresno. County of Fresno – Zoning. Website: https://gisportal.co.fresno.ca.us/portal/apps/webappviewer/index.html?id=b921843d343d4df998b5b3c6a301756a. Accessed March 21, 2023.

standards for determining obstructions in the navigable airspace and designation of imaginary surfaces for airspace protection; (2) requirements for project sponsors to provide notice to the FAA of certain proposed construction or alteration of structures that may affect the navigable airspace; and (3) the initiation of aeronautical studies, by the FAA, to determine the potential effect(s), if any, of proposed construction or alterations of structures on the subject airspace. Pursuant to these federal regulations, any new structure or alterations to an existing structure (including portions of structures, mechanical equipment, flag poles, and other projections) with a height that would exceed Part 77 elevation thresholds is required to file a Notice of Proposed Construction or Alteration with the FAA. Part 77 Subpart C establishes obstruction standards for the airspace around airports including approach zones, conical zones, transitional zones, and horizontal zones known as "imaginary surfaces." These imaginary surfaces rise from the primary surface (ground level at the SFO runways), and gradually rise along the approach slopes and sides of the runways. The FAA considers any objects that penetrate these imaginary surfaces as potential obstructions to air navigation. Obstructions may occur without compromising safe air navigation, but they must be marked, lighted, and noted on aeronautical publications to ensure that pilots can see and avoid them.

State

California Senate Bill 1818

California Senate Bill (SB) 1818, Chapter 928, provides developers with a density bonus and other incentives for constructing lower income housing units within a development provided the developer meets certain requirements, as enumerated in Section 65915(b) of the Government Code:

> 65915 (b) A city, county, or city and county shall grant a density bonus and incentives or concessions described in subdivision (d) when the applicant for the housing development seeks and agrees to construct at least any one of the following:
>
> (1) Ten percent of the total units of a housing development for lower income households, as defined in Section 50079.5 of the Health and Safety Code.
>
> (2) Five percent of the total units of a housing development for very low-income households, as defined in Section 50105 of the Health and Safety Code.
>
> (3) A senior citizen housing development as defined in Sections 51.3 and 51.12 of the Civil Code.
>
> (4) Ten percent of the total dwelling units in a condominium project as defined in subdivision (f) of, or in a planned development as defined in subdivision (k) of, Section 1351 of the Civil Code, for persons and families of moderate income, as defined in Section 50093 of the Health and Safety Code.

With respect to parking requirements, Section 65915.p(1) states:

> Upon the request of the developer no city, county, or city and county shall require a vehicular ratio, inclusive of handicapped and guest parking, of a development meeting the criteria of subdivision (b) that exceeds the following ratios:

(A) Zero to one bedrooms: one on-site parking space
(B) Two to three bedrooms: two on-site parking spaces

Williamson Act

The California Land Conservation Act of 1965 (Williamson Act) allows local governments to enter into voluntary contracts with private landowners to restrict specific parcels of land to agricultural uses. In return, restricted parcel property taxes are assessed at a rate consistent with their actual use rather than potential market value. The minimum length of a Williamson Act Contract is 10 years. Because the contract term automatically renews on each anniversary date of the contract, the actual contract length is essentially indefinite.

Quimby Act

The Quimby Act of 1965 is a State law that allows local legislative bodies to adopt requirements for the dedication of land for parks or recreational purposes, payment of fees in-lieu-of land dedication, or a combination of both, as a condition of approval for a subdivision. The requirements must be adopted by an ordinance, with definite standards for determining the amount of land dedicated, or fees paid, and the requirement must have a clear nexus to the use of the facilities by the future inhabitants of the subdivision. Project consistency with policies related to recreation is discussed in Section 3-15, Public Services, of this Draft PEIR.

Local

Fresno General Plan

The Fresno General Plan outlines a long-range vision for the physical development of the city that reflects the community's vision to preserve the desirable qualities of the existing community while encouraging the aspirations of the community.

Urban Form, Land Use, and Design

The Urban Form, Land Use, and Design Chapter, Chapter 3 of the General Plan, establishes a structural framework for the City and provides policy direction on urban form and a basis for land-use decision making.

Urban Form

Objective UF-1 Emphasize the opportunity for a diversity of districts, neighborhoods, and housing types.

Policy UF-1-a **Diverse Neighborhoods**. Support development projects that provide Fresno with a diversity of urban and suburban neighborhood opportunities.

Policy UF-1-c **Identifiable City Structure.** Focus integrated and ongoing planning efforts to achieve an identifiable city structure, comprised of a concentration of buildings, people, and pedestrian-oriented activity in Downtown; along a small number of transit-oriented, mixed-use corridors and strategically located Activity Centers; and in existing and new neighborhoods augmented with parks and connected by multi-purpose trails and tree lined bike lanes and streets.

Policy UF-1-d **Range of Housing Types.** Provide for diversity and variation of building types, densities, and scales of development in order to reinforce the identity of individual neighborhoods, foster a variety of market-based options for living and working to suit a large range of income levels, and further affordable housing opportunities throughout the city.

Policy UF-1-e **Unique Neighborhoods.** Promote and protect unique neighborhoods and mixed-use areas throughout Fresno that respect and support various ethnic, cultural and historic enclaves; provide a range of housing options, including furthering affordable housing opportunities; and convey a unique character and lifestyle attractive to Fresnans. Support unique areas through more specific planning processes that directly engage community members in creative and innovative design efforts.

Policy UF-1-f **Complete Neighborhoods, Densities, and Development Standards.** Use Complete Neighborhood design concepts and development standards to achieve the development of Complete Neighborhoods and the residential density targets of the General Plan.

Objective UF-12 Locate roughly one-half of future residential development in infill areas—defined as being within the City on December 31, 2012— including the Downtown core area and surrounding neighborhoods, mixed-use centers and transit-oriented development along major BRT corridors, and other non-corridor infill areas, and vacant land.

Policy UF-12-a **BRT Corridors.** Design land uses and integrate development site plans along BRT corridors, with transit-oriented development that supports transit ridership and convenient pedestrian access to bus stops and BRT station stops.

Policy UF-12-b **Activity Centers.** Mixed use designated areas along BRT and/or transit corridors are appropriate for more intensive concentrations of urban uses. Typical uses could include commercial areas; employment centers; schools; compact residential development; religious institutions; parks; and other gathering points where residents may interact, work, and obtain goods and services in the same place.

Policy UF-12-d **Appropriate Mixed Use.** Facilitate the development of vertical and horizontal mixed-uses to blend residential, commercial, and public land uses on one or adjacent sites. Ensure land use compatibility between mixed-use districts in Activity Centers and the surrounding residential neighborhoods.

Policy UF-12-e **Access to Activity Centers.** Promote adoption and implementation of standards supporting pedestrian activities and bicycle linkages from surrounding land uses and neighborhoods into Activity Centers and to transit stops. Provide for priority transit routes and facilities to serve the Activity Centers.

Policy UF-12-f **Mixed Use in Activity Centers.** Adopt a new Development Code which includes use regulations and standards to allow for mixed-uses and shared parking facilities.

Policy UF-12-g **Impacts on Surrounding Uses.** Establish design standards and buffering requirements for high-intensity Activity Centers to protect surrounding residential uses from increased impacts from traffic noise and vehicle emissions, visual intrusion, interruption of view and air movement, and encroachment upon solar access.

Land Use

Objective LU-1 Establish a comprehensive citywide land use planning strategy to meet economic development objectives, achieve efficient and equitable use of resources and infrastructure, and create an attractive living environment.

Policy LU-1-a **Promote Development within the Existing City Limits as of December 31, 2012.** Promote new development, infill, and rehabilitation of existing building stock in the Downtown Planning Area, along BRT corridors, in established neighborhoods generally south of Herndon Avenue, and on other infill sites and vacant land within the City.

Policy LU-1-b **Land Use Definition and Compatibility.** Include zoning districts and standards in the Development Code that provide for the General Plan land use designations and create appropriate transitions or buffers between new development with existing uses, taking into consideration the health and safety of the community.

Policy LU-1-c **Provision of Public Facilities and Services.** Promote orderly land use development in pace with public facilities and services needed to serve development.

Policy LU-1-d **Orderly Transition of Existing Uses.** Implement updates to the Fresno Municipal Code to provide for the orderly transition of existing, legal non-conforming uses on the BRT Corridors.

Policy LU-1-f **Coordination with Fresno County Land Use Planning.** Seek a Memorandum of Understanding (MOU) with the County of Fresno to prohibit development inconsistent with this General Plan on unincorporated land within the City's SOI.

Policy LU-1-g **SOI Expansion.** Maintain the City's current SOI boundaries without additional expansion, except to allow for the siting of a maintenance yard for the California High Speed Train project and related industrial and employment priority areas proximate to and south of the SOI boundary between State Route 41 and State Route 99. Prohibit residential uses in the expansion area.

Objective LU-2 Plan for infill development that includes a range of housing types, building forms, and land uses to meet the needs of both current and future residents.

Policy LU-2-a **Infill Development and Redevelopment.** Promote development of vacant, underdeveloped, and re-developable land within the City Limits where urban services are available by considering the establishment and implementation of supportive regulations and programs.

Policy LU-2-b **Infill Development for Affordable Housing.** Establish a priority infill incentive program for residential infill development of existing vacant lots and underutilized sites within the City as a strategy to help to meet the affordable housing needs of the community.

Policy LU-2-e **Neighborhood Preservation.** Incorporate standards in the Development Code to preserve the existing residential quality of established neighborhoods.

Policy LU-2-f **Lot Consolidation.** Include incentives in the Development Code for streamlining the consolidation of very small, oddly shaped, and difficult to develop lots to create more efficient and developable parcels.

Objective LU-3 Support the successful fulfillment of plans when adopted for the Downtown Planning Area

Policy LU-3-b **Mixed Use Urban Corridors that Connect the Downtown Planning Area.** Support the development of mixed-use urban corridors that connect the Downtown Planning Area with the greater Fresno-Clovis Metropolitan Area with functional, enduring, and desirable urban qualities along the Blackstone Avenue, Shaw Avenue, California Avenue, and Ventura Avenue/Kings Canyon Road corridors, as shown on Figure LU-1: General Plan Land Use Diagram.

Policy LU-3-c **Zoning for High Density on Major BRT Corridors.** Encourage adoption of supportive zoning regulations for compact development along BRT corridors leading to the Downtown Core that will not diminish the long-term growth and development potential for Downtown.

Objective LU-5 Plan for a diverse housing stock that will support balanced urban growth, and make efficient use of resources and public facilities.

Policy LU-5-a **Low Density Residential Uses.** Promote low density residential uses only where there are established neighborhoods with semi-rural or estate characteristics.

Policy LU-5-b **Medium-Low Density Residential Uses.** Promote medium-low density residential uses to preserve existing uses of that nature or provide a transition between low and medium density residential areas.

Policy LU-5-c **Medium Density Residential Uses.** Promote medium density residential uses to maximize efficient use of residential property through a wide range of densities.

Policy LU-5-d **Medium-High Density Residential Uses.** Promote medium-high density residential uses to optimize use of available or planned public facilities and services and to provide housing opportunities with convenient access to employment, shopping, services, and transportation.

Policy LU-5-e **Urban Neighborhood Residential Uses.** Promote urban neighborhood residential uses to support compact communities and Complete Neighborhoods that include community facilities, walkable access to parkland and commercial services, and transit stops.

Policy LU-5-f **High Density Residential Uses.** Promote high-density residential uses to support Activity Centers and BRT Corridors, and walkable access to transit stops.

Policy LU-5-g **Scale and Character of New Development.** Allow new development in or adjacent to established neighborhoods that is compatible in scale and character with the surrounding area by promoting a transition in scale and architectural character between new buildings and established neighborhoods, as well as integrating pedestrian circulation and vehicular routes.

Policy LU-5-h **Housing Offering Amenities.** Support housing that offers residents a range of amenities, including public and private open space, landscaping, and recreation facilities with direct access to commercial services, public transit, and community gathering spaces.

Policy LU-5-I **Housing for Seniors.** Facilitate the development of senior housing projects that are accessible to public transportation and services.

Policy LU-5-j **Campus-Centered Communities.** Encourage development of campus-centered communities by focusing growth around existing and planned academic facilities and by directing infrastructure to those areas.

Objective LU-6 Retain and enhance existing commercial areas to strengthen Fresno's economic base and site new office, retail, and lodging use districts to serve neighborhoods and regional visitors.

Policy LU-6-a **Design of Commercial Development.** Foster high-quality design, diversity, and a mix of amenities in new development with uses through the consideration of guidelines, regulations and design review procedures.

Policy LU-6-b **Commercial Development Guidelines.** Consider adopting commercial development guidelines to assure high-quality design and site planning for large commercial developments, consistent with the Urban Form policies of this Plan.

Policy LU-6-c **Appropriate Office Development.** Promote the establishment of development standards for new offices, addressing location, size, and intensity necessary to meet

the City's needs. Integrate and support employment in adjacent and proximate neighborhoods.

Objective LU-7 Plan and support industrial development to promote job growth.

Policy LU-7-a **Incentives for a Diversity of Industries, Increased Food Processing and Manufacturing, and Related Employment Opportunities in Fresno.** Use the City's Capital Improvement Program to set priorities for locations and timing of water, sewer, and transportation infrastructure investments by the City and initiate implementation programs to encourage development of targeted industries as identified under Policy ED-3-c, in employment land use areas designated on Figure LU-1: Land Use Diagram.

Policy LU-7-b **Business and Industrial Parks.** Promote business and industrial park sites that are of sufficient size, unified in design, and diversified in activity to attract a full range of business types needed for economic growth.

Policy LU-7-c **Efficiency of Industrial Uses.** Promote industrial land use clusters to maximize the operational efficiency of similar activities.

- Provide access to a range of transportation modes through plans and incentives, ensuring that local, regional, and national connections are available to industrial uses;
- Develop a strategy to promote rail-accessible sites for industries that need such capability; and
- Ensure timely access to the full range of urban services for industrial development by coordinating proposed plans with the annual and long-range City infrastructure planning.

Objective LU-8 Provide for the development of civic and institutional land uses to meet the educational, medical, social, economic, cultural, and religious needs of the community.

Policy LU-8-a **Civic and Institutional Use Compatibility.** Protect civic and institutional areas from incompatible uses that could affect their vitality and contributions to the city.

Policy LU-8-c **Zoning for Public Facilities.** Allow public facility uses in zoning districts where appropriate.

Policy LU-8-d **Public Facilities and Institutions Meeting City Standards.** Request that federal, State, and local agencies locating public facilities and institutions in the City or designated growth area, meet City standards for public streets and sidewalks, access, parking, water supply, wastewater disposal, landscaping, and amenities.

Objective LU-9 Plan land uses, design, and development intensities to supplement and support, and not compete with, the Downtown.

Policy LU-9-a **Residential Locations.** Plan for new residential uses and types in a manner that help make the Downtown Planning Area a convenient destination for employment and regional retail shopping.

Policy LU-9-b **Activity Centers.** Plan for future Activity Centers at appropriate locations that avoid competition with Downtown businesses.

Policy LU-9-c **Primacy of Downtown.** Maintain the Downtown mixed-use areas as the Primary Activity Center within the city with the tallest buildings to enhance its profile and visibility.

Buildings and Design

Objective D-1 Provide and maintain an urban image that creates a "sense of place" throughout Fresno.

Objective D-4 Preserve and strengthen Fresno's overall image through new design review and create a safe, walkable and attractive urban environment for the current and future generations of residents.

Policy D-4-f **Design Compatibility with Residential Uses.** Strive to ensure that all new nonresidential land uses are developed and maintained in a manner complementary to and compatible with adjacent residential land uses, to minimize interface problems with the surrounding environment and to be compatible with public facilities and services.

Policy D-4-g **Development Code Update for Design Concepts.** Ensure that standards in the Development Code implement General Plan design concepts for each land use type.

Objective D-7 Continue applying local urban form, land use, and design policies to specific neighborhoods and locations.

Policy D-7-b Consider preparing new community, neighborhood, and/or Specific Plans for neighborhoods and locations that were covered by repealed plans.

Mobility and Transportation Chapter

The Mobility and Transportation Chapter, Chapter 4 of the General Plan, includes objectives and policies for all modes of transportation and users of streets and highways, transit, sidewalks and trails, and bicycle transportation modes, as well as parking, goods movement strategies, and the City's airports.

Objective MT-1 Create and maintain a transportation system that is safe, efficient, provides access in an equitable manner, and optimizes travel by all modes.

Policy MT-1-d **Integrate Land Use and Transportation Planning.** Plan for and maintain a coordinated and well-integrated land use pattern, local circulation network and transportation system that accommodates planned growth, reduces impacts on adjacent land uses, and preserves the integrity of established neighborhoods.

Policy MT-1-e **Ensure Interconnectivity Across Land Uses.** Update development standards and design guidelines applicable to public and private property to achieve Activity Centers, neighborhoods and communities which are well connected by pedestrian, bicycle, appropriate public transportation, and automobile travel facilities.

Policy MT-1-f **Match Travel Demand with Transportation Facilities.** Designate the types and intensities of land uses at locations such that related travel demands can be accommodated by a variety of viable transportation modes and support Complete Neighborhoods while avoiding the routing of excessive or incompatible traffic through local residential streets.

Objective MT-2 Make efficient use of the City's existing and proposed transportation system and strive to ensure the planning and provision of adequate resources to operate and maintain it.

Policy MT-2-a **Intensification of Bus Rapid Transit Corridors.** Where traffic has previously been diverted to freeways, encourage incentives for more intense development along transportation corridors, such as the Blackstone Corridor, where there is now additional capacity.

Policy MT-2-c **Reduce VMT through Infill Development.** Provide incentives for infill development that would provide jobs and services closer to housing and multimodal transportations corridors in order to reduce citywide Vehicle Miles Traveled (VMT).

Resource Conservation and Resilience Chapter

The Resource Conservation and Resilience Chapter, Chapter 7 of the General Plan, establishes objectives and policies for the conservation of natural resources in Fresno. Air resources, including air quality and greenhouse gas emissions; water resources, including groundwater and waterways; energy resources; and land resources, including farmland and mineral resources, are address in this chapter.

Objective RC-2 Promote land uses that conserve resources.

Policy RC-2-a **Link Land Use to Transportation.** Promote mixed use, higher density infill development in multimodal corridors. Support land use patterns that make more efficient use of the transportation system and plan future transportation investments in areas of higher-intensity development. Discourage investment in infrastructure that would not meet these criteria.

Healthy Communities Chapter

The Healthy Communities Chapter, Chapter 10 of the General Plan, focuses on subjects not fully discussed in other chapters pertaining to the relationships between the built, natural, and social environments and community health and wellness outcomes.

Objective HC-2 Create complete, well-structured, and healthy neighborhoods and transportation systems.

Policy HC-2-a **Healthy Neighborhoods.** Promote the design of Complete Neighborhoods whose physical layout and land use mix allow for walking to local stores and services, biking, and transit use; foster community pride; enhance neighborhood identity; encourage public safety; are family-friendly; and address the needs of residents of all ages and abilities.

Objective HC-3 Create healthy, safe, and affordable housing.

Policy HC-3-g **Residential Compatibility.** Consider developing a program with community stakeholders to address compatibility of industrial and heavy commercial uses and zoning with established neighborhoods.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to land use and planning:

Urban Form Element

Objective UF-1 Create complete neighborhoods in the Southeast Development Area that integrate housing, business and retail amenities. Implement a Southeast Development Area plan that balances and mixes housing, jobs, commercial businesses, services, and public facilities to help meet existing thresholds for lower vehicle miles traveled, reduced air pollution, and the efficient use of groundwater resources in compliance with the Sustainable Groundwater Management Act of 2014.

Policy UF-1.1 **Land Use Diversity.** Update the City Development Code to include the new SEDA zone districts and associated development standards to encourage land use diversity within the Plan Area.

Policy UF-1.6 **Right-to-Farm.** Establish right-to-farm practices in accordance with the Fresno County Right-to-Farm Ordinance to allow the continued operation of agricultural activities which occur adjacent to new residential developments. Require buffers between new residential development and existing farmlands.

Policy UF-1.7 **Buffers Between Uses.** Require buffers between new industrial development and existing neighborhoods. Investigate opportunities to develop resilient green buffers between existing industrial and residential uses. Light industrial areas may serve as buffers between heavy industrial and other land uses.

Objective UF-2 Provide a mix of Regional, Community, and Neighborhood Town Centers where individuals can live, work and play.

Policy UF-2.1 **Network of Town Centers.** The SEDA will include mixed-use Regional, Community, and Neighborhood Town Centers that form a network of complementary employment, commercial, cultural, and civic opportunities linked by multimodal transportation systems.

Policy UF-2.2 **Development Code Update.** The size, density, composition, and building character of Mixed-Use Districts will be consistent with the zone district standards set forth in the SEDA Development Code update. In addition, the Plan will call upon the City of Fresno's Department of Public Work Standards, the Active Transportation Plan and the Fresno Area Express (FAX) transit plans to implement streetscape design and non-auto circulation elements.

Objective UF-3 Foster a community of tight-knit residential districts.

Policy UF-3.2 **Development Code Update.** The size, density, composition, and building character of Residential Districts will be consistent with the SEDA zone district standards implemented through a Development Code update. Streets and non-auto circulation elements will be implemented according to the standards set in the Development Code.

Objective UF-4 Attract high-profile businesses to create bustling and desirable Employment Districts.

Policy UF-4.2 **Development Code Update.** The size, density, composition, and building character of Employment Districts will be consistent with the proposed SEDA zone district standards set forth in the SEDA Development Code update. In addition, the Plan will draw upon the City of Fresno's Department of Public Works Standards, the Active Transportation Plan, and the Fresno Area Express (FAX) transit plans to implement streetscape design and non-auto circulation elements.

Objective UF-6 Integrate urban form with a multimodal transportation network.

Policy UF-6.1 **Land Use/Circulation Integration.** The network of streets within the Mixed-Use Districts, Residential Districts and Employment Center districts will not only link districts to one another, but to other designations beyond the Plan area, as shown in Table 2.1 Network of Streets below.

Table 2.1: Network of Streets

Category	Arterial	Collector	Local
Mixed-Use Districts			
Regional Town Center	X	X	X
Community Town Center	X	X	X
Neighborhood Center	–	X	X
Residential Districts			
Mixed Residential	X	X	X
Neighborhood Residential	–	X	X
Rural Residential	–	X	X
Rural Cluster Residential	–	X	X
Employment Centers			
Office Center	X	X	X
Flexible Research and Development	X	X	X
Institutional	X	X	X
Source: City of Fresno 2020.			

Housing Element

Objective HC-1 Mix housing types and designs throughout the Plan Area to respond to the needs of all household types. The Southeast Development Area Specific Plan accommodates a diverse range of household demographics and preferences with housing types that range from higher-density multifamily homes to medium lot single-family homes.

Policy HC-1.1 **Age in Place Housing.** Plan for housing suitable for different stages of life, including smaller, more affordable units for first-time buyers, singles, young couples, families, and older homeowners, as well as opportunities for multi-generational housing, housing for seniors and long-term care/assisted living facilities.

Policy HC-1.2 **Family and Large Household Housing.** Encourage the development of housing to serve larger households and households with children, particularly in areas served by high-capacity transit. The City of Fresno should set targets for the provision of two-plus bedroom homes for purchase and rent.

Policy HC-1.3 **Accessory Dwelling Units.** Allow the development of accessory dwellings or "granny flats" to increase density and affordability while maintaining character.

Policy HC-1.4 **Accessible Housing.** Construct housing with practical features that provide basic access and functionality for people of all ages and various mobility and ambulatory capabilities.

Policy HC-1.6 **Compatibility Between Uses.** Provide for urban edge transitions that protect existing rural residential and agricultural uses from new development.

Objective HC-2 Build housing affordable to all Fresno residents using an array of regulatory, market-based, and other strategies.

Policy HC-2.1 **Provision of Affordable Housing**. Provide funding assistance, partnership support, and take other actions as necessary to support the construction of new affordable housing within the SEDA to meet RHNA-based targets as specified in the City of Fresno General Plan Housing Element.

The Housing Element details a comprehensive set of programs to provide an adequate supply of affordable housing. Programs entail actions by the Planning and Development Department, Fresno Housing (previously known as the Fresno Housing Authority), private and non-profit developers and others as applicable. Development in the SEDA shall be consistent with the Housing Element. Current programs include:

- Land use planning to provide for multi-family units, increased housing density, and mixed-use development.
- Actions to construct housing for specific groups, including farmworkers; special needs persons; homeless and recently homeless persons; very low-income large families; extremely low-, very low-, and low-income seniors; and other extremely low- and very low-income households.
- Strengthening partnerships with affordable housing developers.
- Increasing opportunity through an equitable communities' program, which calls for location of affordable housing in areas of high opportunity .
- Preventing Displacement.
- Make incentives available to all new residential developments that target at least 25 percent of new units for families earning 80% of the area median income or below.

For more detailed information, please refer to the Fresno General Plan Housing Element

Policy HC-2.3 **Distribution of Housing.** Promote affordable housing opportunities that are distributed throughout the Southeast Development Area to avoid concentration in any one area.

Objective HC-3 Link housing and transportation together to limit family expenditures on both housing and transportation. The multi-modal transportation network connects housing and jobs within the Southeast Development Area and to other major regional centers, facilitating internal travel by non-automobile means. The Urban Form Chapter addresses the location, distribution, and standards for transportation infrastructure investment, combining transportation options with land use development to ultimately lower travel costs for SEDA residents and employees.

Policy HC-3.1 **Coordinated Land Use and Transportation Planning.** Support regional and city-wide planning efforts, such as the Regional Transportation Plan and Sustainable Communities Strategy, the Fresno General Plan, and the City's updated Greenhouse Gas Reduction Plan that encourage the development of housing near new and existing public transportation investments.

Policy HC-3.2 **Travel.** Encourage accessible, mixed-use development that incorporates housing and jobs, while lowering daily vehicle miles traveled.

Policy HC-3.3 **Smart Land Uses.** Build smaller-lot single family and multifamily housing types which use less energy and water than larger units.

Community Farming and Agricultural Element

Objective CF-1 Conserve strategic farmland outside the Southeast Development Area most likely to sustain economically viable agriculture over the long term. While the efficient, compact development pattern of the SEDA Specific Plan reduces development pressure on surrounding agricultural land, it must be bolstered by policies that directly limit farmland conversion. These policies require inter-governmental coordination between the cities of Fresno, Sanger, Clovis, Fresno County, and other neighboring cities.

Policy CF-1.1 **Efficient Land Use.** Reduce development pressure on farmland outside the City of Fresno Sphere of Influence (SOI) by adopting the compact, efficient land use pattern of the SEDA Specific Plan. The SEDA Plan clusters homes and jobs at more than twice the density of current trend development.

Policy CF-1.2 **Future Growth Planning.** Support planning efforts that channel new growth to areas already committed to urban uses inside the current SOIs of incorporated cities in Fresno County.

Policy CF-1.3 **Conversion of Farmland to Non-agricultural Uses.** The City of Fresno will strongly discourage the conversion of strategic farmland outside its current SOI.

- **Strategic Farmland Mapping Project.** Support the Strategic Farmland Mapping Project conducted by the Fresno Council of Governments to identify the 'best' or most strategic locations to preserve farmland outside the current SOIs of incorporated cities in Fresno County.

Policy CF-1.4 **Agricultural Farm Buffer.** Establish an agricultural farm belt along the eastern edge of the SEDA. Farm belts provide opportunities to link agricultural land preservation and increased urban efficiency with local food production in ways that positively support local economies, farms, and farmers.

Objective CF-2 Create a long-term transition zone between urban uses in the City of Fresno and agricultural land in Fresno County. Buffering urban and adjoining agricultural land uses reduce conflicts that can arise due to noise, pollution, or traffic.

Policy CF-2.1 **Rural Cluster Districts.** Establish Rural Cluster Districts at the eastern edge of the site, as depicted in the SEDA Plan. Rural clusters consist of clustered residential development surrounded by common land held under easements for agricultural or recreational use.

- **Rural cluster farming.** Allow small-scale and community farming within Rural Cluster Districts.

Policy CF-2.2 **Passive Recreation.** Encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians.

- What is the role of rural cluster development?
  - A transitional buffer. Urban areas and large agricultural operations cannot always sit side-by-side. Noise, dust, and pesticides from farms can pose health concerns for residents, while farmers need space to move machinery and goods. Rural clusters along the eastern edge of SEDA form a transition between the urban area and the agricultural lands beyond.
  - An attractive residential option. Rural clusters offer a rural lifestyle within an environmentally responsible land use framework that promotes active farming and open space preservation.
  - A means to preserve land. Rural cluster lands can be used for organic small-scale farming, equestrian activities, or other uses compatible with the nearby homes. The vast majority of the land is preserved as viable agricultural land or open space.

Objective CF-3 Promote community farming to provide opportunities for entrepreneurs and families to grow food for commercial and household production. Community farming is intended, in part, to diversify agriculture and make residents of the Southeast Development Area stakeholders in the success of Fresno County agriculture.

Policy CF-3.1 **Organic and Pesticide-Free Farming.** Promote ecologically sensitive farming methods that are safe for farm workers, consumers, and residents by restricting pesticide use and promoting integrated pest management practices within the SEDA.

Policy CF-3.2 **Small farms.** Create opportunities for entrepreneurs to grow food for commercial production on small plots of land (2 to 20 acres) that can provide economic opportunities for current and future Fresno residents.

- **Location.** Small farms in the SEDA should be located adjacent to and within open space corridors and within Rural Cluster Districts. If located within a Planned Development or Multi-Family Residential Complex, the Homeowner's Association and/or property management company shall be responsible for the site and shall designate a liaison between the property owner(s) and the City. (City of Fresno Development Code-15-2720)
- **Access.** Public access to small farms should be limited or completely restricted; fencing may be required.
- **Management.** Management structures of small farms shall be determined as appropriate. Small farms may be privately owned or managed by non-profit organizations.

Policy CF-3.3 **Community Farming**. Create and expand a viable community farming program that promotes an appreciation of food and local ecology, instills a sense of stewardship and community, and provides a recreational activity.

- **Community/Neighborhood Gardens.** Create and support neighborhood gardens within local communities. Neighborhood gardens, such as Yo'Ville Community Garden in Southwest Fresno, are woven into the fabric of centers and residential areas, providing households with opportunities to grow some of their own produce and meet with other members of the community.
  - **Location.** Neighborhood gardens shall be integrated into Neighborhood Centers, open spaces, and other locations that place them within walking distance of most residents' homes.
  - **Access.** Access to community spaces can vary. Gardens can be open to the public, or only to designated users.
  - **Management.** Management structures of community spaces shall be determined as appropriate. Neighborhood gardens can be owned by a city or county agency or by a private landowner, and operated by a neighborhood collective, community garden association, non-profit, or city/county parks and recreation department that leases small plots of the garden to community members. Some neighborhood gardens are independent entities, while some jurisdictions have neighborhood garden programs that oversee all the gardens in a jurisdiction.
  - **Funding and staff assistance.** The City of Fresno shall encourage neighborhood organizations to seek funding for the neighborhood garden program and/or facilitate assistance through the Fresno Parks, After School, Recreation, and Community Services Department or other agency/organization.
- **School Gardens.** Support and foster the integration of school gardens within neighborhood schools, such as the school garden located at Kepler Neighborhood School in Downtown Fresno. School gardens can serve as outdoor classrooms

where students learn about soil, botany, natural cycles, nutrition, and basic gardening principles in a hands-on setting.

- **Location.** School gardens should be located on school grounds, or within a very short walk of a school. When possible, school gardens should be planned upon new school construction in order to maximize joint-use opportunities with the City of Fresno Parks, After School, Recreation, and Community Services Department.
- **Access.** Access should be controlled based on school district policies.
- **Management.** Management structures shall be determined as appropriate. School gardens are typically managed by at least one garden coordinator who works closely with school administration or one or more dedicated teachers.
- **School gardens working group.** Create a working group of teachers, students, and residents to explore the development of school garden programs in the Clovis and Sanger Unified School Districts.

- **Community Orchards.** Support and preserve community orchards for both new and existing orchards within the SEDA. Community orchards can be integrated into the community's open space network, serving as park-like features and enhancing connections to agriculture.
  - **Location.** Community orchards can be integrated into public open spaces or associated with private development.
  - **Access.** Community orchards should be unfenced, with high levels of public access.
  - **Management.** Management structures shall be determined as appropriate. In a typical model, residents help to care for the orchards and pay fees to fund professional gardeners.

Objective CF-4 **Support of Agriculture.** Support Fresno agriculture, agricultural industries, and farm employees through economic development, educational training, and social programs within the Southeast Development Area.

Policy CF-4.1 **Economic competitiveness.** Support efforts to promote and market agricultural products to maintain the long-term viability of Fresno-area farmers.

- **Direct Marketing.** Implement direct marketing of locally grown produce from Fresno County and the Southeast Development Area through farmers markets, community-supported agricultural programs, farm- to-restaurant programs, produce stands, and other mechanisms.
- **Branding of local produce.** Utilize the opportunities in SEDA to support and establish Fresno as a center for locally-grown produce serving the Central Valley and California. Establish a "Fresno Grown" brand and support the "California Grown" program to promote locally-grown produce.
- **Agricultural Tourism**. Encourage agricultural tourism in the SEDA to educate visitors and generate income and support for farms.
- **Value-Added Processing and Distribution.** Provide the opportunity for area

farmers to utilize Flexible Research and Development districts for agricultural processing and distribution.

Policy CF-4.2 **Educational training.** Support education and technical assistance for farm employees and aspiring farm owners through direct relationships with educational and non-profit institutions.

- **Public Institutions.** Encourage public institutions, including Fresno State University, the State Center Community College District, and other educational institutions, to provide assistance and training to farm employees.
- **Non-Profit Institutions.** Develop relationships with non-profit agricultural training organizations and encourage those organizations to locate in the Southeast Development Area.

Policy CF-4.3 **Farm worker housing and social services.** Encourage the long-term economic viability of Fresno County agriculture by supporting the housing and social service needs of farm workers.

- **Housing.** Provide safe, affordable, efficient housing for farm workers, permitting housing on agricultural lands and other appropriate sites within the current sphere of influence (refer to General Plan Housing Element).
- **Social Services.** Encourage organizations that support farm workers through family assistance programs, translation assistance, financial literacy training, medical assistance, and other services, to locate within the Southeast Development Area.

Policy CF-4.4 **Strategic plan for agriculture.** Encourage the long-term economic viability of Fresno County agriculture by creating a strategic plan that comprehensively addresses the needs of farmers and farmworkers. The plan should be developed in partnership with the County and private agricultural institutions. The plan should focus on, but is not limited to:

- Develop a pathway for protection of agricultural land at risk of conversion to nonagricultural uses through a review of why and to what extent agricultural land is being converted to other uses.
- Identify how to support agricultural land conservation and what economic, environmental, public health co-benefits arise from conservation.
- Analyze the existing agricultural land base and its function in the regional food system.
- Recognize and protect environmental co-benefits of conserving agricultural lands and analyze how to reduce greenhouse gas emissions.

- Identify the benefit of agricultural land for priority populations such as beginning or Veteran farmers and ranchers; residents of disadvantaged or low-income communities; or California Native American Tribes.

Conservation Element

Objective RC-1 Meet Statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.1 **Land Use Strategies.** Link land use and transportation by incorporating the following components into SEDA's land use plan:

A. Compact Development. Maximize opportunities in the SEDA for compact, higher density development in order to provide more housing, conserve resources, and reduce travel distances.

B. Design the Neighborhood, Community and Regional Town Centers in the SEDA as Mixed-Use Districts that include ground floor retail, civic and other commercial uses and upper floors of office and residential uses. Locate mixed-use development along high-quality transit corridors such as the Ventura/Kings Canyon Corridor that will serve SEDA's Regional Town Center. Incentivize developments that are mixed use, defined as pedestrian-friendly development that blends two or more residential, commercial, cultural or institutional uses, one of which must be residential.

C. Pedestrian-Oriented Development. Providing pedestrian-friendly infrastructure such as sidewalks, paths, and direct connections to neighboring uses such as shopping, schools, libraries and parks increases the potential for people to make trips on foot, bicycle or transit instead of by car. New development should include all sidewalks, paths, trails and facilities required by the General Plan, the Active Transportation Plan and the SEDA.

D. Incentives for Pedestrian-Oriented Anchor Retail. Consider adopting and implementing incentives for new pedestrian-friendly anchor retail to be applied within the SEDA's Regional, Community, and Neighborhood Town Centers.

E. Complete Streets. Ensure that all streets in the SEDA comply with the City's Complete Streets Policy.

F. Transit Oriented Development. Design land uses and integrate development site plans along High-Quality Transit Corridors such as the Ventura/Kings Canyon Corridor, with transit oriented development that supports transit ridership and convenient pedestrian access to bus stops and station stops.

Objective RC-3 Promote water conservation and the long-term sustainability of water resources within the Southeast Development Area.

Policy RC-3.1 **Smart, Compact Land Use.** Build compact communities that include more small-lot and multifamily housing options which require less water for outdoor irrigation.

Open Space Element

Objective OS-14 Provide water, stormwater, and wastewater infrastructure necessary to serve development in the SEDA.

Policy OS-14.2 **Curb, Gutter and Sidewalk Infrastructure.** Require all necessary infrastructure, such as curb, gutter, sidewalk, street trees, public benches, bike parking and amenities to be installed prior to the development of new residential neighborhoods and associated facilities.

Fresno Municipal Code

Chapter 15 of the Municipal Code outlines the City's Zoning Ordinance, which provides a guide for the physical development of the City in order to achieve the arrangement of land uses depicted in the approved General Plan, as well as implement goals, objectives, and policies of the approved General Plan. At the time of preparation of this document, the City of Fresno Municipal Code has been most recently updated on March 14, 2023. The Development Code provides regulations of land and structures in order to protect and promote health, safety, and welfare of the public, and to ensure the orderly development of the city.

Methodology

FirstCarbon Solutions (FCS) evaluated the potential for land use impacts through review of applicable land use policy documents. FCS reviewed the General Plan and the Municipal Code to identify applicable policies and provisions that pertain to the proposed project. Finally, FCS reviewed the proposed SEDA Specific Plan for consistency with the General Plan and Municipal Code.

3.11.4 - Thresholds of Significance

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist as thresholds to determine whether land use and planning impacts are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part, on the questions posed in Appendix G. These significance criteria are as follows:

The project would have a significant impact on the environment if it would:

a) Physically divide an established community.

b) Cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.

3.11.5 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the proposed project and provides mitigation measures where appropriate.

Divide an Established Community

Impact LAND-1: The proposed project would not physically divide an established community.

Impact Analysis

Implementation of the proposed project would have a significant environmental impact if it were configured in such a way as to create a physical barrier or other physical division within an established community. A typical example would be a project which involved a continuous right-of-way, such as a roadway, which would divide an established community and impede access between parts of the community. The Specific Plan does not contemplate or authorize any such physical changes to an established community.

As described in Chapter 2, Project Description, the Plan Area's land uses are predominantly agricultural and rural residential. There is currently one school, Lone Star Elementary School, which is within the Plan Area. The City has expanded rapidly over the past 20 years, and development in the newly urbanized areas has characteristics of suburban sprawl. The new residential developments are often disconnected from each other and not in close proximity to commercial areas or public facilities. New commercial centers are large and auto-oriented. This growth has highlighted the necessity to plan growth in the City of Fresno's SOI more efficiently. The Specific Plan does not propose or approve specific development, rather the Specific Plan provides a framework for the cohesive development of the Plan Area. In addition, the Specific Plan includes general goals and policies which will regulate future development. Implementation of the proposed project would allow for planned development and growth while promoting the emergence of new communities. Because the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network, the proposed project would result in increased connectivity. General Plan Policy LU-3-b would support the development of mixed-use urban corridors that connect the Downtown Planning Area with the greater Fresno-Clovis Metropolitan Area. Objective LU-4 is designed to enhance existing residential neighborhoods. Objective LU-6 would retain and enhance existing commercial areas to strengthen Fresno's economic base and site new office, retail, and lodging use districts to serve neighborhoods and regional visitors. Objective LU-8 would provide for the development of civic and institutional land uses to meet the educational, medical, social, economic, cultural, and religious needs of the community. Therefore, the proposed project would increase connectivity and support, strengthen, and connect new communities. The proposed project would not adversely impact community connectivity nor divide the physical arrangement of the community. As a result, a less than significant impact would occur.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Conflict with Applicable Plans, Policies, or Regulations

Impact LAND-2: **The proposed project would not cause a significant environmental impact due to a conflict with any land use plan, policy, or regulation adopted for the purpose of avoiding or mitigating an environmental effect.**

Impact Analysis

The General Plan Guidelines published by the State Office of Planning and Research define consistency as follows: "An action, program, or project is consistent with the General Plan if, considering all its aspects, it will further the objectives and policies of the General Plan and not obstruct their attainment." Therefore, the standard for analysis used in this Draft PEIR is based on general agreement with the policy language and furtherance of the policy intent (as determined by a review of the policy context). A comparison of the proposed Plan's characteristics with all applicable objectives outlined in the General Plan as they relate to land use issues are presented in Table 3.11-2; as shown, the proposed project is consistent with these objectives. Therefore, impacts would be less than significant.

Table 3.11-1: General Plan Consistency Analysis

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
Economic Development	ED-1	Support economic development by maintaining a strong working relationship with the business community and improving the business climate for current and future businesses.	**Consistent.** The proposed project supports economic development and is designed to create more opportunity for current and future residents and businesses. The proposed project would improve the business climate by locating employment centers in proximity to residential areas and regional transit connections and would accommodate approximately 37,000 jobs. Policy UF-1.3 emphasizes employment-generating development within the Plan Area to expand Fresno's employment base beyond traditional industries.
	ED-2	Support local business start-ups and encourage innovation by improving access to resources and capital and help overcome	**Consistent.** Policy EO-1.1 would broaden access to small business financing by expanding on the City's microlending programs to

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
		obstacles hampering economic development.	support small, local businesses. Policy EO-4.1 would support the development of small businesses by encouraging developments that can accommodate small-scale enterprises.
	ED-3	Attract and recruit businesses and offer incentives for economic development.	**Consistent.** Policy RC-1.1 would incorporate incentives for new pedestrian-friendly anchor retail to be applied within the Plan Area's regional, community, and neighborhood town centers.
	ED-4	Cultivate a skilled, educated, and well- trained workforce by increasing educational attainment and the relevant job skill levels in order to appeal to local and non-local businesses.	**Consistent.** Policy EO-1.2 would build on Fresno's current workforce development efforts by providing career technical education, apprenticeship, and other upskilling opportunities for those who live or work in SEDA. Policy EO-2.3 would establish partnerships with State Center Community College to promote workforce training programs that can support local business growth.
Urban Form, Land Use, and Design	**UF-1**	Emphasize the opportunity for a diversity of districts, neighborhoods, and housing types.	**Consistent.** The Housing Element of the SEDA Specific Plan accommodates a variety of household demographics with a diverse range of housing types, from medium- and higher-density multi-family types, to small and medium-lot single-family options. It utilizes a regulatory and market-based approach to create housing at all income levels. The plan also builds on a definition of affordability that considers household transportation burdens as a component of housing costs. Policy HC-1.1 is to plan for integrated neighborhood housing suitable for different stages of life, including smaller, more affordable units for first-time buyers, singles, young couples, families, and older homeowners, as well as opportunities for senior citizen housing and long-term

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			care/assisted living facilities. Policy HC-2.1 would provide funding assistance, partnership support, and take other actions as necessary to support the construction of new affordable housing within the SEDA.
	UF-12	Locate roughly one-half of future residential development in infill areas— defined as being within the City on December 31, 2012—including the Downtown core area and surrounding neighborhoods, mixed-use centers and transit-oriented development along major BRT corridors, and other non-corridor infill areas, and vacant land.	**Consistent.** The proposed project is consistent with the City's strategy to focus on infill development within existing City limits. The proposed project would minimize the City's outward expansion while promoting vibrant, sustainable communities.
	UF-13	Locate roughly one-half of future residential development in the Growth Areas—defined as unincorporated land as of December 31, 2012 SOI—which are to be developed with Complete Neighborhoods that include housing, services, and recreation; mixed-use centers; or along future BRT corridors.	**Consistent.** The proposed project is a comprehensive plan for the nearly 9,000-acre Southeast Growth Area. The proposed project concentrates residential development in Neighborhood Town Centers, consistent with the General Plan concept of complete neighborhoods.
	UF-14	Create an urban form that facilitates multi-modal connectivity.	**Consistent.** Policy CF-2.2 encourages the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians. Policy RC-1.1 would provide pedestrian-friendly infrastructure such as sidewalks, paths, and direct connections to neighboring uses such as shopping, schools, libraries, and parks increases the potential for people to make trips on foot, bicycle, or transit instead of by car.
	LU-2	Plan for infill development that includes a range of housing types, building forms, and land uses to meet the needs of both current and future residents.	**Consistent.** The proposed project provides for the development of a range of housing types, building forms, and land uses to meet the needs of both existing and future residents.

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
	LU-4	Enhance existing residential neighborhoods through regulations, code enforcement, and compatible infill development.	**Consistent.** The proposed project would design and implement a vision that would allow new growth to occur without negatively affecting existing neighborhoods.
	LU-5	Plan for a diverse housing stock that will support balanced urban growth, and make efficient use of resources and public facilities.	**Consistent.** The proposed project would design and implement a vision that would allow the City to grow in ways that equitably expands the economy and housing stock while protecting public health. The proposed project represents an opportunity to meet emerging market demands, provide much-needed diversity in housing stock, and enrich communities with safe, walkable, and inspiring urban environments.
	LU-6	Retain and enhance existing commercial areas to strengthen Fresno's economic base and site new office, retail, and lodging use districts to serve neighborhoods and regional visitors.	**Consistent.** Neighborhood Town Centers would serve as focal points of adjacent residential areas and would provide the majority of SEDA residents with essential walk, bike, transit, and short-drive access to civic services and amenities, including elementary schools, local parks, community gardens, and other services.
	LU-7	Plan and support industrial development to promote job growth.	**Consistent.** Policy EO-4.3 would promote the growth of manufacturing, distribution and research and development employment in the industrial areas of the SEDA.
	LU-8	Provide for the development of civic and institutional land uses to meet the educational, medical, social, economic, cultural, and religious needs of the community.	**Consistent.** The proposed project includes seven Community Town Centers that provide commercial, civic, and other services to meet the needs of multiple neighborhoods and Community Town Center residents and employees. Policy UF-1.5 is to build public infrastructure, facilities, and parks that meet the needs of Plan Area residents. Policy RC-1.1 Design the neighborhood, community, and regional town centers in SEDA as mixed-use centers that include

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			ground floor retail, civic and other commercial uses and upper floors of office and residential uses.
	LU-9	Plan land uses, design, and development intensities to supplement and support, and not compete with, the Downtown.	**Consistent.** The proposed project is a comprehensive plan for the nearly 9,000-acre Southeast Growth Area, located to the east of the Downtown. The proposed project concentrates residential development in Neighborhood Town Centers, consistent with the General Plan concept of complete neighborhoods. These uses would support the Downtown, but would not compete with the Downtown.
	D-1	Provide and maintain an urban image that creates a "sense of place" throughout Fresno.	**Consistent.** The SEDA Plan supports the preservation of rural landscapes and resources, historically significant buildings, districts, sites, landscapes, and other features to contribute to its sense of place. Policy CR-3.6 incorporates historic sites, infrastructure, and landscape features into new developments to conserve resources and preserve the area's vernacular landscape and "sense of place." Policy CF-3.4 instills a sense of stewardship and community and provides a recreational activity by expanding a viable community farming program. Policy RC-1.7 includes development of a tree palette that reinforces the SEDA's sense of place.
	D-3	Create unified plans for Green Streets, using distinctive features reflecting Fresno's landscape heritage.	**Consistent.** Policy RC-1.7 includes development of a tree palette that reinforces a sense of place, reflects native species, and includes tree species with high carbon storage potential. Trees would meet parks shading targets noted in the Parks Master Plan. Shade trees would delineate corridors and the boundaries of urban areas, and provide tree canopy for bike lanes, sidewalks, parking lots, and trails.

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
	D-4	Preserve and strengthen Fresno's overall image through design review and create a safe, walkable, and attractive urban environment for the current and future generations of residents.	**Consistent.** The proposed project is designed to enrich the community with safe, walkable, and inspiring urban environments.
	D-5	Maintain and improve community appearance through programs that prevent and abate blighting influences.	**Consistent.** The proposed project is a comprehensive plan to address wide-ranging infrastructure, housing, employment, environmental, fiscal, and community challenges associated with accommodating a large increment of the City's growth.
	D-6	Encourage design that celebrates and supports the cultural and ethnic diversity of Fresno.	**Consistent.** By containing development, the proposed project supports the preservation of rural landscapes and resources located outside the area. The Cultural and Historic Resources Policies Element contains policies to protect historic resources. Policy CR-1.2 would limit the conversion of culturally significant rural areas outside the current Fresno SOI by implementing the Farmland Conservation Model Program Policy CR-2.2 would encourage schools and other institutions to emphasize agricultural processes, preservation, and interpretation of farming history within the SEDA.
	D-7	Continue applying local urban form, land use, and design policies to specific neighborhoods and locations.	**Consistent.** The proposed project includes policies related to urban form, land use, and design for neighborhood, community, and regional town centers.
Mobility and Transportation	**MT-1**	Create and maintain a transportation system that is safe, efficient, provides access in an equitable manner, and optimizes travel by all modes.	**Consistent.** The proposed project would contain multimodal transportation systems. Policy UF-5.2 would provide an efficient, safe, integrated, multimodal transportation system to and within the Plan Area via regional transit connections.
	MT-2	Make efficient use of the City's existing and proposed	**Consistent.** Police RC-1.1 would locate mixed-use development

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
		transportation system and strive to ensure the planning and provision of adequate resources to operate and maintain it.	along high-quality transit corridors such as the Ventura/Kings Canyon Corridor that will serve the SEDA Regional Town Center.
	MT-4	Establish and maintain a continuous, safe, and easily accessible bikeways system throughout the metropolitan area to reduce vehicle use, improve air quality and the quality of life, and provide public health benefits.	**Consistent.** Policy RC-1.2 would ensure the SEDA is well-served by bicycle infrastructure, including bicycle lanes, bicycle paths and trails, and safe crossing infrastructure pursuant to the Active Transportation Plan.
	MT-5	Establish a well-integrated network of pedestrian facilities to accommodate safe, convenient, practical, and inviting travel by walking, including for those with physical mobility and vision impairments.	**Consistent.** Policy RC-1.1 would provide convenient pedestrian access to bus stops and station stops. Policy RC-1.2 would ensure the SEDA is well-served by pedestrian infrastructure, including sidewalks and safe crossing infrastructure pursuant to the Active Transportation Plan. Bus stops and stations will comply with the accessibility requirements of the Americans with Disabilities Act (ADA).
	MT-6	Establish a network of multi-purpose pedestrian and bicycle paths, as well as limited access trails, to link residential areas to local and regional open spaces and recreation areas and urban Activity Centers in order to enhance Fresno's recreational amenities and alternative transportation options.	**Consistent.** Policy UF-5.3 states that a network of pedestrian and bicycle routes, including dedicated trails, multi-purpose paths, and priority Bicycle Boulevards will serve work, school, and recreational trips. This extensive non-auto travel network will be coordinated with existing and proposed regional trails. Police OS-4.2 is to coordinate regional trail planning with Fresno County, the City of Clovis, and other jurisdictions as appropriate. The City of Fresno Active Transportation Plan calls for Class I Bicycle Paths along each canal in the SEDA. A regional Rails to Trials Bicycle Path is planned to run parallel to California Avenue should existing railroad lines be vacated.
	MT-10	Establish parking standards that are strategically tuned to support neighborhoods, shopping districts	**Consistent.** Policy RC-1.3 contains Transportation Demand Policies that would include development of

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
		and employment centers that have a complete range of transportation choices.	a trip reduction parking strategy. Policy UF-7.1 would develop, facilitate, and monitor an ongoing and comprehensive parking program within SEDA.
Parks, Open Space, and Schools	**POSS-1**	Provide an expanded, high quality and diversified park system, allowing for varied recreational opportunities for the entire Fresno community.	**Consistent.** The Open Space Element states that the SEDA will feature a range of parks of different sizes and roles, from small "pocket parks" to large, natural open spaces and agricultural areas. These will serve active and passive recreation needs, from playgrounds and sports fields to trails for walking and nature study. The open space system is envisioned as a vibrant outdoor public realm, playing a vital role in anchoring neighborhoods and supporting community life.
	POSS-2	Ensure that adequate land, in appropriate locations, is designated and acquired for park and recreation uses in infill and growth areas.	**Consistent.** The Open Space Element states that ongoing parks planning will ensure that the facilities and services provided respond closely to community needs. The Plan Area is located in a Growth Area. Policy UF-1.5 is to build public infrastructure, facilities, and parks that meet the needs of Plan Area residents. Policy OS-3.5 would engage the public in the parks planning process to ensure that parks respond to community needs.
	POSS-8	Work cooperatively with school districts to find appropriate locations for schools to meet the needs of students and neighborhoods.	**Consistent.** Major civic buildings such as schools will serve as focal points of public spaces. Pursuant to Policy PF-1.1, the City shall work with the Clovis Unified and Sanger Unified school districts to establish specific locations for high schools and middle schools.
Public Utilities and Services	**PU-1**	Provide the level of law enforcement and crime prevention services necessary to maintain a safe, secure, and stable urban living environment through a Police Department that is dedicated to	**Consistent.** The proposed project would provide law enforcement and crime prevention through the following policies:

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
		providing professional, ethical, efficient and innovative service with integrity, consistency and pride.	Policy PF-5.1 Provision of Police Services–Provide police services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can adjust these policies. Policy PF-5.3 Coordination with Police and Fire Departments – The City of Fresno Planning and Development Department shall work with the Police and Fire departments as appropriate to promote safe environments throughout the SEDA and ensure that services can be provided in a manner that is sensitive and responsive to the needs of the community. Coordination may address: • Evaluation of design features for safety and crime prevention • Siting of police and fire substations • Facilitation of citizen involvement processes Policy OS-3.2 Park Design for Safety –Promote the use of Crime Prevention Through Environmental Design (CPTED) principles in park design. CPTED principles include natural surveillance, access control, territorial reinforcement, and space management in promoting safety and discouraging crime. See the Fresno Parks Master Plan, Chapter 5, Design Guidelines for Safety starting on page 141 and Chapter 9, Goal 5-Secure on page 268.
	PU-2	Ensure that the Fire Department's staffing and equipment resources are sufficient to meet all fire and emergency service level objectives and are provided in an efficient and cost-effective manner.	**Consistent.** In addition to the policies above, the proposed project would ensure fire department staffing and resources are sufficient through the following policy:

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			Policy PF-5.2 Provision of Fire Services–Provide fire services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can adjust these policies.
	PU-4	Ensure provision of adequate trunk sewer and collector main capacities to serve existing and planned urban development, consistent with the Wastewater Master Plan.	**Consistent.** According to Policy RC-6.4, the Water Section of the Resource Conservation Element will include a full Infrastructure Assessment (Water Supply Assessment [WSA]), as well as trunk infrastructure diagrams for water, wastewater, and stormwater systems. This work is being completed by the Fresno Metropolitan Flood Control District, and the City's consultants as part of the preparation of this Draft PEIR. Policy RC-6.4 includes water infrastructure planning. Informed by the results of the WSA, infrastructure plans will describe the following components of the wastewater systems for the SEDA: • Backbone wastewater treatment infrastructure. • Wastewater plan map (existing sewer mains, proposed trunk system, and proposed lift stations) if applicable.
	PU-6	Ensure the provision of adequate sewage treatment and disposal by utilizing the Fresno-Clovis Regional Wastewater Reclamation Facility as the primary facility, when economically feasible, for all existing and new development within the Metropolitan Area.	**Consistent.** A water treatment facility was constructed in 2018 and is designed with the latest energy conservation and renewable energy technology. It will serve the SEDA. The proposed project would include Policy PF-8.1 Provision of Water, Stormwater, and Wastewater Infrastructure–Provide water, stormwater, and wastewater infrastructure in accordance with the policies of the Water Resources Element.

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			The proposed project would ensure the provision of adequate sewage treatment through the following policy: Policy RC-6.2 Wastewater Treatment and Delivery–Evaluate the potential wastewater treatment and infrastructure needs necessary to meet Southeast Development Area demand. • Site Water Treatment: Establish site-wide estimates for water treatment demand, reducing demand (as appropriate) after incorporating site design and efficiency measures. • Site Plan Delivery: Proposed wastewater supplies and delivery systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno. – Wastewater Reductions – The City of Fresno and the developer will identify specific wastewater reduction measures required for the development proposal to move forward. Technical assistance will be provided by the City as needed, per Policy WR-2.7. – Detailed engineering – Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.
	PU-7	Promote reduction in wastewater flows and develop facilities for beneficial reuse of reclaimed water and biosolids for management and distribution of treated wastewater.	**Consistent.** Policy RC-1.5 would maintain current targets for recycling and re-use of all types of waste material in the city and enhance waste and wastewater management practices to reduce natural resource consumption. Policy RC-3.2 is to use treated wastewater for irrigation and other uses, consistent with applicable

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			regulations, to minimize the required surface and groundwater needs of SEDA homes and businesses. Tertiary-treated wastewater would be used to irrigate parks. A water treatment facility was constructed in 2018 and is designed with the latest energy conservation and renewable energy technology. It will serve the SEDA. Additionally, Policy RC-1.5 includes a measure to evaluate the feasibility of "carbon foot printing" for the City's wastewater treatment facilities.
	PU-9	Provide adequate solid waste facilities and services for the collection, transfer, recycling, and disposal of refuse.	**Consistent.** Policy PF-6.1 would provide solid waste facilities and services for the collection, transfer, recycling, and disposal of refuse in accordance with the policies of the City of Fresno General Plan**.**
Historic and Cultural Resources	**HCR-2**	Identify and preserve Fresno's historic and cultural resources that reflect important cultural, social, economic, and architectural features so that residents will have a foundation upon which to measure and direct physical change.	**Consistent.** The proposed project includes a Cultural and Historic Resources Policies Element containing several policies designed to identify and preserve the City's historic and cultural resources. The proposed project would preserve elements of the area's past as resources to enrich its future. As detailed planning and development proceeds, the City will continue to evaluate the cultural and historic significance of built and natural features within the area.
Noise and Safety	**NS-1**	Protect the citizens of the City from the harmful and annoying effects of exposure to excessive noise.	**Consistent.** Pursuant to Policy CF-2.2, the proposed project would include transitional buffers to form a transition between the urban area and agricultural lands, which would prevent noise from posing a health concern to residents.
	NS-2	Minimize risks of property damage and personal injury posed by geologic and seismic risks.	**Consistent.** No active faults are mapped within the City of Fresno, and There are no Alquist-Priolo Earthquake Fault Zones in the City.

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			Refer to Section 3.7, Geology and Soils, for further discussion.
	NS-3	Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.	**Consistent.** This Draft PEIR requires construction stormwater quality control measures to prevent flooding due to stormwater runoff. Refer to Section 3.10, Hydrology and Water Quality, for further discussion.
	NS-4	Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.	**Consistent.** Policy RC-1.5 would include programs that promote appropriate recycling and disposal of hazardous waste. Policy RC-5.2 would prevent contamination of the groundwater table and surface water resources.
Healthy Communities	**HC-1**	Work with neighborhood associations of local residents, businesses, and institutions on neighborhood and community health initiatives.	**Consistent.** The proposed project integrates agricultural land uses within the urban area to strengthen community connections to agriculture and provide a range of social, economic, and health benefits. The proposed project would provide a high-quality, accessible open space system to promote health benefits.
	HC-2	Create complete, well-structured, and healthy neighborhoods and transportation systems.	**Consistent.** Policy UF-2.1 will provide for mixed-use Regional, Community, and Neighborhood Town Centers that form a network of complementary employment, commercial, cultural, and civic opportunities linked by multimodal transportation systems.
	HC-3	Create healthy, safe, and affordable housing.	**Consistent.** Policy UF-1.4 would require housing choices affordable to a range of Fresno residents by meeting the housing policies of the Housing Choice and Affordability Element. Policy HC-2.1 would include funding assistance, partnership support, and other actions as necessary to support the construction of new affordable housing within the SEDA to meet RHNA-based targets as specified in the City of Fresno General Plan

Element	Goal/Objective/Policy		Consistency Determination
	Objective No.	Text	
			Housing Element. The Housing Element details a comprehensive set of programs to provide an adequate supply of affordable housing.
	HC-5	Promote access to healthy and affordable food.	**Consistent.** The Community Farming and Agriculture Element seeks to pair opportunities with benefits to the broader community—namely, access to local foods and a tangible relationship with their production. Policy CF-1.4 would establish an agricultural farm belt along the eastern edge of the SEDA. Farm belts provide opportunities to link agricultural land preservation and increased urban efficiency with local food production in ways that positively support local economies, farms, and farmers.
Source: City of Fresno, 2022.			

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.11.6 - Cumulative Impacts

Level of Cumulative Significance Before Mitigation

The geographic scope of the cumulative impact analysis for Land Use and Planning is the Plan Area and portions of the City of Fresno, City of Clovis, and unincorporated Fresno County adjacent to the Plan Area. This analysis evaluates whether impacts of the Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to lands use and planning. This analysis then considers whether incremental contribution of the impacts associated with implementation of the Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to the level of significance.

As discussed in Impact LU-1, the proposed project would not physically divide an established community. The proposed project would allow for planned development and growth and would increase connectivity and support, strengthen, and connect new communities. Additionally, as shown in the conclusions of the General Plan PEIR, the continued implementation of the approved General Plan would ensure there is not an existing cumulative impact related to division of established communities. The policies contained in the proposed project would also serve to minimize impacts within the Plan Area and on surrounding areas. Therefore, the proposed project is not expected to contribute to any cumulative division of an established community.

As demonstrated in Impact LU-2, the proposed project is consistent with the General Plan and thus the potential environmental impacts associated with these plans from buildout of the approved General Plan would be considered less than significant. Therefore, the proposed project and continued implementation of the approved General Plan would not result in a cumulatively considerable contribution to potential cumulative impacts. Therefore, there would be a less than significant cumulative impact with regard to land use and planning as a result of implementing the proposed Plan.

Level of Cumulative Significance Before Mitigation

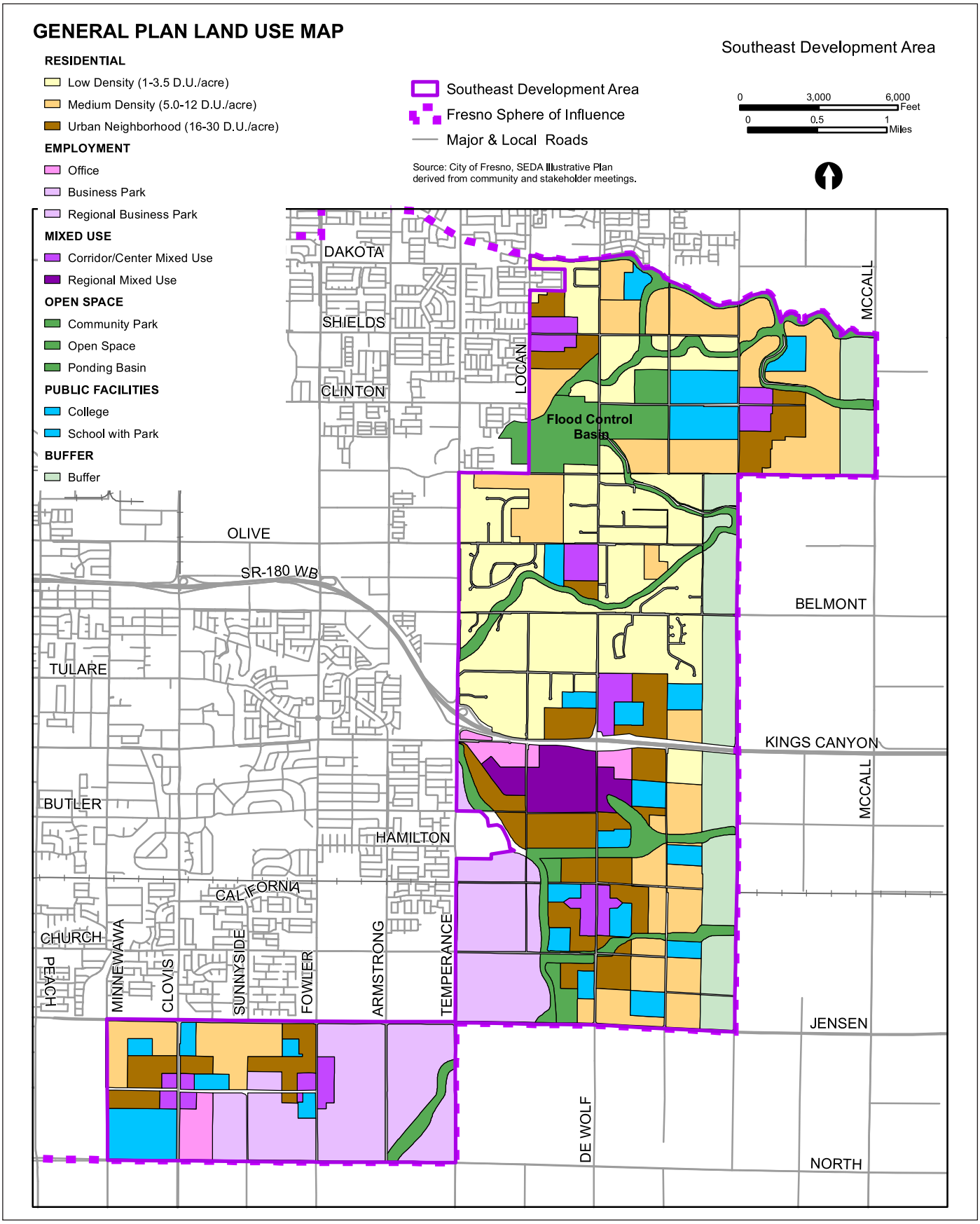
Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.



Source: City of Fresno

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Exhibit 3-11.1
Existing General Plan Land Use Map

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3.12 - Mineral Resources

3.12.1 - Introduction

This section describes the existing conditions related to mineral resources in the region and project area and summarizes the relevant regulatory framework. This section also evaluates potential impacts related to mineral resources that could result from the proposed project. Information in this section is based, in part, on reports and maps from the California Department of Conservation and the Fresno General Plan (General Plan). As further discussed in Chapter 1, Introduction, three comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to mineral resources:

- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Planning Area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.12.2 - Environmental Setting

City of Fresno

Mineral resources, such as aggregate material, are necessary to support urban development, as all public and private projects utilize this material for roadway paving, structural elements, and hardscape, including sidewalks, curbing, and gutters. The principal area for mineral resources in the City of Fresno (City) is located along the San Joaquin River Corridor. Pursuant to the California Surface Mining Reclamation Act (SMARA) of 1975, the California Division of Mines and Geology (CDMG) classifies lands based on the availability of mineral resources. Lands along the San Joaquin River Corridor are classified as Mineral Resources Zones (MRZs) MRZ-1, MRZ-2, and MRZ-3, which are further defined in Section 3.12.3, Regulatory Framework. Areas classified as MRZ-2 indicate that mineral deposits are present or likely present.[1] Furthermore, the entire City is located in the Fresno Production-Consumption (P-C) Region.[2] Mineral resources along the San Joaquin River Corridor are removed via surface mining operations. Because of the zoning and General Plan designations in these areas, current mining operations in the City are considered legal non-conforming uses, and it is anticipated that these uses will continue until the resources are substantially removed and it is no

[1] California Department of Conservation. 2015. CGS Warehouse: Mineral Land Classification. Website: https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=mlc. Accessed June 2, 2022.
[2] City of Clovis. 2014. General Plan and Development Code Update Draft Program EIR, Figure 5.11-2, Mineral Resources Zones Detail. Accessed June 2, 2022.

longer economically feasible to mine the areas. The approved General Plan designates these areas as Open Space, and mining activities require City approval of a conditional use permit.[3]

3.12.3 - Regulatory Framework

Federal and State

California Surface Mining and Reclamation Act of 1975

The SMARA of 1975 mandates that a "classification/designation" analysis be done to provide information on the availability of mineral resource for construction and growth. The objective is to ensure that raw material will be available when needed—that this raw material will not become inaccessible for mining as the result of inappropriate land use decisions involving mineral resource areas. Areas are classified on the basis of geologic factors without regard to existing land use and land ownership. The areas are categorized into four MRZs:

- **MRZ-1:** An area where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
- **MRZ-2:** An area where adequate information indicates that significant mineral deposits are present, or where it is judged that a high likelihood exists for their presence.
- **MRZ-3:** An area containing mineral deposits, the significance of which cannot be evaluated.
- **MRZ-4:** An area where available information is inadequate for assignment to any other MRZ zone.

Of the four categories, lands classified as MRZ-2 are of the greatest importance. Such areas are underlain by known mineral resources are located or where geologic data indicate that significant measured or indicated resources are present. MRZ-2 areas are designated by the State of California Mining and Geology Board as being regionally significant.

Local

City of Fresno Surface Mining and Reclamation Ordinance

The City's Surface Mining and Reclamation Ordinance (Section 12-5.5 of the Municipal Code) is intended to protect and allow recovery of mineral deposits in the Planning Area. Protection and recovery of mineral deposits is prioritized in order to promote the continued economic well-being of the City. However, since mining and mineral processing activities can have substantial adverse environmental impacts, the Surface Mining and Reclamation Ordinance allows the City to mitigate environmental impacts, if necessary, because discretionary projects are evaluated for project-specific impacts related to mineral resources at the time they are proposed. In general, the purpose of the Surface Mining and Reclamation Ordinance is to maximize recovery of mineral resources while also minimizing threats to the public health and safety, potential environmental damage, and nuisance effects of mining and mineral processing activities.

[3] City of Fresno. 2022. Fresno General Plan Program Environmental Impact Report. Accessed June 20, 2022.

City of Fresno Citywide Development Code

The City of Fresno Citywide Development Code established the Mining (M) Overlay District to allow ongoing mineral extraction in the San Joaquin River bottom in conjunction with open space uses.[4]

The California Department of Conservation CDMG periodically maps high-quality concrete aggregate deposits and compiles statistics on the amount of aggregate minerals available, and consumed, within designated Production-Consumption (P-C) Regions of the State. The CDMG uses an "MRZ-2" designation for regionally significant deposits of high-grade sand and gravel aggregate (i.e., material suitable for making Portland Cement Concrete). Potential, but presently unproven, mineral resource areas are mapped as MRZ-3. Most of the area outside of the San Joaquin and Kings River Resource Areas has an MRZ-3 designation and may contain economically recoverable mineral resources. However, those resources may not be of the high quality needed to formulate concrete.

City of Fresno General Plan

The General Plan contains the following objectives and policies related to mineral resources within the City:

Resource Conservation and Resilience Element

Objective RC-10 Conserve aggregate mineral resources within the Planning Area, as identified by the Division of Mines and Geology, and allow for responsible extraction to meet Fresno's needs.

Policy RC-10-a **Meet Future Needs.** Adopt land use and resource protection regulations that support mining of the high-quality, close-to-market aggregate resources to meet the needs of the Fresno Production-Consumption Region.

Policy RC-10-b **Zoning in San Joaquin River bottom.** Maintain zoning consistent with on-going mineral extraction in the San Joaquin River bottom that also allows multiple open space uses in conformance with State law and the City's Surface Mining Ordinance.

Policy RC-10-c **Processing-Mining Link.** Accommodate only those mineral processing activities in the San Joaquin River bottom that are associated and co-located with mining operations when such industrial activities will sunset with the mining operation and do not stimulate unplanned growth or conversion of multi-use open space to urban uses.

Policy RC-10-d **Manage MRZ-2 Areas.** Prohibit land uses and development projects that preclude mineral extraction in potential high-quality mineral resource areas designated MRZ-2 by the California Department of Conservation Division of Mines and Geology.

[4] City of Fresno. 2023. Citywide Development Code 15-107 Districts Established. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIGEPR_ART1INPR_S15-107DIES. Accessed March 22, 2023.

Policy RC-10-e **Existing Permits.** Honor surface mining permits approved by Fresno County upon annexation, provided that the mining operation is in compliance with the terms of its current permit(s) and State law. Require new permit applications in the event of noncompliance, permit expiration, or permit revocation, and ensure compliance with law or regulations.

Policy RC-10-f **Cooperate on Uniform Criteria.** Work with Fresno County, Madera County, and the City of Clovis to develop uniform criteria applicable to existing, new, and altered mineral extraction sites in the San Joaquin River bottom.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan Program Environmental Impact Report (General Plan PEIR) does not contain any mitigation measures related to mineral resources that are applicable to the proposed project.

Fresno Southeast Development Area Specific Plan

The Fresno Southeast Development Area (SEDA) Specific Plan does not contain policies directly related to mineral resources.

3.12.4 - Methodology

Impacts were assessed by evaluating the proposed project's potential for impacting mineral resources within the Plan Area based, in part, on the General Plan and MRZs classified by the SMARA.

3.12.5 - Thresholds of Significance

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts to mineral resources are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research (OPR) and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would be considered significant if the project would:

a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State.

b) Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

3.12.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Project Design Features

Impact MIN-1:	**The proposed project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the State.**

Impact Analysis

As previously discussed, mineral resources within the City are primarily located along the San Joaquin River Corridor, which is located in the northwestern part of the City. The Plan Area is located in the southeastern part of the City; thus, the San Joaquin River Corridor does not bisect the Plan Area and is not adjacent to the Plan Area. Further, the nearest areas designated MRZ-2 in the Plan Area, which means significant mineral resources are known or very likely, are along the San Joaquin River approximately 9 miles northwest of the Plan Area boundaries and the Kings River approximately 5 miles east of the Plan Area boundaries. Therefore, no mining operations occur in the Plan Area, and thus, future development under the Specific Plan would not result in a loss of mineral resources. Moreover, the Specific Plan does not contain any objectives, policies, or programs related to mineral resources and does not identify any mineral resources. Therefore, the proposed project would not result in the loss of a locally important mineral resource recovery site delineated by an applicable land use plan or the loss of availability of a known mineral resource of Statewide, regional, or local importance. No impact to mineral resources would occur.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Impact MIN-2:	**The proposed project would not result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.**

Impact Analysis

As previously discussed, the Plan Area is identified by the California Department of Conservation as the Fresno Production-Consumption Region.[5] However, neither the State nor the City identifies the Plan Area as containing known regional mineral resource reserves, according to the California Department of Conservation's MRZ classification and the General Plan. Therefore, the proposed

[5] California Department of Conservation. 2015. CGS Warehouse: Mineral Land Classification. Website: https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=mlc. Accessed June 2, 2022.

project would not result in the loss of availability of a mineral resource recovery site. Thus, future development under the Specific Plan would not result in a loss of mineral resources. Therefore, project implementation would not result in impacts to known mineral resources or locally important mineral resources.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.12.7 - Cumulative Impacts

The geographic scope for the analysis of cumulative impacts related to mineral resources includes the Plan Area, the rest of the City of Fresno, adjacent portions of the City of Clovis, and adjacent portions of unincorporated Fresno County. This analysis evaluates whether the impacts of the Specific Plan, together with the impacts of cumulative development, could result in a cumulatively significant impact with respect to mineral resources. This analysis then considers whether incremental contribution of impacts associated with the implementation of the Specific Plan would be significant. Both conditions must apply for a proposed project's cumulative effects to rise to the level of significance.

Cumulative development is likely to continue occurring in the surrounding planning areas and the adjacent City of Clovis. The remaining unincorporated lands adjacent to the Planning Area are subject to the land use plans, policies, and regulations of Fresno County. As such, development within adjacent planning areas and unincorporated Fresno County is not likely to create significant loss of availability of a known mineral resource or loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan. For these reasons cumulative impacts with respect to land use would be less than significant.

The proposed project's incremental contribution to cumulative land use impacts would also not be significant since no mining operations occur in the Plan Area, and thus, future development under the Specific Plan would not result in a loss of mineral resources, and the Plan Area does not contain known regional mineral resource reserves. Accordingly, the Specific Plan's contribution to cumulative impacts would be less than significant with regard to mineral resources.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

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3.13 - Noise

3.13.1 - Introduction

This section describes the existing noise setting and potential effects from project implementation on the site and its surrounding area. Descriptions and analysis in this section are based, in part, on noise modeling performed by FirstCarbon Solutions (FCS). The noise modeling output is included in this Draft Program Environmental Impact Report (Draft PEIR) as Appendix I. No public comments were received during the PEIR scoping period related to noise.

3.13.2 - Environmental Setting

Characteristics of Noise

Noise is generally defined as unwanted or objectionable sound. Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. The effects of noise on people can include general annoyance, interference with speech communication, sleep disturbance, and in the extreme, hearing impairment. Noise effects can be caused by pitch or loudness. *Pitch* is the number of complete vibrations or cycles per second of a wave that result in the range of tone from high to low; higher-pitched sounds are louder to humans than lower-pitched sounds. *Loudness* is the intensity or amplitude of sound.

Sound is produced by the vibration of sound pressure waves in the air. Sound pressure levels are used to measure the intensity of sound and are described in terms of decibels. The decibel (dB) is a logarithmic unit, which expresses the ratio of the sound pressure level being measured to a standard reference level. The 0 point on the dB scale is based on the lowest sound level that the healthy, unimpaired human ear can detect. Changes of 3 dB or less are only perceptible in laboratory environments. Audible increases in noise levels generally refer to a change of 3 dB or more, as this level has been found to be barely perceptible to the human ear in outdoor environments. Only audible changes in existing ambient or background noise levels are considered potentially significant.

The human ear is not equally sensitive to all frequencies within the audible sound spectrum, so sound pressure level measurements can be weighted to better represent frequency-based sensitivity of average healthy human hearing. One such specific “filtering” of sound is called “A-weighting.” A-weighted decibels (dBA) approximate the subjective response of the human ear to a broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies that are audible to the human ear. Because decibels are logarithmic units, they cannot be added or subtracted by ordinary arithmetic means. For example, if one noise source produces a noise level of 70 dB, the addition of another noise source with the same noise level would not produce 140 dB; rather, they would combine to produce a noise level of 73 dB.

Noise Descriptors

There are many ways to rate noise for various intervals, but an appropriate rating of ambient noise affecting humans also accounts for the annoying effects of sound. Equivalent continuous sound level (L_{eq}) is the total sound energy of time-varying noise over a sample period. However, the predominant

rating scales for human communities in the State of California are the L_{eq} and Community Noise Equivalent Level (CNEL) or the day-night average level (L_{dn}) based on dBA. CNEL is the time-varying noise over a 24-hour period, with a 5 dBA weighting factor applied to the hourly L_{eq} for noises occurring from 7:00 p.m. to 10:00 p.m. (defined as relaxation hours) and a 10 dBA weighting factor applied to noise occurring from 10:00 p.m. to 7:00 a.m. (defined as sleeping hours). L_{dn} is similar to the CNEL scale but without the adjustment for events occurring during the evening hours. CNEL and L_{dn} are within one dBA of each other and are normally exchangeable. The noise adjustments are added to the noise events occurring during the more sensitive hours.

Other noise rating scales of importance when assessing the annoyance factor include the maximum noise level (L_{max}), which is the highest exponential time-averaged sound level that occurs during a stated time period. The noise environments discussed in this analysis are specified in terms of maximum levels denoted by L_{max} for short-term noise impacts. L_{max} reflects peak operating conditions and addresses the annoying aspects of intermittent noise.

Noise Propagation

From the noise source to the receiver, noise changes both in level and frequency spectrum. The most obvious is the decrease in noise as the distance from the source increases. The manner in which noise reduces with distance depends on whether the source is a point or line source, as well as ground absorption, atmospheric conditions (wind, temperature gradients, and humidity) and refraction, and shielding by natural and manmade features. Sound from point sources, such as an air conditioning condenser, a piece of construction equipment, or an idling truck, radiates uniformly outward as it travels away from the source in a spherical pattern.

The attenuation or sound drop-off rate is dependent on the conditions of the land between the noise source and receiver. To account for this ground-effect attenuation (absorption), two types of site conditions are commonly used in noise models: soft-site and hard-site conditions. Soft-site conditions account for the sound propagation loss over natural surfaces, such as normal earth and ground vegetation. For point sources, a drop-off rate of 7.5 dBA per each doubling of the distance (dBA/DD) is typically observed over soft ground with landscaping, as compared with a 6 dBA/DD drop-off rate over hard ground such as asphalt, concrete, stone, and very hard packed earth. For line sources, such as traffic noise on a roadway, a 4.5 dBA/DD is typically observed for soft-site conditions compared to the 3 dBA/DD drop-off rate for hard-site conditions. Table 3.13-1 briefly defines these measurement descriptors and other sound terminology used in this section.

Table 3.13-1: Sound Terminology

Term	Definition
Sound	A vibratory disturbance created by a vibrating object which, when transmitted by pressure waves through a medium such as air, can be detected by a receiving mechanism such as the human ear or a microphone.
Noise	Sound that is loud, unpleasant, unexpected, or otherwise undesirable.

Term	Definition
Ambient Noise	The composite of noise from all sources near and far in a given environment.
Decibel (dB)	A unitless measure of sound on a logarithmic scale, which represents the squared ratio of sound pressure amplitude to a reference sound pressure. The reference pressure is 20 micropascals, representing the threshold of human hearing (0 dB).
A-Weighted Decibel (dBA)	An overall frequency-weighted sound level that approximates the frequency response of the human ear.
Equivalent Noise Level (L_{eq})	The average sound energy occurring over a specified time period. In effect, L_{eq} is the steady-state sound level that in a stated period would contain the same acoustical energy as the time-varying sound that actually occurs during the same period.
Maximum and Minimum Noise Levels (L_{max} and L_{min})	The maximum or minimum instantaneous sound level measured during a measurement period.
Day-Night Level (DNL or L_{dn})	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m. (nighttime).
Community Noise Equivalent Level (CNEL)	The energy average of the A-weighted sound levels occurring during a 24-hour period, with 5 dB added to the A-weighted sound levels occurring between 7:00 p.m. and 10:00 p.m. and 10 dB added to the A-weighted sound levels occurring between 10:00 p.m. and 7:00 a.m.
Source: Data compiled by FirstCarbon Solutions (FCS). 2022.	

Traffic Noise

The level of traffic noise depends on the three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires. Because of the logarithmic nature of noise levels, a doubling of the traffic volume (assuming that the speed and truck mix do not change) results in a noise level increase of 3 dBA. Based on the Federal Highway Administration (FHWA) community noise assessment criteria, this change is “barely perceptible”; for reference, a doubling of perceived noise levels would require an increase of approximately 10 dBA. The truck mix on a given roadway also has an effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

Stationary Noise

A stationary noise producer is any entity in a fixed location that emits noise. Examples of stationary noise sources include machinery, engines, energy production, and other mechanical or powered equipment and activities such as loading and unloading or public assembly that may occur at commercial, industrial, manufacturing, or institutional facilities. Furthermore, while noise generated by the use of motor vehicles over public roads is preempted from local regulation, the use of these vehicles is considered a stationary noise source when operated on private property such as at a construction site, a truck terminal, or warehousing facility. The emitted noise from the producer can be mitigated to acceptable levels either at the source or on the adjacent property through the use of proper planning, setbacks, block walls, acoustic-rated windows, dense landscaping, or by changing the location of the noise producer.

The effects of stationary noise depend on factors such as characteristics of the equipment and operations, distance and pathway between the generator and receptor, and weather. Stationary noise sources may be regulated at the point of manufacture (e.g., equipment or engines), with limitations on the hours of operation, or with provision of intervening structures, barriers, or topography.

Construction activities are a common source of stationary noise. Construction-period noise levels are higher than background ambient noise levels but eventually cease once construction is complete. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on each construction site and, therefore, would change the noise levels as construction progresses. Despite the variety in the type and size of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction-related noise ranges to be categorized by work phase. Table 3.13-2 shows typical noise levels of construction equipment as measured at a distance of 50 feet from the operating equipment.

Table 3.13-2: Typical Construction Equipment Maximum Noise Levels

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Impact Pile Driver	Yes	95
Auger Drill Rig	No	85
Vibratory Pile Driver	No	95
Jackhammers	Yes	85
Pneumatic Tools	No	85
Pumps	No	77
Scrapers	No	85
Cranes	No	85
Portable Generators	No	82
Rollers	No	85
Bulldozers	No	85
Tractors	No	84

Type of Equipment	Impact Device? (Yes/No)	Specification Maximum Sound Levels for Analysis (dBA at 50 feet)
Front-End Loaders	No	80
Backhoe	No	80
Excavators	No	85
Graders	No	85
Air Compressors	No	80
Dump Truck	No	84
Concrete Mixer Truck	No	85
Pickup Truck	No	55

Notes:
dBA = A-weighted decibel
Source: Federal Highway Administration (FHWA) 2006. Highway Construction Noise Handbook. August.

Noise from Multiple Sources

Because sound pressure levels in decibels are based on a logarithmic scale, they cannot be added or subtracted in the usual arithmetical way. Therefore, sound pressure levels in decibels are logarithmically added on an energy summation basis. In other words, adding a new noise source to an existing noise source, both producing noise at the same level, will not double the noise level. Instead, if the difference between two noise sources is 10 dBA or more, the louder noise source will dominate and the resultant noise level will be equal to the noise level of the louder source. In general, if the difference between two noise sources is 0–1 dBA, the resultant noise level will be 3 dBA higher than the louder noise source, or both sources if they are equal. If the difference between two noise sources is 2–3 dBA, the resultant noise level will be 2 dBA above the louder noise source. If the difference between two noise sources is 4–10 dBA, the resultant noise level will be 1 dBA higher than the louder noise source.

Characteristics of Vibration

Groundborne vibration consists of rapidly fluctuating motion through a solid medium, specifically the ground, which has an average motion of zero and in which the motion's amplitude can be described in terms of displacement, velocity, or acceleration. The effects of groundborne vibration typically only cause a nuisance to people, but in extreme cases, excessive groundborne vibration has the potential to cause structural damage to buildings. Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. Groundborne noise is an effect of groundborne vibration and only exists indoors, since it is produced from noise radiated from the motion of the walls and floors of a room, and may also consist of the rattling of windows or dishes on shelves.

Several different methods are used to quantify vibration amplitude such as the maximum instantaneous peak in the vibrations velocity, which is known as the peak particle velocity (PPV) or the root mean square (rms) amplitude of the vibration velocity. Because of the typically small amplitudes of vibrations, vibration velocity is often expressed in decibels—denoted as LV—and is

based on the reference quantity of 1 microinch per second. To distinguish vibration levels from noise levels, the unit is written as "VdB."

Although groundborne vibration can be felt outdoors, it is typically only an annoyance to people indoors where the associated effects of the shaking of a building can be notable. When assessing annoyance from groundborne vibration, vibration is typically expressed as rms velocity in units of decibels of 1 microinch per second, with the unit written in VdB. Typically, developed areas are continuously affected by vibration velocities of 50 VdB or lower. Human perception to vibration starts at levels as low as 67 VdB. Annoyance due to vibration in residential settings starts at approximately 70 VdB.

Off-site sources that may produce perceptible vibrations are usually caused by construction equipment, steel-wheeled trains, and traffic on rough roads, while smooth roads rarely produce perceptible groundborne noise or vibration. Construction activities, such as blasting, pile driving, and operating heavy earthmoving equipment, are common sources of groundborne vibration. Construction vibration impacts on building structures are generally assessed in terms of PPV. Typical vibration source levels from construction equipment are shown in Table 3.13-3.[1]

Table 3.13-3: Vibration Levels of Construction Equipment

Construction Equipment	PPV at 25 Feet (inches/second)	rms Velocity in Decibels (VdB) at 25 Feet
Water Trucks	0.001	57
Scraper	0.002	58
Bulldozer—small	0.003	58
Jackhammer	0.035	79
Concrete Mixer	0.046	81
Concrete Pump	0.046	81
Paver	0.046	81
Pickup Truck	0.046	81
Auger Drill Rig	0.051	82
Backhoe	0.051	82
Crane (Mobile)	0.051	82
Excavator	0.051	82
Grader	0.051	82
Loader	0.051	82
Loaded Trucks	0.076	86
Bulldozer—large	0.089	87
Caisson drilling	0.089	87

[1] Federal Highway Administration (FHWA). 2006. Highway Construction Noise Handbook. August.

Construction Equipment	PPV at 25 Feet (inches/second)	rms Velocity in Decibels (VdB) at 25 Feet
Vibratory Roller (small)	0.101	88
Compactor	0.138	90
Clam shovel drop	0.202	94
Vibratory Roller (large)	0.210	94
Pile Driver (impact–typical)	0.644	104
Pile Driver (impact–upper range)	1.518	112

Notes:
PPV = peak particle velocity
rms = root mean square
VdB = velocity in decibels
Source: Compilation of scientific and academic literature, generated by Federal Transit Administration (FTA) and Federal Highway Administration (FHWA).

The propagation of groundborne vibration is not as simple to model as airborne noise. This is because noise in the air travels through a relatively uniform medium, while groundborne vibrations travel through the earth, which may contain significant geological differences. Factors that influence groundborne vibration include:

- **Vibration source:** Type of activity or equipment, such as impact or mobile, and depth of vibration source;
- **Vibration path:** Soil type, rock layers, soil layering, depth to water table, and frost depth; and
- **Vibration receiver:** Foundation type, building construction, and acoustical absorption.

Among these factors that influence groundborne vibration, there are significant differences in the vibration characteristics when the source is underground compared to at the ground surface. In addition, soil conditions are known to have a strong influence on the levels of groundborne vibration. Among the most important factors are the stiffness and internal damping of the soil and the depth to bedrock. Vibration propagation is more efficient in stiff clay soils than in loose sandy soils, and shallow rock seems to concentrate the vibration energy close to the surface, and can result in groundborne vibration problems at large distance from the source. Factors such as layering of the soil and depth to the water table can have significant effects on the propagation of groundborne vibration. Soft, loose, sandy soils tend to attenuate more vibration energy than hard, rocky materials. Vibration propagation through groundwater is more efficient than through sandy soils. There are three main types of vibration propagation: surface, compression, and shear waves. Surface waves, or Rayleigh waves, travel along the ground's surface. These waves carry most of their energy along an expanding circular wave front, similar to ripples produced by throwing a rock into a pool of water. P-waves, or compression waves, are body waves that carry their energy along an expanding spherical wave front. The particle motion in these waves is longitudinal (i.e., in a "push-pull" fashion). P-waves are analogous to airborne sound waves. S-waves, or shear waves, are also body waves that carry energy along an expanding spherical wave front. However, unlike P-waves, the particle motion is transverse, or side-to-side and perpendicular to the direction of propagation.

As vibration waves propagate from a source, the vibration energy decreases in a logarithmic nature and the vibration levels typically decrease by 6 VdB per doubling of the distance from the vibration source. As stated above, this drop-off rate can vary greatly depending on the soil type, but it has been shown to be effective enough for screening purposes, in order to identify potential vibration impacts that may need to be studied through actual field tests. The vibration level (calculated below as "PPV") at a distance from a point source can generally be calculated using the vibration reference equation:

$$PPV = PPV_{ref} * (25/D)^n \text{ (in/sec)}$$

Where:

PPV_{ref} = reference measurement at 25 feet from vibration source
D = distance from equipment to the receptor
n = vibration attenuation rate through ground

According to Chapter 12 of the Federal Transit Administration (FTA) Transit Noise and Vibration Impact Assessment Manual, an "n" value of 1.5 is recommended to calculate vibration propagation through typical soil conditions.[2]

Existing Noise Levels

The existing land uses in the Plan Area include agricultural, rural residential, institutional and public facilities, and natural features. The dominant daily average noise sources in the Plan Area are traffic on local roadways and seasonal agricultural operations.

Noise-Sensitive Land Uses

Noise-sensitive land uses generally consist of those uses where exposure to noise would result in adverse effects as well as uses for which quiet is an essential element of their intended purpose. Residential dwellings are of primary concern, because of the potential for increased and prolonged exposure of individuals to both interior and exterior noise levels. Other typical noise-sensitive land uses include hospitals, convalescent facilities, hotels, religious institutions, libraries, and other uses where low noise levels are essential.

The existing noise-sensitive land uses in the Plan Area include residential, church, and school land uses. Potential noise impacts associated with implementation of the Specific Plan to these existing noise-sensitive land uses are analyzed in this section.

Traffic Noise

Traffic noise depends primarily on traffic speed and the proportion truck traffic. Existing traffic noise levels along selected roadway segments in the project vicinity were modeled using the FHWA Traffic Noise Prediction Model (FHWA-RD-77-108). Site-specific information is entered, such as roadway traffic volumes, roadway active width, source-to-receiver distances, travel speed, noise source and receiver heights, and the percentages of automobiles, medium trucks, and heavy trucks that the traffic is made up of throughout the day, among other variables. The modeled Average Daily Traffic (ADT) volumes were obtained from the traffic analysis prepared by TJKM for the proposed project.

[2] Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. May.

The model inputs and outputs, including the 60 dBA, 65 dBA, and 70 dBA CNEL traffic noise contour distances, are provided in Appendix I. A summary of the modeling results is shown in Table 3.13-4.

Table 3.13-4: Existing (Year 2019) Traffic Noise Levels

Roadway Segment	ADT	Centerline to 70 CNEL (feet)	Centerline to 65 CNEL (feet)	Centerline to 60 CNEL (feet)	CNEL (dBA) 50 feet from Centerline of Outermost Lane
Clovis Avenue–south of American Avenue	14,400	58	115	244	68.1
De Wolf Avenue–north of McKinley Avenue	2,800	< 50	< 50	82	62.5
De Wolf Avenue–south of McKinley Avenue	1,900	< 50	< 50	63	60.8
De Wolf Avenue–south of Clinton Avenue	2,300	< 50	< 50	72	61.7
De Wolf Avenue–north of Jensen Avenue	1,700	< 50	< 50	59	60.3
De Wolf Avenue–south of Jensen Avenue	1,200	< 50	< 50	< 50	58.8
Jensen Avenue–east of Bethel Avenue	14,000	74	153	326	70.0
Jensen Avenue–east of De Wolf Avenue	9,800	60	121	258	68.5
Jensen Avenue–west of De Wolf Avenue	5,700	< 50	86	180	66.1
Jensen Avenue–east of Temperance Avenue	9,900	61	122	259	68.5
Jensen Avenue–west of Temperance Avenue	10,800	64	129	275	68.9
Locan Avenue–north of Tulare Avenue	170	< 50	< 50	< 50	50.3
Locan Avenue–south of Tulare Avenue	160	< 50	< 50	< 50	50.1
McCall Avenue–north of McKinley Avenue	4,200	< 50	< 50	107	64.3
McCall Avenue–north of Ashlan Avenue	5,200	< 50	58	124	65.2
McCall Avenue–north of Belmont Avenue	5,800	< 50	62	133	65.7
Tulare Avenue–east of Locan Avenue	250	< 50	< 50	< 50	52.0
Tulare Avenue–west of Locan Avenue	600	< 50	< 50	< 50	55.8
North Avenue–west of Temperance Avenue	2,500	< 50	< 50	76	62.0

Notes:
ADT = Average Daily Traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
* Modeling results do not take into account mitigating features such as topography, vegetative screening, fencing, building design, or structure screening. Rather, they assume a worst-case scenario of having a direct line of site on flat terrain.
Source: FirstCarbon Solutions (FCS) 2022.

3.13.3 - Regulatory Framework

Federal

Noise Control Act

The adverse impact of noise was officially recognized by the federal government in the Noise Control Act of 1972, which serves three purposes:

- Promulgating noise emission standards for interstate commerce
- Assisting state and local abatement efforts
- Promoting noise education and research

The Federal Office of Noise Abatement and Control (ONAC) was initially tasked with implementing the Noise Control Act. However, the ONAC has since been eliminated, leaving the development of federal noise policies and programs to other federal agencies and interagency committees.

Among the agencies now regulating noise are the Occupational Safety and Health Administration (OSHA), which limits noise exposure of workers to 90 dB L_{eq} or less for 8 continuous hours or 105 dB L_{eq} or less for 1 continuous hour; the United States Department of Transportation (USDOT), which assumed a significant role in noise control through its various operating agencies; and the Federal Aviation Administration (FAA), which regulates noise of aircraft and airports. Surface transportation system noise is regulated by a host of agencies, including the FTA. Transit noise is regulated by the federal Urban Mass Transit Administration, while freeways that are part of the interstate highway system are regulated by the FHWA. Finally, the federal government actively advocates that local jurisdictions use their land use regulatory authority to arrange new development in such a way that "noise-sensitive" uses are either prohibited from being sited adjacent to a highway, or, alternatively, that developments are planned and constructed in such a manner that minimize potential noise impacts.

Since the federal government has preempted the setting of standards for noise levels that can be emitted by transportation sources, local jurisdictions are limited to regulating the noise generated by the transportation system through nuisance abatement ordinances and land use planning.

Federal Transit Administration Standards and Guidelines

The FTA has established industry accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment document (2006). The FTA guidelines include thresholds for construction vibration impacts for various structural categories as shown in Table 3.13-5.

Table 3.13-5: Federal Transit Administration Construction Vibration Impact Criteria

Building Category	PPV (in/sec)	Approximate VdB
I. Reinforced-Concrete, Steel or Timber (no plaster)	0.5	102
II. Engineered Concrete and Masonry (no plaster)	0.3	98
III. Non-engineered Timber and Masonry Buildings	0.2	94
IV. Buildings Extremely Susceptible to Vibration Damage	0.12	90

Building Category	PPV (in/sec)	Approximate VdB
Notes: PPV = peak particle velocity VdB = velocity in decibels Source: Federal Aviation Administration (FAA). 2006. Transit Noise and Vibration Impact Assessment.		

State

California General Plan Guidelines

Established in 1973, the California Department of Health Services Office of Noise Control was instrumental in developing regularity tools to control and abate noise for use by local agencies. One significant model is the "Land Use Compatibility for Community Noise Environments Matrix," which allows the local jurisdiction to delineate compatibility of sensitive uses with various incremental levels of noise.[3]

Government Code Section 65302 mandates that the legislative body of each county and city in California adopt a noise element as part of its comprehensive general plan. The local noise element must recognize the land use compatibility guidelines published by the State Department of Health Services. The guidelines rank noise/land use compatibility in terms of normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable. The project is also subject to review under the State of California Environmental Quality Act (CEQA). Appendix G of the CEQA Guidelines provides impact thresholds for potential noise and vibration impacts. The City of Santa Rosa had developed its own CEQA thresholds, which are listed in the Thresholds of Significance section below.

California Building Standards Code

The State of California has established noise insulation standards for new hotels, motels, apartment houses, and dwellings (other than single-family detached housing). These requirements are provided in the 2022 California Building Standards Code (CBC) (California Code of Regulations [CCR] Title 24).[4] As provided in the CBC, the noise insulation standards set forth an interior standard of 45 dBA CNEL as measured from within the structure's interior. When such structures are located within a 65 dBA CNEL (or greater) exterior noise contour associated with a traffic noise along a roadway, an acoustical analysis is required to ensure that interior levels do not exceed the 45 dBA CNEL threshold.

Title 24 standards are typically enforced by local jurisdictions through the building permit application process.

[3] California Department of Health Services Office of Noise Control. Land Use Compatibility for Community Noise Environments Matrix. 1976.

[4] California Building Standards Commission. 2022. California Building Standards Code (CCR Title 24). January 1.

Local

The City of Fresno (City) has established Noise Compatibility Standards for residential and nonresidential land uses in the Noise Element of the City of Fresno General Plan[5] and in the City of Fresno Municipal Code.[6]

Fresno General Plan

The Fresno General Plan contains goals, objectives, and policies that address noise within the City of Fresno. The following General Plan goals, objectives, and policies are applicable to the proposed project:

Guiding Policies: Noise

NS-1 Objective Protect the citizens of the City from the harmful and annoying effects of exposure to excessive noise.

Policy NS-1-a Desirable and Generally Acceptable Exterior Noise Environment. Establish 65dBA L_{dn} or CNEL as the standard for the desirable maximum average exterior noise levels for defined usable exterior areas of residential and noise-sensitive uses for noise but designate 60 dBA L_{dn} or CNEL (measured at the property line) for noise generated by stationary sources impinging upon residential and noise-sensitive uses. Maintain 65 dBA L_{dn} or CNEL as the maximum average exterior noise levels for non-sensitive commercial land uses and maintain 70 dBA L_{dn} or CNEL as maximum average exterior noise level for industrial land uses, both to be measured at the property line of parcels where noise is generated which may impinge on neighboring properties.

Policy NS-1-b Conditionally Acceptable Exterior Noise Exposure Range. Establish the conditionally acceptable noise exposure level range for residential and other noise-sensitive uses to be 65 dBA L_{dn} or require appropriate noise reducing mitigation measures as determined by a site specific acoustical analysis to comply with the desirable and conditionally acceptable exterior noise level and the required interior noise level standards set in Table 9-2 [Table 3.13-6].

Policy NS-1-c Generally Unacceptable Exterior Noise Exposure Range. Establish the exterior noise exposure of greater than 65 dBA L_{dn} or CNEL to be generally unacceptable for residential and other noise-sensitive uses for noise generated by sources in Policy NS-1-a, and study alternative less noise-sensitive uses for these areas if otherwise appropriate. Require appropriate noise reducing mitigation measures as determined by a site specific acoustical analysis to comply with the generally desirable or generally acceptable exterior noise level and the required 45 dBA interior noise level standards set in Table 9-2 [Table 3.13-6] as conditions of permit approval.

[5] City of Fresno. 2014. Fresno General Plan, Chapter 9 Noise and Safety. December 18.
[6] City of Fresno. 2023. Fresno Municipal Code. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH15CIDECOINRE_PTIIIREAPSOALDI_ART25PEST_S15-2506NO. Accessed March 22, 2023.

Policy NS-1-f Performance Standards. Implement performance standards for noise reduction for new residential and noise-sensitive uses exposed to exterior community noise levels from transportation sources above 65 dBA L_{dn} or CNEL, as shown on Figure NS-3: Future Noise Contours, or as identified by a project-specific acoustical analysis based on the target acceptable noise levels set in Table 9-2 [Table 3.13-6] and Policies NS-1-a through NS-1-c.

Policy NS-1-i Mitigation by New Development. Require an acoustic analysis where new development of industrial, commercial or other noise generating land uses (including transportation facilities such as roadways, railroads, and airports) may result in noise levels that exceed the noise level exposure criteria established by Tables 9-2 and 9-3 [Table 3.13-6] and Table 3.13-7] to determine impacts, and require developers to mitigate these impacts in conformance with Tables 9-2 and 9-3 [Table 3.13-6] and Table 3.13-7] as a condition of permit approval through appropriate means. Noise mitigation measures may include:

- The screening of noise sources such as parking and loading facilities, outdoor activities, and mechanical equipment.
- Providing increased setbacks for noise sources from adjacent dwellings.
- Installation of walls and landscaping that serve as noise buffers.
- Installation of soundproofing materials and double-glazed windows.
- Regulating operations, such as hours of operation, including deliveries and trash pickup.
- Alternative acoustical designs that achieve the prescribed noise level reduction may be approved by the City, provided a qualified Acoustical Consultant submits information demonstrating that the alternative designs will achieve and maintain the specific targets for outdoor activity areas and interior spaces. As a last resort, developers may propose to construct noise walls along roadways when compatible with aesthetic concerns and neighborhood character. This would be a developer responsibility, with no City funding.

Policy NS-1-j Significance Threshold. Establish, as a threshold of significance for the City's environmental review process, that a significant increase in ambient noise levels is assumed if the project would increase noise levels in the immediate vicinity by 3 dBA L_{dn} or CNEL or more above the ambient noise limits established in this General Plan Update.

Policy NS-1-k Proposal Review. Review all new public and private development proposals that may potentially be affected by or cause a significant increase in noise levels, per Policy NS-1-i, to determine conformance with the policies of this Noise Element. Require developers to reduce the noise impacts of new development on adjacent properties through appropriate means.

Policy NS-1-l Enforcement. Continue to enforce applicable State Noise Insulation Standards and Uniform Building Code noise requirements, as adopted by the City.

Policy NS-1-m Transportation Related Noise Impacts Related Noise Impacts. For projects subject to City approval, require that the project sponsor mitigate noise created by new transportation and transportation-related stationary noise sources, including roadway improvement projects, so that resulting noise levels do not exceed the City's adopted standards for noise-sensitive land uses.

Policy NS-1-n Best Available Technology. Require new noise source to use best available control technology to minimize noise emissions.

Policy NS-1-o Sound Wall Guidelines. Acoustical studies and noise mitigation measures for projects shall specify the heights, materials, and design for sound walls and other noise barriers. Aesthetic considerations shall also be addressed in these studies and mitigation measures such as variable noise barrier heights, a combination of a landscaped berm with wall, and reduced barrier height in combination with increased distance or elevation differences between noise source and noise receptor, with a maximum allowable height of 15 feet. The City will develop guidelines for aesthetic design measures of sound walls, and may commission area wide noise mitigation studies that can serve as templates for acoustical treatment that can be applied to similar situations in the urban area.

Table 3.13-6: Transportation (Non-Aircraft) Noise Source

Noise Sensitive Land Use[1]	Outdoor Activity Areas[2] CNEL/L_{dn} dB	Interior Spaces	
		CNEL/L_{dn} dB	CNEL/L_{dn} dB[3]
Residential	65	45	—
Transient Lodging	65	45	—
Hospitals, Nursing Homes	65	45	—
Theaters, Auditoriums, Music Halls	—	—	35
Churches, Meeting Halls	65	—	45
Office Buildings	—	—	45
Schools, Libraries, Museums	—	—	45

Notes:
CNEL = Community Noise Equivalent Level
dB = decibel
L_{dn} = day/night average sound level
[1] Where the location of outdoor activity areas is unknown or is not applicable, the exterior noise level standard shall be applied to the property line of the receiving land use.
[2] As determined for a typical worst-case hour during periods of use.
[3] As determined for a typical worst-case hour during periods of use.
Source: Fresno General Plan, Noise and Safety Element. 2014.

Table 3.13-7: Stationary Noise Sources

Category	Daytime (7:00 a.m. to 10:00 p.m.)	Nighttime (10:00 p.m. to 7:00 a.m.)
Hourly Equivalent Sound Level (L_{eq}), dB	50	45
Maximum Sound Level (L_{max}), dB	70	65

Notes:
dB = decibel
L_{dn} = day/night average sound level
L_{max} = maximum noise/sound level
[1] The Department of Development and Resource Management Director, on a case-by-case basis, may designate land uses other than those shown in this table to be noise-sensitive and may require appropriate noise mitigation measures.
[2] As determined at outdoor activity areas. Where the location of outdoor activity areas is unknown or not applicable, the noise exposure standard shall be applied at the property line of the receiving land use. When ambient noise levels exceed or equal the levels in this table, mitigation shall only be required to limit noise to the ambient plus 5 dB.
Source: Fresno General Plan Noise and Safety Element. 2014.

City of Fresno Municipal Code

Chapter 10, Article 1 (Noise Regulations), of the Fresno Municipal Code establishes excessive noise guidelines and exemptions. The following portions of the Municipal Code are applicable to the proposed project:

SEC. 10-102: Definitions

(b) Ambient Noise. "Ambient noise" is the all-encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far. For the purpose of this ordinance, ambient noise level is the level obtained when the noise level is averaged over a period of 15 minutes, without inclusion of the offending noise, at the location and time of day at which a comparison with the offending noise is to be made. Where the ambient noise level is less than that designated in this section, however, the noise level specified herein shall be deemed to be the ambient noise level for that location.

District	Time	Sound Level Decibels
Residential	10:00 p.m. to 7:00 a.m.	50
Residential	7:00 p.m. to 10:00 p.m.	55
Residential	7:00 a.m. to 7:00 p.m.	60
Commercial	10:00 p.m. to 7:00 a.m.	60
Commercial	7:00 a.m. to 10:00 p.m.	65
Industrial	anytime	70

SEC. 10-105 Excessive Noise Prohibited

No person shall make, cause, or suffer or permit to be made or caused upon any premises or upon any public street, alley, or place within the City, any sound or noise which causes discomfort or annoyance to any reasonable person of normal sensitiveness residing or working in the area, unless such noise or sound is specifically authorized by or in accordance with this article. The provisions of this section shall apply to, but shall not be limited to, the control, use, and operation of the following noise sources:

(a) Radios, musical instruments, phonographs, television sets, or other machines or devices used for the amplification, production, or reproduction of sound or the human voice.
(b) Animals or fowl creating, generating, or emitting any cry or behavioral sound.
(c) Machinery or equipment, such as fans, pumps, air conditioning units, engines, turbines, compressors, generators, motors or similar devices, equipment, or apparatus.
(d) Construction equipment or work, including the operation, use or employment of pile drivers, hammers, saws, drills, derricks, hoists, or similar construction equipment or tools.

SEC. 10-109 Exceptions

The provisions of this article shall not apply to:

(a) Construction, repair or remodeling work accomplished pursuant to a building, electrical, plumbing, mechanical, or other construction permit issued by the City or other governmental agency, or to site preparation and grading, provided such work takes place between the hours of 7:00 a.m. and 10:00 p.m. on any day except Sunday.
(b) Emergency work.
(c) Any act or acts which are prohibited by any law of the State of California or the United States.

Chapter 15, Article 25 (Performance Standards), of the Fresno Municipal Code establishes noise and vibration performance standards. The following portions of the Municipal Code are applicable to the proposed project:

SEC. 15-2506 Noise

The provisions of this section apply to noise sources resulting from and relating to new development or the expansion of a use or activity. Section 15-2506 establishes noise exposure thresholds from transportation-related noise sources for new noise-sensitive land use development. The maximum allowable exterior noise level for

noise-sensitive land uses is 65 dBA L_{dn}/CNEL, and the maximum allowable interior noise level for noise-sensitive land uses is 45 dBA L_{eq}.

Section 15-2506 also establishes land use compatibility standards for new development proposed near transportation noise sources. For example, environments with traffic noise levels ranging up to 65 dBA L_{dn}/CNEL are considered satisfactory for new residential or similar noise-sensitive land use development and may be permitted without requiring noise attenuation. Environments with traffic noise levels between 65 dBA and 70 dBA CNEL would require analysis and integration of noise reduction measures in the project design. Environments with traffic noise levels between 70 dBA and 75 dBA CNEL would require a site specific acoustical study and implementation of noise attenuation measures. Environments with traffic noise levels above 75 dBA CNEL are not acceptable for new residential or similar noise-sensitive development.

Section 15-2506 further establishes noise performance standards for stationary noise sources. The daytime noise performance standards are 50 dBA L_{eq} (hourly) and 70 dBA L_{max}; and the nighttime standards are 45 dBA L_{eq} (hourly) and 60 dBA L_{max}.

SEC. 15-2507 Vibration

No vibration shall be produced that is transmitted through the ground and is discernible without the aid of instruments by a reasonable person at the lot lines of the site. Vibrations from temporary construction, demolition, and vehicles that enter and leave the subject parcel (e.g., construction equipment, trains, trucks, etc.) are exempt from this standard.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan PEIR contains the following mitigation measures that are applicable to the proposed project.

MM NOI-2 Construction Vibration

The use of heavy construction equipment within 25 feet of existing structures shall be prohibited.

Fresno Southeast Development Area Specific Plan

The Fresno Southeast Development Area (SEDA) Specific Plan does not contain policies directly related to noise or groundborne vibration.

3.13.4 - Methodology

Construction Noise Analysis Methodology

A worst-case scenario was analyzed assuming each piece of modeled equipment would operate simultaneously at the nearest reasonable locations to the closest noise-sensitive receptor for the

loudest phase of construction. Noise emission levels recommended by FHWA's Highway Construction Noise Handbook were used to ascertain the noise generated by specific types of construction equipment. The construction noise impact was evaluated in terms of maximum levels (L_{max}). Analysis requirements were based on the sensitivity of nearby receptors and the Noise Ordinance specifications.

Traffic Noise Modeling Methodology

The FHWA highway traffic noise prediction model (FHWA RD-77-108) was used to evaluate traffic-related noise conditions in the vicinity of the project site. Traffic data used in the model was obtained from the Traffic Impact Analysis (TIA) prepared for the project (Appendix H).[7] The resultant noise levels were weighed and summed over a 24-hour period in order to determine the CNEL values. The FHWA-RD-77-108 Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level. Adjustments are then made to account for the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway); the total ADT and the percentage of ADT that flows during the day, evening, and night; the travel speed; the vehicle mix on the roadway; a percentage of the volume of automobiles, medium trucks, and heavy trucks; the roadway grade; the angle of view of the observer exposed to the roadway; and the site conditions ("hard" or "soft") as they relate to the absorption of the ground, pavement, or landscaping.

The level of traffic noise depends on the three primary factors: (1) the volume of the traffic, (2) the speed of the traffic, and (3) the number of trucks in the flow of traffic. Generally, the loudness of traffic noise is increased by heavier traffic volumes, higher speeds, and greater number of trucks. Vehicle noise is a combination of the noise produced by the engine, exhaust, and tires. Because of the logarithmic nature of traffic noise levels, a doubling of the traffic volume (assuming that the speed and truck mix do not change) results in a noise level increase of 3 dBA. Based on the FHWA community noise assessment criteria, this change is "barely perceptible." For reference, a doubling of perceived noise levels would require an increase of approximately 10 dBA. The truck mix on a given roadway also has an effect on community noise levels. As the number of heavy trucks increases and becomes a larger percentage of the vehicle mix, adjacent noise levels increase.

The model analyzed the noise impacts from the nearby roadways onto the project vicinity, which consists of the area that has the potential of being impacted from the on-site noise sources as well as the project-generated traffic on the nearby roadways. The roadways were analyzed based on a single-lane-equivalent noise source combining both directions of travel. A single-lane-equivalent noise source exists when the vehicular traffic from all lanes is combined into a theoretical single lane that has a width equal to the distance between the two outside lanes of a roadway, which provides almost identical results to analyzing each lane separately where elevation changes are minimal.

Stationary Noise Source Analysis Methodology

The proposed project would generate noise from future development that could contain new exterior mechanical equipment sources, such as rooftop ventilation systems on proposed industrial

[7] Environmental Planning Development Solutions, Inc, 2022. Rio Vista Specific Plan Traffic Impact Analysis. January 26.

uses, and potential new parking lot activities. To provide a conservative analysis, the highest end of the range of reference noise levels for these stationary noise sources was used to calculate the reasonable worst-case hourly average noise levels from each noise source. These noise levels were then compared to the City's applicable noise performance threshold to determine whether these noise sources would result in a substantial increase in excess of this standard.

Vibration Impact Analysis Methodology

The City of Fresno does not have adopted criteria for construction or operational groundborne vibration impacts. Therefore, the FTA's vibration impact criteria and modeling and analysis methodology were utilized to evaluate potential vibration impacts. The FTA has established industry accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment document[8] and are summarized in Table 3.13-5 in the regulatory discussion above.

3.13.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist as thresholds to determine whether noise impacts are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part on the questions posed in Appendix G. These significance criteria are as follows:

The project would have a significant impact on the environment if it would:

a) Generation of a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.

b) Generation of excessive groundborne vibration or groundborne noise levels.

c) For a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project expose people residing or working in the project area to excessive noise levels.

3.13.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the project and provides mitigation measures where appropriate.

[8] Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. May.

Substantial Noise Increase in Excess of Standards

Impact NOI-1: **The proposed project could generate a substantial temporary or permanent increase in ambient noise levels in the vicinity of the project in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.**

Impact Analysis

Temporary Construction Noise Impacts

A significant impact would occur if project-related, noise producing construction activities result in a substantial temporary increase in ambient noise levels in excess of the established standards. The City's Noise Ordinance identifies that construction, repair, or remodeling work accomplished pursuant to a building, electrical, plumbing, mechanical, or other construction permit issued by the City or other governmental agency, or to site preparation and grading, are exempt from the noise performance standards of the Noise Ordinance provided such work takes place between the hours of 7:00 a.m. and 10:00 p.m. on any day except Sunday.

Development that could occur from implementation of the Specific Plan is expected to result in construction activities within the planning area. Noise impacts from construction activities would be a function of the noise generated by construction equipment, equipment location, sensitivity of nearby land uses, and the timing and duration of the construction activities.

For future development projects, two types of short-term noise impacts would occur during site preparation and project construction. The first type would result from the increase in traffic flow on local streets associated with the transport of workers, equipment, and materials to and from the project site. The transport of workers and construction equipment and materials to a development site would incrementally increase noise levels on access roads leading to the site. Typically, a doubling of the ADT hourly volumes on a roadway segment is required in order to result in an increase of 3 dBA in traffic noise levels, which, as discussed in the characteristics of noise discussion above, is the lowest change that can be perceptible to the human ear in outdoor environments. Individual development project's construction trips would not be expected to double the hourly or daily traffic volumes along roadway segments in the vicinity of a development site. For this reason, short-term intermittent noise from construction trips would not be expected to result in a perceptible increase in hourly or daily average traffic noise levels. Therefore, short-term construction-related noise impacts associated with the transportation of workers and equipment to a development site would be less than significant.

For future development projects, the second type of short-term noise impact is related to noise generated during site preparation, grading, and construction activities. Construction is performed in discrete steps, each of which has its own mix of equipment and, consequently, its own noise characteristics. These various sequential phases would change the character of the noise generated on-site. Thus, the noise levels vary as construction progresses. Despite the variety in the types and sizes of construction equipment, similarities in the dominant noise sources and patterns of operation allow construction noise ranges to be categorized by work phase. Table 3.13-2 shows typical noise

levels of construction equipment as measured at a distance of 25 feet from the operating equipment.

The site preparation phase, which includes excavation and grading activities, generates the highest noise levels because the noisiest construction equipment is earthmoving equipment. Earthmoving equipment includes excavating machinery and compacting equipment, such as bulldozers, draglines, backhoes, front loaders, roller compactors, scrapers, and graders. Typical operating cycles for these types of construction equipment may involve 1 or 2 minutes of full power operation followed by 3 or 4 minutes at lower power settings.

Development projects that could occur with implementation of the of the Specific Plan would be expected to require the use of some of the loudest pieces of construction equipment listed in Table 3.13-2. For example, the maximum noise level generated by each pile driver is assumed to be 112 dBA L_{max} at 25 feet from this equipment. Bulldozers would generate 87 dBA L_{max} at 25 feet. The maximum noise level generated by graders is approximately 82 dBA L_{max} at 25 feet. Each doubling of sound sources with equal strength increases the noise level by 3 dBA. Assuming that each piece of construction equipment operates at some distance from the other equipment, a reasonable worst-case combined noise level during this phase of construction would be 90 dBA L_{max} at a distance of 50 feet from the acoustical center of a construction area. This would result in a reasonable worst-case hourly average of 86 dBA L_{eq}. The acoustical center reference is used because construction equipment must operate at some distance from one another on a project site and the combined noise level as measured at a point equidistant from multiple sources operating simultaneously would represent the worst-case noise levels.

There are no site-specific development plans; however, project development in the Plan Area could result in the potential for relatively high single event construction noise causing resulting in temporary substantial increase in ambient noise levels in the vicinity of the project in excess of established standards, potentially resulting in an intermittent noise nuisance that could result in annoyance or sleep disturbances at nearby sensitive receptors. Therefore, mitigation is required to reduce this potential impact. With implementation of Mitigation Measure (MM) NOI-1a and MM NOI-1b, construction noise impacts due to construction activities would be reduced to the extent feasible. However, given that details of individual development projects in the vicinity of the Plan Area are currently unknown, it is not possible to quantify the construction noise impacts at specific off-site or on-site sensitive receptors. Because these construction activities may occur near noise-sensitive receptors and because noise disturbances may occur for prolonged periods of time, construction noise impacts would remain significant and unavoidable.

Operational Mobile Source Noise Impacts

A significant impact would occur if project-generated traffic would result in a substantial increase in ambient noise levels compared with those that would exist without the proposed project. The City does not define “substantial increase”; therefore, for purpose of this analysis, a substantial increase is based on the following criteria. A characteristic of noise is that audible increases in noise levels generally refer to a change of 3 dBA or more as this level has been found to be barely perceptible to the human ear in outdoor environments. A change of 5 dBA is considered the minimum readily perceptible change to the human ear in outdoor environments. Therefore, for purposes of this

analysis, a significant impact would occur if the proposed project would cause the CNEL to increase by any of the following:

- 5 dBA or more even if the CNEL would remain below normally acceptable levels for a receiving land use.
- 3 dBA or more, thereby causing the CNEL to exceed normally acceptable levels for a receiving land use.

As identified in Table 3.13-6, noise environments with transportation noise levels of up to 65 dBA CNEL are considered normally acceptable for new residential, transient lodging, hospitals, nursing homes, churches, and meeting halls land use development.

The FHWA highway traffic noise prediction model (FHWA-RD-77-108) was used to evaluate existing and future project-related traffic noise conditions along modeled roadway segments in the vicinity of the project site. Traffic modeling was performed using the data provided by TJKM in the traffic analysis prepared for the proposed project. The resultant noise levels were weighed and summed over a 24-hour period to determine the CNEL values. The traffic noise modeling input and output files—including the 60 dBA, 65 dBA, and 70 dBA CNEL noise contour distances—are included in Appendix I. Table 3.13-8 shows a summary of the traffic noise levels for year 2035 forecast traffic conditions without and with the proposed project, as measured at 50 feet from the centerline of the outermost travel lane.

Table 3.13-8: Year 2035 Forecast Traffic Noise Levels Without and With the Proposed Project

Roadway Segment	Without Project		With Project		Increase Over Without Project Conditions (dBA)
	ADT	CNEL (dBA)	ADT	CNEL (dBA)	
Clovis Avenue–south of American Avenue	**15,400**	**68.4**	**18,300**	**69.2**	0.8
De Wolf Avenue–north of McKinley Avenue	4,300	64.4	**5,600**	**65.5**	1.1
De Wolf Avenue–south of McKinley Avenue	1,900	60.8	3,700	63.7	2.9
De Wolf Avenue–south of Clinton Avenue	3,500	63.5	4,700	64.8	1.3
De Wolf Avenue–north of Jensen Avenue	1,700	60.3	3,600	63.6	3.3
De Wolf Avenue–south of Jensen Avenue	1,300	59.2	2,200	61.5	2.3
Jensen Avenue–east of Bethel Avenue	**15,100**	**70.3**	**18,900**	**71.3**	1.0
Jensen Avenue–east of De Wolf Avenue	**11,600**	**69.2**	**16,800**	**70.8**	1.6
Jensen Avenue–west of De Wolf Avenue	**6,700**	**66.8**	**10,000**	**68.5**	1.7
Jensen Avenue–east of Temperance Avenue	**13,900**	**70.0**	**20,100**	**71.6**	1.6
Jensen Avenue–west of Temperance Avenue	**12,700**	**69.6**	**19,800**	**71.5**	1.9
Locan Avenue–north of Tulare Avenue	220	51.5	400	54.1	2.6

Roadway Segment	Without Project		With Project		Increase Over Without Project Conditions (dBA)
	ADT	CNEL (dBA)	ADT	CNEL (dBA)	
Locan Avenue–south of Tulare Avenue	200	51.0	320	53.1	2.1
McCall Avenue–north of McKinley Avenue	4,200	64.3	**6,400**	**66.1**	1.8
McCall Avenue–north of Ashlan Avenue	**5,200**	**65.2**	**5,700**	**65.6**	0.4
McCall Avenue–north of Belmont Avenue	**5,800**	**65.7**	**10,000**	**68.0**	2.3
Tulare Avenue–east of Locan Avenue	370	53.7	590	55.7	2.0
Tulare Avenue–west of Locan Avenue	870	57.4	1,400	59.5	2.1
North Avenue–west of Temperance Avenue	2,500	62.0	2,500	62.0	0.0

Note:
ADT = Average Daily Traffic
CNEL = Community Noise Equivalent Level
dBA = A-weighted decibel
Bold values indicate roadway segments with traffic noise levels in excess of the City's acceptable noise exposure level for new noise-sensitive land use development.
Source: FirstCarbon Solutions (FCS) 2022.

As shown in Table 3.13-8, the highest traffic noise level increase with implementation of the proposed project would occur along De Wolf Avenue, on the segment north of Jensen Avenue. The modeling results show that the plus project traffic noise levels would result in an increase of 3.3 dBA over conditions that would exist without the project, resulting in traffic noise levels of 63.6 dBA CNEL as measured at 50 feet from the centerline of the outermost travel lane along this roadway segment. These noise levels are below the City's normally acceptable land use compatibility standard of 65 dB CNEL for noise-sensitive land use development. The resulting increase is less than the 5 dBA increase that would be considered a substantial increase. Therefore, project-related traffic noise levels would not result in a substantial permanent increase in traffic noise levels in excess of applicable standards and would represent a less than significant impact.

However, several of the modeled roadway segments, shown in bold in Table 3.13-8, have traffic noise levels that exceed the City's land use compatibility standards for new development proposed near transportation noise sources. The roadway segment of Jensen Avenue east of Temperance Avenue would experience the highest forecasted traffic noise levels, with noise levels of 71.6 dBA CNEL as measured at 50 feet from the centerline of the outermost travel lane under With Project conditions. This would be considered a significant impact and site-specific analysis would be required for future noise-sensitive land use development in these areas. These traffic noise impacts can be mitigated either by using setbacks, soundwalls, acoustic-rated windows, or by siting non-sensitive buildings as shielding. For example, at a distance of 160 feet from the centerline of Jensen Avenue, future traffic noise levels would attenuate to below 65 dBA CNEL; in addition, properly sited structural (building or sound wall) shielding can provide 15 dBA or greater additional noise reduction.

Therefore, implementation of MM NOI-2, which requires preparation of a traffic noise reduction plan to identify appropriate design measures, where required, would ensure traffic noise impacts on future noise-sensitive land use development projects would be reduced to less than significant.

Operational Stationary Source Noise Impacts

A significant impact would occur if operational noise levels generated by stationary noise sources associated with development projects within the Plan Area would exceed the noise performance standards of Section 15-2506 of the Municipal Code.

Development projects that could occur with implementation of the Specific Plan would include new stationary noise sources. These stationary noise sources could involve a wide spectrum of uses and activities, including various industrial uses, commercial operations, agricultural production, school playgrounds, high school football games and marching bands, HVAC units, generators, lawn maintenance equipment, and swimming pool pumps. These would be potential point sources of noise that could affect noise-sensitive receptors in the Plan Area.

Typical maximum noise levels from truck loading and unloading activity are 65 dBA to 75 dBA L_{max} as measured at 50 feet. These maximum noise levels include noise from associated truck loading/unloading activities, including maneuvering, trailer loading and unloading, backup alarms or beepers, and docking noise. Parking activities include vehicles cruising at slow speeds, doors shutting, or cars starting, would generate noise levels of approximately 60 dBA to 70 dBA L_{max} at 50 feet. Current market available residential mechanical ventilation equipment has rated operational noise levels up to 70 dBA L_{eq} at a distance of 3 feet. Current market available commercial grade mechanical ventilation equipment is rated as having operational noise levels up to 80 dBA L_{eq} at 3 feet from the operating equipment.

These stationary source operational noise levels could exceed the City's noise performance thresholds if they were to occur in areas adjacent to sensitive receptor land uses. Therefore, mitigation would be required to reduce this potential impact. Operational activity noise levels can be mitigated either at the source or at the receiving land use using setbacks, soundwalls, acoustic-rated windows, or by siting loading/parking areas on sides of buildings opposite sensitive receptors (using buildings as shielding). For example, at a distance of 300 feet, unobstructed truck loading activity noise levels would attenuate to below 60 dBA L_{max}, while properly sited structural shielding (building or sound wall) can provide 15 dBA or greater additional noise reduction.

Therefore, with implementation of MM NOI-3, which requires preparation of a stationary source noise reduction plan to identify appropriate design measures, where required, would ensure stationary source operational noise impacts generated by future development projects would be reduced to less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

As noted in Section 3.13.3, Regulatory Framework, the following mitigation measures from the General Plan PEIR are applicable to the proposed project.

MM NOI-2 Construction Vibration

The use of heavy construction equipment within 25 feet of existing structures shall be prohibited.

Project Specific Mitigation Measures

MM NOI-1a Construction Activity Hours Restriction

Construction activity which requires a permit issued by the City of Fresno shall be limited to the hours between 7:00 a.m. and 10:00 p.m. on weekdays and Saturdays. Any construction activity outside of these hours must comply with the City's noise performance standards in Section 15.2506 of the Municipal Code.

MM NOI-1b Construction Noise Mitigation Plan

Prior to the issuance of demolition, grading, and/or construction permits, applicants for individual development projects within 500 feet of noise-sensitive receptors (e.g., residences, hospitals, schools) shall conduct a project-level construction noise analysis to evaluate potential impacts on sensitive receptors. The analysis shall be conducted once the final construction equipment list that will be used for demolition and grading activities is determined. The project-level noise analysis shall be prepared, reviewed, and approved by the City of Fresno Planning Director. If the analysis determines that demolition and construction activities would result in an impact to identified noise-sensitive receptors, then specific measures to attenuate the noise impact shall be outlined in the analysis and reviewed and approved by the City of Fresno Planning Director. Specific measures may include, but are not limited to, the following Best Management Practices (BMPs):

- Post a construction site notice near the construction site access point or in an area that is clearly visible to the public. The notice shall include the following: job site address; permit number, name, and phone number of the contractor and owner; dates and duration of construction activities; construction hours allowed; and the City of Fresno Planning Director and construction contractor phone numbers where noise complaints can be reported and logged.
- Consider the installation of temporary sound barriers for construction activities immediately adjacent to occupied noise-sensitive structures.
- Restrict haul routes and construction-related traffic to the least noise-sensitive times of the day.
- Reduce non-essential idling of construction equipment to no more than 5 minutes.

- Ensure that all construction equipment is monitored and properly maintained in accordance with the manufacturer's recommendations to minimize noise.
- Fit all construction equipment with properly-operating mufflers, air intake silencers, and engine shrouds, no less effective than as originally equipped by the manufacturer, to minimize noise emissions.
- If construction equipment is equipped with back-up alarm shut offs, switch off back-up alarms and replace with human spotters, as feasible.
- Stationary equipment (such as generators and air compressors) and equipment maintenance and staging areas shall be located as far from existing noise-sensitive land uses, as feasible.
- To the extent feasible, use acoustic enclosures, shields, or shrouds for stationary equipment such as compressors and pumps.
- Shut off generators when generators are not needed.
- Coordinate deliveries to reduce the potential of trucks waiting to unload and idling for long periods of time.
- Grade surface irregularities on construction sites to prevent potholes from causing vehicular noise.
- Minimize the use of impact devices such as jackhammers, pavement breakers, and hoe rams. Where possible, use concrete crushers or pavement saws rather than hoe rams for tasks such as concrete or asphalt demolition and removal.
- The final noise reduction measures to be implemented and their associated details shall be determined by the construction-level noise analysis. The final noise reduction measures shall be included on all construction and building documents and/or construction management plans and submitted for verification to the City; implemented by the construction contractor through the duration of the construction phase; and discussed at the pre-demolition, -grade, and/or -construction meetings.

MM NOI-2 Traffic Noise Reduction Plan

Prior to issuance of building permits, the property owner/developer shall be responsible to implement the following measures to limit potential traffic noise source impacts:

- Any proposed development project that would include noise-sensitive land use development along noise impacted roadway segments identified in Table 3.13-8 shall demonstrate compliance with Municipal Code Section 15-2506 by submitting a final acoustical report. This report shall demonstrate that the proposed project incorporates sufficient noise attenuation features, if needed, to meet the City's exterior/interior noise performance standards. The individual project owner/developer shall submit the acoustic study to the Planning Director for review and approval. Upon approval by the City of Fresno, the proposed acoustical design features shall be incorporated into the proposed development. Noise reduction design features may include, but are not limited to, locating

noise-sensitive development on the site to be shielded by structures (buildings, enclosures, or sound walls) or by using upgraded wall and window assemblies to ensure that acceptable interior noise levels are maintained.

MM NOI-3 Stationary Source Noise Reduction Plan

Prior to issuance of building permits, the property owner/developer shall be responsible to implement the following measures to limit operational stationary noise source impacts:

- Any proposed development projects that include unshielded parking areas within 175 feet, or unshielded truck loading docks within 300 feet, or unshielded mechanical ventilation equipment systems within 35 feet of a noise-sensitive receptor, shall demonstrate compliance with Municipal Code Section 15-2506 by submitting a site specific acoustic study. These reports shall demonstrate that the proposed project incorporates sufficient noise attenuation features, if needed, to meet the City of Fresno's exterior/interior noise performance standards. The individual project owner/developer shall submit the acoustic study to the Planning Director for review and approval. Upon approval by the City, the proposed acoustical design features shall be incorporated into the proposed development. Noise reduction design features may include, but are not limited to, locating stationary noise sources on the site to be shielded by structures (buildings, enclosures, or sound walls) or by using equipment that has a quieter rating.

Level of Significance After Mitigation

Significant and unavoidable (construction noise). With implementation of MM NOI-1a and MM NOI-1b, construction noise impacts due to construction activities would be reduced to the extent feasible. However, given that details of individual development projects in the vicinity of the Plan Area are currently unknown, it is not possible to quantify the construction noise impacts at specific off-site or on-site sensitive receptors. Because these construction activities may occur near noise-sensitive receptors and because noise disturbances may occur for prolonged periods of time, construction noise impacts would remain significant and unavoidable.

Groundborne Vibration/Noise Levels

Impact NOI-2: The proposed project could result in generation of excessive groundborne vibration or groundborne noise levels.

Impact Analysis

This section analyzes both construction and operational groundborne vibration impacts. The City prohibits groundborne vibration that is discernible without the aid of instruments by a reasonable person at the lot lines of the site; however, vibrations from temporary construction activities are exempt from this standard. Therefore, for purposes of this analysis, the FTA's vibration impact criteria are utilized to analyze construction vibration impacts. The FTA has established industry

accepted standards for vibration impact criteria and impact assessment. These guidelines are published in its Transit Noise and Vibration Impact Assessment Manual. The construction vibration impact criteria are summarized in Table 3.13-3 in the regulatory section above.

A significant impact would occur if existing structures at the project site or in the project vicinity would be exposed to groundborne vibration levels in excess of levels established by the FTA's Construction Vibration Impact Criteria. Development of the Specific Plan would require the use of construction equipment which are vibration generators.

Short-term Construction Vibration Impacts to Off-site Receptors

Construction activity can result in varying degrees of ground vibration, depending on the equipment used on the site. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings in the vicinity of a construction site respond to these vibrations with varying results ranging from no perceptible effects at the low levels to slight damage at the highest levels. As shown in the setting section above, Table 3.13-3 provides approximate vibration levels for construction activities.

Of the variety of equipment used during construction, impact pile drivers that could be used in the site preparation phase of construction would produce the greatest groundborne vibration levels. Impact pile drivers produce groundborne vibration levels ranging up to 0.644 inch per second (in/sec) PPV at 25 feet from the operating equipment. The heaviest type of mobile equipment that would produce the highest vibration levels would be a large vibratory roller produce groundborne vibration levels ranging up to 0.644 in/sec PPV as measured at 25 feet.

Construction vibration levels from future development projects could exceed the FTA's damage threshold criteria for receiving structures. Therefore, mitigation would be required to reduce this potential impact. Construction vibration sources can be mitigated to acceptable levels either at the source or on the adjacent property using alternate equipment, adequate setbacks, or by digging temporary trenches between the source and the receptor. For example, at a distance of 200 feet, vibration levels from an impact pile driver would attenuate to 0.02 in/sec PPV.

Therefore, implementation of MM NOI-2a, which requires preparation of a Construction Vibration Monitoring Plan for any nearby structure, would ensure that these vibration level impacts generated by future development projects would be reduced to a less than significant impact.

Operational Vibration Impacts

Based on the proposed types of land uses of the Specific Plan, future related development projects are not anticipated to include any permanent sources of vibration that would expose persons in the project vicinity to excessive groundborne vibration levels. In addition, there are no existing significant permanent sources of groundborne vibration located within the Specific Plan development area to which future development projects would be exposed. Therefore, project operational groundborne vibration level impacts would be considered less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM NOI-4 Construction Vibration Reduction Plan

Prior to issuance of grading and/or building permits, a note shall be provided on grading and building plans indicating that during grading and construction the property owner/developer shall be responsible for requiring contractors to implement the following measures to limit construction-related vibration impacts:

- For any future development projects that would necessitate the use of pile driving within 200 feet of an off-site structure shall submit a Construction Vibration Reduction Plan that identifies specific techniques, such as the depth and location of temporary trenching that would reduce potential vibration impacts to less than significant for the impacted structure.
- For any future development projects that would necessitate the use of large vibratory rollers within 30 feet of an off-site structure, or the use of other heavy construction equipment within 15 feet of an off-site structure, shall submit a Construction Vibration Reduction Plan that identifies specific techniques, such as the depth and location of temporary trenching that would reduce potential vibration impacts to less than significant for the impacted structure.
- The individual project owner/developer shall submit the Construction Vibration Reduction Plan to the Planning Director for review and approval prior to issuance of building permits. Upon approval by the City, the construction vibration reduction measures shall be incorporated into the construction documents.

Level of Significance After Mitigation

Less than significant impact.

Excessive Noise Levels from Airport Activity

Impact NOI-3:	**The proposed project would not expose people residing or working in the project area to excessive noise levels for a project located within the vicinity of a private airstrip or an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport.**

Impact Analysis

The nearest public airport to the project site is the Fresno Yosemite International Airport, located approximately 2 miles west of the nearest Specific Plan boundary. At this distance, the entire Plan Area is located outside of the airport noise contours. Therefore, implementation of the project would not expose persons residing or working in the Plan Area to noise levels from airport activity that would be in excess of normally acceptable standards. Therefore, no impact would occur.

Level of Significance Before Mitigation

No impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.13.7 - Cumulative Impacts

The geographic scope of the cumulative noise analysis is limited by the range of potential noise impacts. Noise impacts tend to be localized; therefore, noise impacts for traffic and stationary noise sources are limited to approximately 500 feet from the source. This analysis evaluates whether impacts of the Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to noise. This analysis then considers whether incremental contribution of the impacts associated with implementation of the Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to the level of significance.

Construction Noise Impacts

The significance threshold for a cumulative construction noise impact would be a substantial temporary noise increase in areas in the project vicinity, which already experience excessive noise levels from construction activities. There are no major long-term development projects undergoing construction in the Plan Area that would constitute an existing cumulative impact. However, given that details of individual development projects adjacent to the Plan Area are currently unknown, it is not possible to quantify future cumulative construction noise impacts that could occur if multiple developments were to construct simultaneously, which could constitute a cumulative noise impact. Because construction activities associated with implementation of the Specific Plan could then also occur simultaneously and because noise disturbances could occur for prolonged periods of time, there is the possibility for a cumulative construction noise impacts that would remain significant and unavoidable.

Traffic Noise Impacts

The significance threshold for a cumulative traffic noise impact would be a substantial permanent increase in traffic noise levels in the vicinity of the project along any roadway segment that already experiences noise levels in excess of normally acceptable standards for adjacent land uses. As shown in Table 3.13-8, several modeled roadway segments currently experience traffic noise levels that exceed the City's land use compatibility standards for new development proposed near transportation noise sources. This would be considered an existing cumulative impact. However, as shown in the traffic noise impact discussion above, for each of the existing impacted roadway segments, implementation of the Specific Plan would not result in a considerable contribution to this existing cumulative impact. Therefore, implementation of the project would not result in a potentially significant cumulatively considerable contribution to traffic noise impacts on roadway segments in the Plan Area or within 500 feet of the Plan Area. This impact would be less than significant.

Stationary Source Noise Impacts

The significance threshold for a cumulative stationary source operational noise impact would be a substantial temporary noise increase at any location that is already exposed to excessive noise levels from stationary source operational noise. There are no major permanent stationary noise sources in the Plan Area that would constitute an existing cumulative noise impact. Therefore, since there is not an existing cumulative stationary source noise impact in the Plan Area, implementation of the Specific Plan would result in a less than significant cumulative impact related to stationary source noise. In addition, as shown in the stationary source noise impact discussion, any proposed project in the Plan Area that would have stationary noise sources would be required to prepare a site-specific analysis and incorporate design measures, where necessary, to ensure potential impacts would be reduced to less than significant as measured at sensitive receptors. Therefore, implementation of the project would not result in a potentially significant cumulatively considerable contribution to stationary source noise impacts in the Plan Area or within 500 feet of the Plan Area. This impact would be less than significant.

Construction Vibration Impacts

Construction-related groundborne vibration impacts are very localized; therefore, only areas within approximately 50 feet of a construction site could potentially be affected by groundborne vibration resulting from construction activities. There are no major long-term development projects undergoing construction in the Plan Area that would constitute an existing cumulative groundborne vibration impact. Therefore, since there is not an existing cumulative groundborne vibration impact in the Plan Area, then implementation of the Specific Plan would result in a less than significant cumulative impact related to construction groundborne vibration. Therefore, implementation of the project would not result in a potentially significant cumulatively considerable contribution to construction vibration impacts in the Plan Area or within 50 feet of the Plan Area. This impact would be less than significant.

Operational Groundborne Vibration Impacts

The only cumulatively considerable contribution to groundborne vibration conditions in the project vicinity would result from introduction of new permanent sources of groundborne vibration to an existing impacted environment. The only major sources of groundborne vibration in the project vicinity is railroad activity along the rail line located over 9,000 feet west of the proposed project's development areas. Implementation of the proposed project would not introduce any new permanent sources of groundborne vibration to the project vicinity and would not increase railroad activity. Therefore, implementation of the proposed project would not result in a potentially significant cumulatively considerable contribution to vibration conditions in the project vicinity. This impact would be less than significant.

Level of Cumulative Significance Before Mitigation

Potentially significant impact (construction noise).

Less than significant impact (all other noise and vibration impacts).

Mitigation Measures

No mitigation is available that would reduce cumulative construction noise impacts to less than significant.

Level of Cumulative Significance After Mitigation

Significant and unavoidable impact (construction noise).

3.14 - Population and Housing

This section describes existing population and housing in the region, County, and project area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to population and housing that could result from implementation of the proposed project. Information included in this section is based, in part, on databases and reports provided in the Fresno General Plan (General Plan) and Municipal Code, and by California Department of Finance (CDF), and the United States Census Bureau. As further discussed in Chapter 1*,* Introduction, three public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to population, housing, and employment:

- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.14.1 - Existing Conditions

This section describes the existing population and housing conditions within the Plan Area, as well as in the City of Fresno (City) as a whole, to provide context for the analysis of the proposed project.

Land within the Plan Area includes a mixture of industrial, agricultural, commercial, and residential land uses. Rural residential development is primarily concentrated in the area between State Route (SR) 180 and McKinley Avenue but also scattered throughout the Plan Area. The pattern transitions into agricultural uses toward the southeastern end of the Plan Area, closer to land outside the city limits within the City's Sphere of Influence (SOI) and County-owned land. The predominant existing use in the Plan Area (approximately 5,000 acres) is agriculture, primarily vineyards, orchards, and vegetable farms. Pockets of commercial uses are scattered through the Plan Area. Industrial uses are located immediately adjacent to, or enclosed by, residential neighborhoods. Additionally, there are vacant lands across the Plan Area.

Population

As of April 2020, the U.S. Census Bureau determined that City of Fresno had a population of 542,107, up from 494,665 in 2010, which is a population increase of 9.5 percent. As of 2020, the City had 170,137 households.[1]

[1] United States Census Bureau. 2022. Quick Facts: Fresno city, California. Website: https://www.census.gov/quickfacts/fact/table/fresnocitycalifornia,fresnocountycalifornia/PST045221. Accessed May 20, 2022.

As of July 2021, Fresno County included 336,473 households and had a total population of 1,013,581. Between the years 2020 and 2021, there was a 0.5 percent population increase in the County. Between the years of 2010 and 2020, the population increased from 930,450 to 1,008,654, which is an 8.5 percent population increase countywide.[2]

Currently, there are 700 residential parcels within the Plan Area, which accommodate 713 single-family homes and 13 mobile homes. According to the CDF, the average household size in the City is 2.99 persons per household.[3] Therefore, the estimated population of the Plan Area is approximately 2,171 persons.[4]

Population Projections

The Fresno Council of Governments (Fresno COG) anticipates the City's growth will increase from 621,540 people in 2025 to 728,200 people in 2050. Additionally, the total number of new households between 2019 and 2025 will be 41,670.[5]

As described above, there are currently 700 residential parcels within the Plan Area, which accommodate 713 single-family homes and 13 mobile homes. The General Plan projects that the Plan Area would have approximately 15,000 housing units by the year 2035. At its full buildout, the Plan Area is expected to have 45,000 housing units. Using the average household size in the City of 2.99, the Plan Area is expected to have a total population of approximately 44,850 persons by 2035 and approximately 134,550 persons at full buildout.

Housing

Between 2016 and 2020, the average household size in the City was 3.04 persons per dwelling unit, about 3 percent lower than the countywide average of 3.14.[6] The total number of new households between 2019 and 2025 is anticipated to be 41,670.

Employment

According to the U.S. Census Bureau, there were a total of 284,131 people employed in Fresno in 2020.[7] The Fresno COG job projections indicate that employment will increase from 257,140 in 2019 to 299,960 in 2050.[8]

[2] United States Census Bureau. 2022. Quick Facts: Fresno city, California. Website: https://www.census.gov/quickfacts/fact/table/fresnocitycalifornia,fresnocountycalifornia/PST045221. Accessed May 20, 2022.
[3] State of California Department of Finance. May 2022. E-5 Population and Housing Estimates for Cities, Counties and the State, 2020-2022. Website: https://dof.ca.gov/forecasting/demographics/estimates/e-5-population-and-housing-estimates-for-cities-counties-and-the-state-2020-2022/. Accessed June 29, 2022.
[4] (700 single-family homes + mobile homes)*2.99 persons per household = 2,170.74
[5] Fresno Council of Governments (Fresno COG). 2021. Fresno County 2050 Growth Projections. Website: https://www.fresnocog.org/project/demographic-data/. Accessed May 20, 2022.
[6] United States Census Bureau. 2022. Quick Facts: Fresno city, California. Website: https://www.census.gov/quickfacts/fact/table/fresnocitycalifornia,fresnocountycalifornia/PST045221. Accessed May 20, 2022.
[7] Ibid.
[8] Fresno Council of Governments (Fresno COG). 2021. Fresno County 2050 Growth Projections. Website: https://www.fresnocog.org/project/demographic-data/. Accessed May 20, 2022.

As of May 2022, the unemployment rate in the City was 5.2 percent.[9] Given that the Plan Area has an estimated population of 2,171 persons, and that approximately 39.8 percent of the City's residents are either over the age of 65 or below the age of 18, it can be estimated that there are approximately 1,371 people employed in the Plan Area.[10]

3.14.2 - Regulatory Setting

State

California Housing Element Law

The State Housing Element Law (Government Code Chapter 1143, Article 10.6, §§ 65580 and 65589) requires each city and county to adopt a general plan for future growth. This plan must include a housing element that identifies housing needs for all economic segments and provides opportunities for housing development to meet that need. The amount of housing that must be accounted for in a local housing element is determined through a process called the Regional Housing Needs Allocation (RHNA). In the RHNA process, the State gives each region a number representing the amount of housing needed, based on existing need and expected population growth.

At the State level, the California Department of Housing and Community Development (HCD) estimates the relative share of the State's anticipated population growth that would occur in each county in the State, based on CDF population projections and historic growth trends. Where there is a regional COG, such as the Fresno COG, the HCD provides the regional housing need to the council. The council then assigns a share of the regional housing need to each of its cities and counties. The process of assigning shares provides cities and counties the opportunity to comment on the proposed allocations. The HCD oversees the process to ensure that the COG distributes its share of the State's projected housing need.

Each city and county must update its general plan housing element on a regular basis pursuant to the requirements of Government Code Section 65580, *et seq*. Among other things, the housing element must incorporate policies and identify potential sites that would accommodate a city's share of the regional housing need. Before adopting an update to its housing element, a city or county must submit the draft to the HCD for review. The HCD will advise the local jurisdiction whether its housing element complies with the provisions of California Housing Element Law. The regional COGs are required to assign regional housing shares to the cities and counties within their region on a similar schedule. At the beginning of each cycle, the HCD provides population projections to the regional COGs, who then allocate shares to their cities and counties. The shares of the regional need are allocated before the end of the cycle so that the cities and counties can amend their housing elements by the deadline.

[9] State of California Employment Development Department (EDD). Interactive Maps and Data Tools. Labor Force and Unemployment Interactive Map. Website: https://www.labormarketinfo.edd.ca.gov/data/interactive-labor-market-data-tools.html. Accessed June 29, 2022.

[10] (2,171 persons - (0.398*2,171)*(1-0.052))

Regional

Regional Housing Needs Allocation

State Housing Element Law, Government Code Chapter 1143, Article 10.6, Sections 65580 and 65589, requires development of an RHNA. The RHNA, which was adopted by the Fresno COG in July 2014, defines local housing market areas. Each jurisdiction within a market area is then assigned and is responsible for, a proportional share of the area's non-market rate housing needs. According to the 2013 Fresno County RHNA Plan, the City of Fresno falls into the Fresno-Clovis Metropolitan Area (FCMA) and receives an allocation of units based on the City's share of the housing need within that boundary. The FCMA also includes the City of Clovis, the unincorporated communities of Easton and Friant, and several unincorporated neighborhoods such as Calwa, Fig Garden, Malaga, and Sunnyside.

Adopted in April 2016, the Fresno County RHNA Plan covers an 8-year planning period that is between December 21, 2015, and December 31, 2023. The Plan includes housing at four different income levels, including very low, low, moderate, and above-moderate. As determined by Fresno COG, the City of Fresno's total housing unit capacity allocation is 23,565.1 This allocation translates into sites that could accommodate housing affordable to households that fall within the various income categories as follows:

- Extremely and Very Low Income: 5,666 dwelling units
- Low Income: 3,289 dwelling units
- Moderate Income: 3,571 dwelling units
- Above-Moderate: 11,0392

Local

Fresno General Plan

The General Plan is the City's primary policy planning document, providing the framework for management and utilization of the City's physical, economic, and human resources. Adopted on December 18, 2014, the General Plan includes 10 separate elements, including a Housing Element chapter. Each Element of the General Plan contains goals, objectives, and implementing policies that guide development within the City. The City's Policies related to population and housing in the City are listed below.

Economic Development and Fiscal Sustainability Element

Objective ED-1 Support economic development by maintaining a strong working relationship with the business community and improving the business climate for current and future businesses.

Objective ED-2 Support local business start-ups and encourage innovation by improving access to resources and capital and help overcome obstacles hampering economic development.

Objective ED-3 Attract and recruit businesses and offer incentives for economic development.

Objective ED-4 Cultivate a skilled, educated, and well-trained workforce by increasing educational attainment and the relevant job skill levels in order to appeal to local and non-local businesses.

Urban Form Element

Objective UF-12 Emphasize the opportunity for a diversity of districts, neighborhoods, and housing types.

Policy UF-1-a **Diverse Neighborhoods.** Support development projects that provide Fresno with a diversity of urban and suburban neighborhood opportunities.

Policy UF-1-d **Range of Housing Types.** Provide for diversity and variation of building types, densities, and scales of development in order to reinforce the identity of individual neighborhoods, foster a variety of market-based options for living and working to suit a large range of income levels, and further affordable housing opportunities throughout the City.

Policy UF-1-e **Unique Neighborhoods.** Promote and protect unique neighborhoods and mixed-use areas throughout Fresno that respect and support various ethnic, cultural and historic enclaves; provide a range of housing options, including furthering affordable housing opportunities; and convey a unique character and lifestyle attractive to Fresnans. Support unique areas through more specific planning processes that directly engage community members in creative and innovative design efforts.

Policy UF-1-f **Complete Neighborhoods, Densities, and Development Standards.** Use Complete Neighborhood design concepts and development standards to achieve the development of Complete Neighborhoods and the residential density targets of the General Plan.

Objective UF-13 Locate roughly one-half of future residential development in infill areas—defined as being within the City on December 31, 2012— including the Downtown core area and surrounding neighborhoods, mixed-use centers and transit-oriented development along major BRT corridors, and other non-corridor infill areas, and vacant land.

Housing Element

Objective H-1 Provide adequate sites for housing development to accommodate a range of housing by type, size, location, price, and tenure.

Policy H-1-a Implement land use policies and standards that allow for a range of residential densities and products that will enable households of all types and income levels the opportunity to find suitable ownership or rental housing.

Policy H-1-b Encourage development of residential uses in strategic proximity to employment, recreational facilities, schools, neighborhood commercial areas, and transportation routes.

Policy H-1-c Promote the development of affordable and special needs housing near transit and/or smart growth areas.

Policy H-5-g Create equitable and affordable housing options throughout the City that provide incentives to residents for finding housing in high opportunity areas and to developers for building affordable housing in high opportunity areas.

Objective H-2 Assist in the development of adequate housing to meet the needs of extremely low-, very low-, low-, and moderate-income households.

Policy H-2-a Facilitate housing development that is affordable to extremely low-, very low-, low-, and moderate-income households by providing technical assistance, regulatory incentives and concessions, and financial resources as funding permits.

Policy H-2-b Encourage both the private and public sectors to produce or assist in the production of housing, with particular emphasis on housing affordable to persons with disabilities, elderly, large families, female-headed households with children, and people experiencing homelessness.

Policy H-2-c Continue to utilize federal and State subsidies to the fullest extent to meet the needs of lower-income residents, including extremely low-income residents.

Policy H-2-d Support regional efforts to address homelessness, including the Fresno- Madera Continuum of Care.

Policy H-2-e Support and coordinate with agencies and service providers offering foreclosure services.

Policy H-2-f Promote and encourage sustainable development and green building practices for all new residential development and for the retrofitting of existing housing.

Objective H-3 Address, and where possible, remove any potential governmental constraints to housing production and affordability.

Policy H-3-a Review and adjust as appropriate residential development standards, regulations, ordinances, departmental processing procedures, and residential fees related to rehabilitation and construction that are determined to be a constraint on the development of housing.

Objective H-5 Continue to promote equal housing opportunity in the City's housing market regardless of age, disability/medical condition, race, sex, marital status, ethnic background, source of income, and other factors.

Policy H-5-a Prohibit discrimination in the sale, rental, or financing of housing based on race, color, ancestry, religion, national origin, sex, sexual orientation, gender identity, age, disability/medical condition, familial status, marital status, source of income, or any other arbitrary factor.

Policy H-5-b Assist in the enforcement of fair housing laws by providing support to organizations that can receive and investigate fair housing allegations, monitor compliance with fair housing laws, and refer possible violations to enforcing agencies.

Policy H-5-c Provide equal access to housing for special needs residents such as people experiencing homelessness, elderly individuals, and persons with disabilities.

Policy H-5-d Promote the provisions of disabled-accessible units and housing for persons with mental and physical disabilities.

Policy H-5-e Ensure that all development applications are considered, reviewed, and approved without prejudice to the proposed residents, contingent on the development application's compliance with all entitlement requirements.

Policy H-5-f Accommodate persons with disabilities who seek reasonable waiver or modification of land use controls and/or development standards pursuant to procedures and criteria set forth in the Development Code.

Policy H-5-g Create equitable and affordable housing options throughout the City that provide incentives to residents for finding housing in high opportunity areas and to developers for building affordable housing in high opportunity areas.

Policy H-5-h Consult with a wide range of groups throughout the community and consider environmental justice issues in the development and update of regulations, guidelines and other local programs.

Policy H-5-I Increase or maintain resources to establish and support outreach, public education and community development activities through community- based and neighborhood organizations.

Fresno Southeast Development Area Specific Plan

The Fresno Southeast Development Area (SEDA) Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to population and housing:

Community Farming and Agriculture Element

Objective CF-1 Conserve strategic farmland outside the Southeast Development Area most likely to sustain economically viable agriculture over the long term. While the efficient, compact development pattern of the SEDA Specific Plan reduces development

pressure on surrounding agricultural land, it must be bolstered by policies that directly limit farmland conversion. These policies require inter-governmental coordination between the cities of Fresno, Sanger, Clovis, Fresno County, and other neighboring cities.

Policy CF-1.2 **Future Growth Planning**. Support planning efforts that channel new growth to areas already committed to urban uses inside the current SOIs of incorporated cities in Fresno County.

Cultural and Historic Resource Policies Element

Objective CR-1 Preserve the region's culturally significant landscapes outside the Southeast Development Area by reducing development pressure on those landscapes.

Policy CR-1.1 **Future Growth**. Channel new growth to areas already committed to urban uses. This includes areas currently inside the Fresno Sphere of Influence (SOI) and those designated as SOI expansion areas in the Fresno General Plan.

Housing Element

Objective HC-1 Mix housing types and designs throughout the Plan Area to respond to the needs of all household types. The Southeast Development Area Specific Plan accommodates a diverse range of household demographics and preferences with housing types that range from higher-density multifamily homes to medium-lot single-family homes.

Policy HC-1.1 **Age in Place Housing**. Plan for housing suitable for different stages of life, including smaller, more affordable units for first-time buyers, singles, young couples, families, and older homeowners, as well as opportunities for multi-generational housing, housing for seniors and long-term care/assisted living facilities.

Policy HC-1.2 **Family Housing.** Encourage the development of housing to larger households and households with children, particularly in areas served by high-capacity transit. The City of Fresno should set targets for the provision of two-plus bedroom homes for purchase and rent.

Policy HC-1.3 **Accessory Dwelling Units**. Allow the development of accessory dwellings or "granny flats" to increase density and affordability while maintaining character.

Policy HC-1.4 **Accessible Housing**. Construct housing with practical features that provide basic access and functionality for people of all ages and various mobility and ambulatory capabilities.

Policy HC-1.5 **Housing Diversity.** Encourage the inclusion of housing opportunities which provide for a range and diversity of housing types.

Objective HC-2 Build housing affordable to all Fresno residents using an array of regulatory, market-based, and other strategies.

Policy HC-2.1 **Provision of Affordable Housing**. Provide funding assistance, partnership support, and take other actions as necessary to support the construction of new affordable housing within the SEDA to meet RHNA-based targets as specified in the City of Fresno General Plan Housing Element.

The Housing Element details a comprehensive set of programs to provide an adequate supply of affordable housing. Programs entail actions by the Planning and Development Department, Fresno Housing (previously known as the Fresno Housing Authority), private and non-profit developers and others as applicable. Current programs include:

- Land use planning to provide for multifamily units, increased housing density, and mixed-use development.
- Actions to construct housing for specific groups, including farmworkers; special needs persons; homeless and recently homeless persons; very low-income large families; extremely low-, very low-, and low-income seniors; and other extremely low- and very low-income households.
- Strengthening partnerships with affordable housing developers.
- Increasing opportunity through an equitable communities program, which calls for location of affordable housing in areas of high opportunity.
- Preventing Displacement.
- Make incentives available to all new residential developments that target at least 25 percent of new units for families earning 80 percent of the area median income or below

For more detailed information, please refer to the Fresno General Plan Housing Element.

Policy HC-2.2 **Publicly Owned Land**. Leverage publicly owned land to provide housing.

- **Land Acquisition:** Consider early purchase of parcels within the SEDA near both community amenities and transit to minimize land acquisition cost.
- **Excess Land:** Consider developing publicly owned lands with 100 percent affordable housing if the public agency deems the land in excess of their needs.
- Consider establishing a community land trust to create a pool of owned affordable housing in perpetuity.

Policy HC-2.3 **Distribution of Housing**. Promote affordable housing opportunities that are distributed throughout the Southeast Development Area to avoid concentration in any one area.

Policy HC-2.4 **Economic Incentives**. Develop economic incentives to encourage private sector developers and residential developments to construct accessible units in excess of the minimums. The State of California Building Code does not require that single-family homes and developments be accessible. This creates a barrier of choice and

options for people with disabilities who wish to purchase homes. The plan calls for this expectation locally as is described in the General Plan. Economic incentives could include density bonuses, parking requirement reductions, and streamlined permitting.

Make incentives available to all new residential developments that target at least 25 percent of new units as accessible.

Policy HC-2.5 **Secure Affordability**. Maintain long-term affordability by using covenants and deeds, equity sharing, and other mechanisms.

Objective HC-3 Link housing and transportation together to limit family expenditures on both housing and transportation. The multimodal transportation network connects housing and jobs within the Southeast Development Area and to other major regional centers, facilitating internal travel by non-automobile means. The Urban Form Chapter addresses the location, distribution, and standards for transportation infrastructure investment, combining transportation options with land use development to ultimately lower travel costs for SEDA residents and employees.

Policy HC-3.1 **Coordinated Land Use and Transportation Planning**. Support regional and citywide planning efforts, such as the Regional Transportation Plan and Sustainable Communities Strategy, the Fresno General Plan, and the City's updated Greenhouse Gas Reduction Plan that encourage the development of housing near new and existing public transportation investments.

Policy HC-3.2 **Travel**. Encourage accessible, mixed-use development that incorporates housing and jobs, while lowering daily vehicle miles traveled.

Policy HC-3.3 **Smart Land Uses**. Build smaller-lot single-family and multifamily housing types which use less energy and water than larger units.

Urban Form Element

Objective UF-1 Create complete neighborhoods in the Southeast Development Area that integrate housing, business and retail amenities. Implement a Southeast Development Area plan that balances and mixes housing, jobs, commercial businesses, services, and public facilities to help meet existing thresholds for lower vehicle miles traveled, reduced air pollution, and the efficient use of groundwater resources in compliance with the Sustainable Groundwater Management Act of 2014.

Policy UF-1.2 **Jobs-Housing Balance**. Maintain a target jobs-housing balance of at least one job to 1.25 housing units within the Plan Area.

Policy UF-1.3 **Employment Centers.** Promote employment-generating development within the Plan Area to expand Fresno's employment base beyond traditional industries (as specified in the policies of Economic Opportunity Chapter, Objective EO-2).

Policy UF-1.4 **Housing Choices.** Encourage housing choices affordable to a range of Fresno residents by implementing the housing policies of the Housing Choice and Affordability Element.

Objective UF-2 Provide a mix of Regional, Community, and Neighborhood Town Centers where individuals can live, work and play.

Policy UF-2.3 **Design & Development Principles.** The following principles are provided to guide the creation of public and private spaces within the Plan Area. More specific guidelines and regulations regarding many of these elements are found in the SEDA Development Code update section of this Chapter.

- **Pattern of streets, blocks, and buildings**. The centers will be designed with pedestrian oriented streets, blocks, buildings, and public spaces based on the block connectivity and size standards specified in the SEDA Development Code update, including a transportation network which will be based on a high-density grid system. Public spaces and civic buildings shall be arranged along streets in order to create a network of civic spaces of varying size and function.

- **Building character and orientation**. The character, massing, and orientation of buildings will contribute to a cohesive urban fabric that reinforces public spaces, creates a sense of intimacy, and visually distinguishes the center from surrounding districts.

As shown in Figure 2.1 regarding building orientation, the front edges of buildings shall meet or approach front and side property lines according to the requirements of the SEDA Development Code update. Visual diversity will be created through variations in setback, massing, and architectural details. In addition, solar exposure and orientation shall be considered in the layout and design of all streets, blocks, and buildings to maximize energy and resource efficiency.

- **Center core.** Each town center will feature a core that provides a common gathering place not only within the center, but surrounding districts as well. The core will accommodate the highest capacity for retail, employment, civic, and pedestrian activity of each center, and will design streets and buildings with pedestrian comfort and visual interest at the forefront.

- **Location and orientation of commercial activity.** Commercial activity is permitted throughout Regional and Community Town Centers, but the highest-intensity commercial uses (and/or ground floor commercial) will be located along all Arterials and Collector Streets and in the core area of the town center. Small convenience retail establishments, such as corner stores, can also occupy a portion of the ground floors of residential and office buildings outside of the core of centers. Ideally, office uses should be clustered around public transit stations and squares.

- **Location and orientation of large-format retail activity.** Large-format retail establishments (i.e., "big box" retail) may be located in the Regional Town Center but are discouraged in Community or Neighborhood Town Centers in order to preserve the local neighborhood character of those areas. The urban design and parking standards of large-format retail stores will be consistent with the standards and policies of these districts. Large-format retail establishments served by surface parking will be located at the edges of the Regional Town Center, preferably adjacent to major regional roadways or highways.

- **Character, location, and orientation of public spaces.** Public gathering places that provide visual relief and passive recreation should be located in the Mixed-Use Districts and should be surrounded by civic buildings and any commercial or mixed-use buildings located in the town center.

- **Location and orientation of civic buildings.** Major civic buildings (e.g., libraries, schools, and government offices) will serve as focal points of public spaces within centers. Providing attention to distinctive building details, entry features and varying setbacks will allow civic buildings to stand out from other structures in the center. Wherever possible, civic buildings will be located in proximity to and open onto public spaces.

3.14.3 - Thresholds of Significance

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts to population and housing are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part, on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would be considered significant if the project would:

a) Induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?

b) Displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere?

3.14.4 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the proposed project and provides mitigation measures where necessary.

Population Growth

Impact POP-1: **The proposed project would not induce substantial unplanned population growth in an area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure).**

Impact Analysis

As discussed in Chapter 2, Project Description, buildout of the proposed project could generate up to approximately 45,000 homes and 37,000 jobs as well as 1,820 acres of employment-generating land uses such as office, research and development, and institutional uses by the year 2050. Based on the average household size in the City of 2.99 persons per household, this anticipated future development could accommodate up to 134,550 residents. The population potential for the Plan Area is within the population growth anticipated by the General Plan, which anticipates growth of up to 226,000 additional residents by 2035, consistent with the proposed project. Accordingly, implementation of the proposed project would not exceed the City's anticipated population growth.

According to the General Plan, the City projects that the total additional residential development capacity by the General Plan's horizon in 2035 would be approximately 76,000 additional dwelling units and by the General Plan's buildout in 2050 would be approximately 145,000 additional dwelling units between both the infill and growth areas.[11] These values constitute the planned growth anticipated by the City for residential units within its SOI. As the proposed project would generate approximately 45,000 new dwelling units by 2050, approximately 31 percent of the total planned capacity for the City, full buildout of the proposed project would be considered planned growth and would provide housing to meet the demand for new residential units.

New jobs in the Plan Area would be created by development of commercial, office, and other employment-generating uses. Growth under the proposed project would occur incrementally over a period of approximately 25 years and would be guided by a policy framework in the proposed project that is generally consistent with many of the principal goals and objectives established in the General Plan and 2015-2023 Housing Element. The proposed project is consistent with Economic Development Objectives ED-1, -2, -3 and -4 that seek to promote employment growth. As the goals and vision of the proposed project are to facilitate new housing and jobs, implementation of the proposed project would support citywide planning efforts. Therefore, this additional growth would be consistent with the citywide planning objectives and would not be considered unplanned growth. Furthermore, as shown in Table 3.14-1 below, the proposed project would promote a balance of jobs and housing in the Plan Area, consistent with the General Plan. As a result, impacts to population

[11] City of Fresno. 2014. General Plan, Table 1-2, Residential Development Capacity Under Horizon and Buildout, and Table 1-3, Residential Development Capacity Under General Plan Horizon. Website: https://cityoffresno.wpenginepowered.com/darm/wp-content/uploads/sites/10/2022/12/upload_temp_Consolidated-GP-10-13-2022.pdf. Accessed January 20, 2023.

growth associated with potential future development under the proposed project would be less than significant.

Table 3.14-1: Projected (2050) Jobs to Housing Ratio for the Planning Area

Housing Units at Buildout	Jobs at Buildout	Job to Housing Ratio
45,000	37,000	1.22
Source: Fresno Council of Governments (Fresno COG). 2021. Fresno County 2050 Growth Projections. Website: https://www.fresnocog.org/project/demographic-data/. Accessed May 20, 2022.		

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Housing Displacement/Replacement Housing

Impact POP-2: The proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere.

Impact Analysis

The proposed project would not displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere. As described in Chapter 2, Project Description, of this Draft PEIR, the proposed project would accommodate up to 45,000 dwelling units of varying types, sizes, densities, and affordability levels at full buildout. Since implementation of the proposed project would result in a net increase in housing, it would not require replacement housing outside of the Plan Area.

Currently, there are 700 residential parcels within the Plan Area, which accommodate 713 single-family homes and 13 mobile homes. No housing is proposed to be demolished under the proposed project, and buildout of the proposed project would not require the demolition of existing housing units to produce new units. Development under the proposed project would be required to comply with the General Plan's Housing Element, which promotes equal housing opportunity in the City's housing market, as well as the proposed project's Housing Element, which provides further specifications regarding housing opportunities, including the provision of an adequate supply of housing and housing types, in the Plan Area.

Furthermore, as the City receives development applications for subsequent development under the proposed project, those applications will be reviewed by the City for compliance with the policies

and objectives of the General Plan and the proposed SEDA Specific Plan to ensure the displacement of housing or significant need for new housing does not occur.

As such, the proposed project would not displace substantial numbers of existing people or housing, necessitating the construction of replacement housing elsewhere, and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.14.5 - Cumulative Impacts

The geographic context for analysis of cumulative impacts related to population, housing, and employment includes the Plan Area, the City boundary and SOI, in combination with impacts from projected growth in the rest of Fresno County and the surrounding region. Impacts from cumulative growth are considered in the context of their consistency with regional planning policies. This analysis evaluates whether impacts of the proposed project, together with impacts of cumulative development, could result in a cumulatively significant impact to public services. This analysis then considers whether the incremental contribution of impacts associated with implementation of the proposed project would be significant. Both conditions must apply for a project's cumulative effects to rise to the level of significance.

The general plans and other planning documents prepared by the jurisdictions within Fresno County would be required to develop land use plans that comply with State law and that would accommodate the existing and forecasted population, similar to the long-range planning guidance included in the proposed project. Consistent with State law, these planning documents would be required to provide adequate housing to accommodate forecasted numbers of people within the jurisdiction, and displaced development, if any, would be replaced primarily within the jurisdiction. Further, new development would be required to address potential environmental impacts as part of individual project review. As such, cumulative development would not induce substantial unplanned population growth, either directly or indirectly. Because cumulative projects would comply with all applicable land use plans to provide adequate development within a jurisdiction, cumulative impacts would be less than significant.

Moreover, the proposed project would not have a cumulatively considerable contribution to the less than significant cumulative impact. As described above, the proposed project would not induce a substantial amount of growth that has not been adequately planned for or require the construction of replacement housing elsewhere. As the projected population growth resulting from the proposed project is within projected growth estimates, the proposed project's contribution to this less than

significant cumulative impact would not be cumulatively considerable. The proposed project would not result in any policies or physical improvements that would result in direct or indirect unplanned regional growth or result in substantial displacement of people or the need to construct additional housing and therefore would not contribute to a cumulative impact. Therefore, the proposed project would not have a cumulatively considerable cumulative impact. Cumulative impacts would be less than significant.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.15 - Public Services

3.15.1 - Introduction

This section describes the existing conditions related to public services in the City of Fresno (City) and Plan Area, as well as the relevant regulatory framework. This section also evaluates the possible impacts related to public services that could result from project implementation of the proposed project. Descriptions and analysis in this section are based, in part, on information provided by the Fresno General Plan (General Plan), the Fresno Fire Department (FFD) website, City of Fresno Fire Department Standard Operating Procedures Manual, City of Fresno Municipal Code (Municipal Code), Fresno County Sheriff's Office website, California Department of Education website, and Fresno County Library website. As further described in Chapter 1*,* Introduction, seven public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to public services:

- Requests that the Draft PEIR analyze whether the number of schools shown is appropriate to adequately serve the Southeast Development Area (SEDA) buildout population.
- States that a new high school (Sanger West) and middle schools serving 7-8 grades would serve SEDA population.
- Recommends that at least one additional high school and one additional middle school would be needed to serve the buildout of SEDA.
- States that any future school site locations designated as part of the Specific Plan should be considered conceptual rather than locked into parcel location.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Plan Area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.15.2 - Environmental Setting

Fire Protection and Emergency Medical Services

Fresno Fire Department

The FFD, headquartered at 911 H Street, provides fire prevention and suppression, emergency medical care, hazardous materials, urban search and rescue, water rescue, emergency preparedness planning, hydrant flow maintenance, and public education coordination services to over 540,000 City residents and the Fig Garden Fire Protection District (FGFPD).[1] The FFD is under contract to provide

[1] City of Fresno Fire Department. Website: https://www.fresno.gov/fire/fire-supression/. Accessed June 7, 2022.

services for the FGFPD through 2035 and participates in automatic aid agreements with the City of Clovis and the Fresno County Fire Protection District through which emergency fire and medical assistance are provided by the nearest available station.[2]

Stations

The FFD operates a total of 21 fire stations, including the Airport Rescue Fire Fighting (ARFF) station located at the Fresno Yosemite International Airport. The Department also provides responses to hazardous material, water rescue, and urban search and rescue incidents through specialized teams. Currently, there are no existing fire stations within the Plan Area. According to the Fresno Municipal Code (Municipal Code), Section 12-4.508-E requires that new residential developments with four or fewer units per building must be within a 5-mile "running distance" of a fire station. The Municipal Code defines running distance as the actual distance that must be traveled on public streets or right-of-way from a fire station to reach the scene of a fire incident. All other developments, including residential developments with more than four units per building, must be located within 3 miles of an existing fire station.[3] As shown in Table 3.15-1 Fresno Fire Stations, Station 15 is the closest to the Plan Area, located roughly 1.92 miles to the west at 6530 East Park Circle Drive. Stations 1, 4, 7, 8, and 10 are located within 5 miles of the Plan Area.[4] The table below shows all fire stations in the City and their distance from the boundary of the Plan Area.

Table 3.15-1: Fresno Fire Stations

Station Number[1]	Address	Distance to Plan Area Boundary (miles)
1*	1264 North Jackson Avenue, Fresno, CA	4.62
2	7114 North West Avenue, Fresno, CA	10.30
3	1406 Fresno Street, Fresno, CA	5.18
4*	3065 East Iowa Avenue, Fresno, CA	6.04
5	3131 North Fresno Street, Fresno, CA	7.04
6	4343 East Gettysburg Avenue, Fresno, CA	5.49
7*	2571 South Cherry Avenue, Fresno, CA	4.01
8*	1428 South Cedar Avenue, Fresno, CA	5.05
9	2340 North Vagedes Avenue, Fresno, CA	8.95
10*	5545 East Aircorp Way, Fresno, CA	2.33
11	5544 North Fresno Street, Fresno, CA	7.30
12	2874 West Acacia Avenue, Fresno, CA	10.56

[2] City of Fresno Fire Department. 2019. Standard Operating Procedures Manual, Section 210.001 Automatic Aid Agreements. Website: https://documents.fresno.gov/WebLink/DocView.aspx?id=4602904&dbid=0&repo=LF-Repository&cr=1. Accessed June 17, 2022.

[3] City of Fresno. 2023. City of Fresno Municipal Code, Section 12-4.508-E. Website: https://library.municode.com/ca/fresno/codes/code_of_ordinances?nodeId=MUCOFR_CH12IMFEHIREOTMITO_ART4.5URGRMA_S12-4.508UGFIST. Accessed March 22, 2023.

[4] City of Fresno Fire Department. 2022. Station Locations web page. Website: http://www.fresno.gov/fire/station-locations/. Accessed June 8, 2022.

Station Number[1]	Address	Distance to Plan Area Boundary (miles)
13	815 East Nees Avenue, Fresno, CA	7.75
14	6239 North Polk Avenue, Fresno, CA	13.31
15*	5630 East Park Circle Drive, Fresno, CA	1.92
16	2510 North Polk Avenue, Fresno, CA	12.48
17	10512 North Maple Avenue, Fresno, CA	8.64
18	5938 North La Ventana Avenue, Fresno, CA	14.57
19	3187 West Belmont Avenue, Fresno, CA	10.28
20	4537 North Wishon Avenue, Fresno, CA	8.26
ARFF[2]*	5065 East Andersen Avenue, Fresno, CA	3.24

Notes:
[1] An asterick indicates that the fire station is within in 5 miles of the Plan Area boundary.
[2] ARFF indicates the Airport Rescue Fire Fighting station
Source: Fresno Fire Department (FFD) 2022.

Equipment and Staffing

FFD employs approximately 401 personnel including 347 uniformed firefighter members, 25 sworn non-safety staff, and 29 civilian members. As of July 2022, the Fire Department is staffed with 95 members on duty daily within the City and FGFPD, and the City aims to bring this number to 103 on-duty firefighters each day.[5] National Fire Protection Association (NFPA) 1710 standards identify minimum company staffing as four firefighters on duty per engine company, and four firefighters on duty per truck company.[6] Department resources include 19 engine companies, five truck companies, and two aircraft rescue firefighting units. Additional resources including two water rescue vehicles, one HazMat unit, and one Heavy Urban Search and Rescue (USAR) unit are cross staffed at three stations. Department staff and resources are divided across four battalions, each managed by a Battalion Chief. As of 2022, Fresno employed 0.62 firefighters per 1,000 residents, lower than the Statewide average of 0.82 firefighters per 1,000 residents.[7]

Average Response Times

FFD has identified a target response time that is in line with the NFPA 1710 standards. NFPA standards dictate the first firefighting company should arrive within 4 minutes, while an effective firefighting force (EFF) or a commercial EFF should arrive within 8 minutes 90 percent of the time. An EFF for a residential fire consists of 15 firefighters and a commercial EFF consists of 21 firefighters on scene. According to the FFD 2021 Annual Report the Department met the 4-minute response time

[5] City of Fresno. 2021. Adopted Fiscal Year 2022 Budget. Website: https://www.fresno.gov/finance/wp-content/uploads/sites/11/2021/10/FY2022AdoptedBudgetLINKS.pdf. Accessed June 15, 2022.
[6] International Association of Fire Fighters (NFPA). NFPA Standard 1710 Organization and Deployment of Fire Suppression Operations, EMS and Special Operations in Career Fire Departments. Website: https://www.iaff.org/wp-content/uploads/Departments/Fire_EMS_Department/30541_Summary_Sheet_NFPA_1710_standards.pdf. Accessed June 17, 2022.
[7] Fresno Fire Department (FFD). 2022. Fresno Fire Department 2022 Annual Report. Website: https://www.fresno.gov/fire/wp-content/uploads/sites/6/2023/01/2022-Annual-Report.pdf. Accessed March 22, 2023.

72 percent of the time, while an EFF was assembled within 8 minutes 87 percent of the time, and commercial EFF 88 percent of the time, falling short of target response times.[8]

Impact Fees

Development within the City creates demands on exisiting municipal facilities, improvements, and services. Thus, various development fees and charges are imposed on new development in order to mitigate such demands. Payment of those fees and charges is required at various stages of the development process. The Development Fee Deferral Ordinance of the City of Fresno, Article 4.6 of the Municipal Code, regulates the payment of fees prescribed by the City's Zoning Ordiance.

Section 12-4.901 of the Municipal Code states the development fees for fire facilities. The City Council established a Fire Facilities Fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements. Table 3.15-2 below lists the fire facilities fees required by new development based on development type according to the City's Master Fee Schedule.[9]

Table 3.15-2: Fire Facilities Impact Fee

Development Type	Fee
Single-family Residential	$2,285 per unit
Multi-family Residential	$1,743 per unit
Industrial	$344per 1,000 square feet
Commercial Retail	$602 per 1,000 square feet
Commercial Office	$688 per 1,000 square feet
Source: City of Fresno 2019.	

Additionally, Section 12-4.10 of the Municipal Code states the development fees for street facilities. These fees also support fire facilties by ensuring that roadways meet City standards and support FFD vehicles. The City Council established the street facilties fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements. Based on this determination, Council adopted, by resolution amending the Master Fee Schedule, a Citywide Regional Street Impact Fee (Citywide Street Fee) and a New Growth Area Major Street Fee (Growth Area Street Fee). Council adopts this Article to require the imposition of these street facilities fees on new development in the City. Table 3.15-3 below lists the Citywide

[8] Fresno Fire Department (FFD). 2021. Fresno Fire Department 2021 Annual Report. Website: https://www.fresno.gov/fire/wp-content/uploads/sites/6/2022/02/2021-Annual-Report-final.pdf. Accessed June 17, 2022.

[9] City of Fresno. FY 2020 City of Fresno Development Impact Charge and Fee Summary. Website: https://www.fresno.gov/publicworks/wp-content/uploads/sites/17/2019/10/2019-City-of-Fresno-Fee-Summary.pdf. Accessed June 17, 2022.

Regional Street Fees required by new development based on development type according to the City's Master Fee Schedule.[10]

Table 3.15-3: Street Facilities Fees

Development Type	Fee Type	Fee Amount
Single-family Residential	Citywide Street Fee	$8,038 per street adjacent acre
	Growth Area Street Fee	$22,126 per street adjacent acre
Multi-family Residential	Citywide Street Fee	$15,607 per street adjacent acre
	Growth Area Street Fee	$42,999 per street adjacent acre
Light Industrial	Citywide Street Fee	$4,281 per street adjacent acre
	Growth Area Street Fee	$12,198 per street adjacent acre
Heavy Industrial	Citywide Street Fee	$2,631 per street adjacent acre
	Growth Area Street Fee	$7,401 per street adjacent acre
Commercial Retail	Citywide Street Fee	$14,213 per street adjacent acre
	Growth Area Street Fee	$39,941 per street adjacent acre
Commercial Office	Citywide Street Fee	$15,054 per street adjacent acre
	Growth Area Street Fee	$37,805 per street adjacent acre
Source: City of Fresno 2019.		

Police Protection

City of Fresno Police Department

The Fresno Police Department (FPD), headquartered at 2323 Mariposa Street, provides police services including uniformed patrol response to emergeny and non-emergency calls, crime prevention, pro-active tactical crime enforcement, and investigation of crimes. The FPD operates four divisions: the Patrol Division, the Investigation Division, the Support Division, and the Administration Division. The FPD operates out of five policing districts: the Southwest Policing District, the Central Policing District, the Southeast Policing District, the Northeast Policing District, and the Northwest policing district. The Plan Area lies partially within the Southeast Policing District which is located to the east of North 1st Street and South Railroad Avenue, and to the south of Ashlan Avenue and East Clinton Avenue to the southern city limits. The Southwest Policing District is located South of East McKinley Avenue and west of South 1st Street and South Railroad Avenue; the Central Police Dsitrict is located between North 1st Street to the east, the Union Pacific railway tracks to the west, East Ashland Avenue to the north, and East Belmont Avenue to the south; the Northeast Policing District is located between North Blackstone Avenue to the west and North Willow Avenue to the east, and is bounded by East McKinley Avenue to the South and the San Joaquin River to the north; and the Northwest Policing District is located to the west of North Blackstone Avenue, and

[10] City of Fresno. FY 2020 City of Fresno Development Impact Charge and Fee Summary. Website: https://www.fresno.gov/publicworks/wp-content/uploads/sites/17/2019/10/2019-City-of-Fresno-Fee-Summary.pdf. Accessed June 17, 2022.

bounded by the San Joaquin River to the north, East Ashlan Avenue and West McKinley Avnue to the south, and extends to the western city limits.[11]

Other Law Enforcement Agencies

The Fresno County Sheriff's Office (Sheriff's Office) provides law enforcement and crime prevention services to the unicorporated areas of metropolitan Fresno County. This includes rural outlying areas to the east, south, and west of the City. The Sheriff's Office service area is divided into four Patrol Areas, with Patrol Area 2 serving the communities of Calwa, Malaga, Mayfair, Sunnyside, Fig Garden, and Tarpey.[12] Patrol Area 2 is bounded by the San Joaquin River to the north and American Avenue to the south, and from Chatea Fresno east to McCall Avenue, which borders the Plan Area's eastern-most boundary. The California Highway Patrol, Fresno State Police Department, and the Fresno City College Department also provide law enforcement services in the Fresno area.

Stations

The FPD operates one police station in each of its five policing districts in addition to the Fresno Police Headquarters, for a total of six police stations within the City. The Plan Area lies partially within the Southeast Policing District, with officers operating out of the Southeast Policing District station located at 1617 South Cedar Avenue. A full list of the City's police stations is below:

- Fresno Police Headquarters: 2323 Mariposa Street, Fresno, CA
- Southwest Policing District: 1211 Fresno Street, Fresno, CA
- Southeast Policing District: 1617 South Cedar Avenue, Fresno, CA
- Northeast Policing District: 1450 Eeast Teague Avenue, Fresno, CA
- Northwest Policing District: 3781 North Hughes Avenue, Fresno, CA
- Central Policing District: 3502 North Blackstone Avenue, Fresno, CA

The Plan Area lies within the Fresno County Sheriff's Office Patrol Area 2, with a Sheriff's Office located 1.97 miles to the northwest of the Plan Area at 5717 East Shields Avenue, Fresno, CA.[13]

Equipment, Staffing, and Calls for Service

The City has a target staffing ratio of 1.5 unrestricted officers per 1,000 City residents.[14] According to the Fiscal Year 2022 Adopted Budget, the Department's sworn staff will increase to 850, the highest in FPD history.[15] The FPD provides additional services and staffs special units including Explosive Ordinance Disposal Unit, Internal Affairs, K9 Unit, Mounted Patrol, Skywatch, Specialized Weapons and Tactics (SWAT), and the Records Bureau. According to the 2020 Fresno Police Department

[11] City of Fresno. Website: https://www.fresno.gov/police/policing-district-locator/. Accessed June 8, 2022

[12] Fresno County Sheriff's Office. Website: https://www.fresnosheriff.org/units/enforcement/patrol-areas/area-2.html. Accessed June 9, 2022.

[13] Fresno County Sheriff's Office. Fresno County Sheriff's Office Area 2. Website: https://www.fresnosheriff.org/images/PatrolAreas/A2Cities.pdf. Accessed January 17, 2022.

[14] LSA. 2020. Fresno General Plan Public Review Draft Program Environmental Impact Report, Section 4.15 Public Services and Recreation, Page 4.15-5.

[15] City of Fresno. 2022. Adopted Fiscal Year 2022 Budget, Page B-139. Website: https:// www.fresno.gov/finance/wp-content/uploads/sites/11/2021/10/FY2022AdoptedBudgetLINKS.pdf. Accessed June 17, 2022.

Annual Report, FPD fielded over 350,000 calls for service, with an average of over 959 calls for service per day.[16]

Impact Fees

As previously discussed, development within the City creates demands on exisiting muncial facilities, improvements, and services. Thus, various development fees and charges are imposed on new development in order to mitigate such demands. Payment of those fees and charges is required at various stages of the development process. The Development Fee Deferral Ordinance of the City of Fresno, Article 4.6 of the Municipal Code, regulates the payment of fees prescribed by the City's Zoning Ordiance.

Section 12-4.801 of the Municipal Code states the development fees for police facilities. The City Council established a Police Facilities Fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements. Table 3.15-4 below lists the fire facilities fees required by new development based on development type according to the City's Master Fee Schedule.[17]

Table 3.15-4: Police Facilities Impact Fee

Development Type	Fee
Single-family Residential	$618 per unit
Multi-family Residential	$466 per unit
Industrial	$313 per 1,000 square feet
Commercial Retail	$658 per 1,000 square feet
Commercial Office	$626 per 1,000 square feet
Source: City of Fresno 2019.	

Additionally, as discussed above, Section 12-4.10 of the Municipal Code states the development fees for street facilities. These fees also support police facilties by ensuring that roadways meet City standards and support FPD vehicles. The City Council established the street facilties fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements, as further described in Table 3.15-3 above.

Schools

The City is served by multiple school districts: Fresno Unified School District (FUSD), Clovis Unified School District (CUSD), Central Unified School District (Central USD), Sanger Unified School District (Sanger USD), and Washington Unified School District. The majority of the City is served by the FUSD, while the CUSD serves areas of the City north of Herndon Avenue and east of the Fresno Yosemite

[16] Fresno Police Department (FPD). 2020. Fresno Police Department 2020 Annual Report. Website: https://www.fresno.gov/police/wp-content/uploads/sites/5/2021/05/28947-2020AnnualReport-FINAL-2.pdf. Accessed June 17, 2022.

[17] City of Fresno. FY 2020 City of Fresno Development Impact Charge and Fee Summary. Website: https://www.fresno.gov/publicworks/wp-content/uploads/sites/17/2019/10/2019-City-of-Fresno-Fee-Summary.pdf. Accessed June 17, 2022.

International Airport, the Central USD serves north and northwestern portions of the City, the Sanger USD serves the southeastern area of the City, and a large portion of the southwest portion of the City is served by the Washington USD.

School District and Schools in the Area

The Plan Area would be served by both the Sanger USD and CUSD, both of which provide kindergarten through twelfth grade classes. The Plan Area encompasses two elementary schools: Lone Star Elementary in the Sanger USD and Young Elementary in the CUSD.[18, 19] Table 3.15-5 below features all existing schools within the Plan Area.

Table 3.15-5: School Districts and Schools in the Project Area

School District	School Name	Address
Sanger Unified School District	Lone Star Elementary School	2617 South Fowler Avenue, Fresno, CA
Clovis Unified School District	Young Elementary School	3140 North Locan Avenue, Fresno, CA
Sources: SchoolSite Locator, 2022; Clovis Unified School District (CUSD) 2022.		

Enrollment

Table 3.15-6 below shows the enrollment by grade for the 2021-2022 school year in the Sanger USD and in the CUSD as a whole as well as in Lone Star Elementary School and Young Elementary School.[20]

Table 3.15-6: School District and School Enrollment by Grade

School District	School	Elementary School (Grades K-6)	Middle School (Grades 7-8)	High School (Grades 9-12)	Total Enrollment
Sanger Unified School District	Lone Star Elementary	569	0	0	569
	District Total	7,119	1,989	3,965	13,087
Clovis Unified School District	Young Elementary School	639	0	0	639
	District Total	22,118	6,704	13,835	42,669
Source: California Department of Education 2021.					

[18] SchoolSite Locator. 2022. Sanger USD web page. Website: https://portal.schoolsitelocator.com/apps/ssl/?districtcode=79027. Accessed June 17, 2022.

[19] Clovis Unified School District (CUSD). 2022. Clovis Unified Boundary Map. Website: https:// maps.cusd.com/address/. Accessed June 17, 2022.

[20] California Department of Education. 2021. DataQuest, 2021-2022 Enrollment by Grade. Website: https://dq.cde.ca.gov/dataquest. Accessed June 9, 2022.

Student Generation Rates

As discussed in Section 2.0, *Project Description*, and Section 3.14, *Population and Housing*, the existing population in Plan Area is estimated to contain approximately 2,171 persons. According to the General Plan, the Plan Area is expected to be built out with approximately 15,000 housing units by 2035, resulting in a total population of 44,850. The Plan Area's total housing capacity is 45,000 housing units, resulting in a total population of approximately 134,550. To determine the number of students that would be generated by the proposed project, the State provides a housing unit yield of 0.7 students per unit.[21] Therefore, the proposed project would be expected to generate approximately 10,500 students by 2035 and could generate up to 31,500 students at total buildout.

School Impact Fees

As discussed above, Section 12-4.10 of the Municipal Code states the development fees for street facilities. These fees support school facilties by ensuring that roadways meet City standards and provide safe roadways for students and families. The City Council established the street facilties fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements, as further described in Table 3.15-3 above.

Parks

The Parks Master Plan was updated in 2017 pursuant to General Plan Parks, Open Space and Schools Element Policy POSS-1-b. As shown in Table 3.15-7 the General Plan classifies five different park types based on acreage and service area: pocket park, neighborhood park, community park, regional park, and greenbelts/trails.[22] The City also has joint-use agreements that allow select school and basin sites to be used for recreation by the public during certain times, including Fresno Metropolitan Flood Control District (FMFCD) stormwater retention and detention basins.

Table 3.15-7: City of Fresno Park Types

Park Type	Typical Size	Service Area
Pocket Park	0.5 to 2 acres	Up to 0.5 mile
Neighborhood Park	2.01 to 10 acres	Up to 1 mile radius
Community Park	10.01 to 40 acres	Up to 4 mile radius
Regional Park	More than 40 acres[1]	100,000 residents
Greenbelts/Trail	Varies	Entire City

Notes:
[1] Parks that are less than 40 acres may be considered a Regional Park if a unique recreational opportunity, such as river access, is provided.
Source: City of Fresno 2014.

[21] Office of Public School Construction. 2019. School Facility Program Handbook.
[22] City of Fresno. 2014. Fresno General Plan, Chapter 5 Parks, Open Space, and School, Page 5-7.

Existing Parks and Recreation Facilities

The existing Fresno Park System consists of more than 80 parks including pocket parks, public grounds, neighborhood parks, community parks, regional parks, and special use facilities. The Plan Area does not encompass any parks. The nearest park to the Plan Area, Al Radka Park, is located 1.25 miles to the west of the Plan Area boundary.

Service Standards

The General Plan has established service standards by park type. These standards are 3 acres per 1,000 residents for pocket parks, neighborhood parks, and community parks; and 2 acres per 1,000 residents for regional parks, open space/natural areas, and special use parks. As Fresno's population increases the amount of park land must increase to maintain the established Level of Service (LOS) standards. Fresno must increase its park lands by 1,095 acres in order to meet the LOS goals for current population, and by 1,751 acres to meet the needs of the projected 2035 population.[23]

Impact Fees

As previously discussed, development within the City creates demands on exisiting municipal facilities, improvements, and services. Thus, various development fees and charges are imposed on new development in order to mitigate such demands. Payment of those fees and charges is required at various stages of the development process. The Development Fee Deferral Ordinance of the City of Fresno, Article 4.6 of the Municipal Code, regulates the payment of fees prescribed by the City's Zoning Ordiance.

Secton 12-4.701 of the Municipal Code describes the park facilities fees for new development. The Municipal Code states that in order to implement the goals and objectives of the City's General Plan, and to mitigate the impacts caused by future development in the City, certain park facilities must be constructed. The City Council has determined that a Park Facilities Fee is needed in order to pay for (a) land acquisition for, and design, engineering, and construction of the public facilities designated in the Council resolution and reasonable costs of outside consultant studies related thereto; (b) to reimburse the City for designated public facilities construction by the City with funds (other than gifts or grants) from other sources together with accrued interest; (c) to reimburse developers who have designed and constructed designated public facilities which are oversized and supplemental size, length, or capacity; and/or (d) to pay for and/or reimburse costs of program development and ongoing administration of the Park Facilities Fee program. Table 3.15-8 below lists the park facilities fees required by new development based on development type according to the City's Master Fee Schedule.[24]

[23] City of Fresno. 2017. Fresno Parks Master Plan, Introduction, Page 11 Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2018/05/FresnoPMPFinalDocumentwithAppA051818.pdf. Accessed June 17, 2022.

[24] City of Fresno. 2019. FY 2020 City of Fresno Development Impact Charge & Fee Summary. Website: https://www.fresno.gov/publicworks/wp-content/uploads/sites/17/2019/10/2019-City-of-Fresno-Fee-Summary.pdf. Accessed June 17, 2022.

Table 3.15-8: Park Facilities Fees

Development Type	Park Facility Impact Fee	Quimby Parkland Dedication Fee
Single-family Residential	$5,108 per unit	$1,542 per unit
Multi-family Residential	$3,852 per unit	$1,164 per unit
Single-family Residential with Quimby obligation satisfied	$3,566 per unit	N/A
Multi-family Residential with Quimby obligation satisfied	$2,688 per unit	N/A
Source: City of Fresno, 2022.		

As discussed above, Section 12-4.10 of the Municipal Code states the development fees for street facilities. These fees support school facilties by ensuring that roadways meet City standards and provide safe roadways for students and families. The City Council established the street facilties fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements, as further described in Table 3.15-3 above.

Other Public Facilities

Libraries

The Fresno County Library System provides collections and services via 39 library branches and its Central Resource Library. The Fresno County Public Library is part of the San Joaquin Valley Library System (SJVLS), a library consortium of 10 public library jurisdictions across Fresno, Kern, Kings, Madera, Mariposa, Merced, and Tulare counties.[25,26,27]

- Woodward Park Regional Library, 994 East Perrin Avenue, Fresno, CA
- Pinedale Branch Library, 7170 North San Pablo Avenue, Pinedale, CA
- Clovis Regional Library, 1155 5th Street, Clovis, CA
- Politi Branch Library, 5771 North 1st Street, Fresno, CA
- Betty Rodriguez Regional Library, 3040 North Cedar Avenue, Fresno, CA
- Sunnyside Regional Library, 5566 East Kings Canyon Road, Fresno, CA
- Mosqueda Branch Library, 4670 East Butler Avenue, Fresno, CA
- Talking Book Library for the Blind, 770 North San Pablo Avenue, Fresno, CA
- Fig Garden Regional Library, 3071 West Bullard Avenue, Fresno, CA
- Gillis Branch Library, 629 West Dakota Avenue, Fresno, CA
- Central Library, 106 East Shields Avenue, Fresno, CA
- West Fresno Branch Library, 188 East California Avenue, Fresno, CA

[25] Fresno County Public Library. Website: http://www.fresnolibrary.org/about/index.html. Accessed June 9, 2022.;
[26] San Joaquin Valley Library System. Website: https://www.sjvls.org/about. Accessed June 9, 2022.
[27] Fresno County Public Library. Map of Fresno Clovis Metro-Area. Website: http://www.fresnolibrary.org/branch/metro.html. Accessed June 9, 2022.

Library Location

There are no libraries located within the Plan Area. The nearest libraries to the Plan Area are the Sunnyside Regional Library and the Sanger Branch Library. The Sunnyside Regional Library is located at 5566 East Kings Canyon Road in the Sunnyside Square Shopping Center approximately 2.01 miles west of the Plan Area boundary. The Sanger Branch Library is located at 1812 7th Street, 3.60 miles to the east of the Plan Area boundary.

Hospitals

As is shown in Table 3.15-9 there are eight hospitals located within the City, with three providing emergency medical services and one providing Level 1 trauma services. Community Regional Medical Center, located in Downtown Fresno, provides the most comprehensive medical services, including the metropolitan area's only Level 1 trauma center.[28, 29]

Table 3.15-9: City of Fresno Hospitals

Hospital Name	Address (Fresno)	Services	Capacity
Fresno Surgical Hospital	6125 North Fresno Street	General Acute Care Hospital	27 Beds
Fresno Heart and Surgical Hospital	15 East Audubon Drive	General Acute Care Hospital, Cardiac, Vascular, and Bariatric Surgical Services	57 Beds
St. Agnes Medical Center	1303 East Herndon Avenue	General Acute Care Hospital, Basic Emergency Services	436 Beds
Kaiser Foundation Hospital - Fresno	7300 North Fresno Street	General Acute Care Hospital, Basic Emergency Services	169 Beds
Community Regional Medical Center	2823 Fresno Street	General Acute Care Hospital, Comprehensive Emergency Services, Neuroscience Institute, Level 3 Neonatal ICU, Level 1 Trauma and Comprehensive Burns Center	689 Beds
Community Behavioral Health Center	7171 North Cedar Avenue	Inpatient and outpatient acute psychiatric care	61 Beds
Community Subacute and Transitional Care Center	3003 North Mariposa Street	Chronic Subacute Conditions	106 Beds
San Joaquin Valley Rehabilitation Hospital	7173 North Sharon Avenue	Outpatient and Inpatient Rehabilitation Services	62 Beds
Sources: The Office of Statewide Health Planning and Development 2020; City of Fresno 2020.			

[28] The Office of Statewide Health Planning and Development. 2020. Facility Finder. Website: www.oshpd.ca.gov/facility‐finder/. Accessed June 9, 2022.

[29] City of Fresno. 2020. Fresno General Plan Public Review Draft Program Environmental Impact Report, Section 4.15 Public Services and Recreation, Page 4.15-10.

Hospital Location

There are no hospitals located within the Plan Area. The nearest hospital to the Plan Area, the Clovis Community Medical Center, lies outside of the City. Clovis Community Medical Center is located at 2755 Herndon Avenue in the City of Clovis, approximately 3.46 miles north of the Plan Area. The hospital is licensed as a General Acute Care Hospital and provides basic emergency room services with a capacity of 208 beds.

3.15.3 - Regulatory Framework

State

California Health and Safety Code

California Health and Safety Code, Sections 13100–13135, establish the following policies related to fire protection:

13100.1 The functions of the office of the State Fire Marshall, including CAL FIRE, shall be to foster, promote, and develop strategies to protect life and property against fire and panic.

13104.6 The Fire Marshall has the authority to require fire hazards to be removed in accordance with the law relating to removal or public nuisances on tax-deeded property.

California Senate Bill 50

SB 50 (funded by Proposition 1A, approved in 1998) limits the power of cities and counties to require mitigation of school facilities impacts as a condition of approving new development, and provides instead for a standardized developer fee. SB 50 generally provides for a 50/50 State and local school facilities funding match. SB 50 also provides for three levels of statutory impact fees. The application level depends on whether State funding is available, whether the school district is eligible for State funding, and whether the school district meets certain additional criteria involving bonding capacity, year-round school, and the percentage of movable classrooms in use.

California Government Code, Section 65995(b) and Education Code, Section 17620

SB 50 amended Section 65995 of the California Government Code, which contains limitations on Section 17620 of the Education Code, the statute that authorizes school districts to assess development fees within school district boundaries. Section 65995(b)(3) of the Government Code requires the maximum square footage assessment for development to be increased every 2 years, according to inflation adjustments. On January 22, 2014, the State approved increasing the allowable amount of statutory school facilities fees (Level I School Fees) from $3.20 to $3.36 per square foot of assessable space for residential development of 500 square feet or more, and from $0.51 to $0.54 per square foot of chargeable covered and enclosed space for commercial/industrial development. School districts may levy higher fees if they apply to the State and meet certain conditions.

Local

Fresno General Plan

The General Plan outlines a long-range vision for the physical development of the City that reflects the community's vision to preserve the desirable qualities of the existing community while encouraging the aspirations of the community. The following objectives, policies, and programs are related to public services:

Urban Form, Land Use, and Design

Land Use

Objective LU-11 Encourage coordination with adjacent jurisdictions in providing public services, infrastructure and cooperative economic development.

Policy LU-11-c **General Plan Consistency**. Pursue coordinated planning and development project reviews with relevant federal, State, and local public agencies to ensure consistency with this General Plan

Public Utilities and Services Element

Police Protection Services

Objective PU-1 Provide the level of law enforcement and crime prevention services necessary to matinain a safe, secure, and stable urban living environment through a Police Department that is dedicated to providing professional, ethical, efficient, and innovative service with integrity, consistency and pride.

Policy PU-1-b **Involvement in General Plan.** Facilitate Police Department participation in the implementation of General Plan policies, including citizen participation efforts and the application of crime prevention design measures to reduce the exposure of neighborhoods to crime and to promote community security

- Facilitate Police Department communication with citizen advisory committees.
- Refer appropriate development entitlements to the Police Department for review and comment.

Policy PU-1-c **Safety Considerations in Development Approval.** Continue to identify and apply appropriate safety, design and operational measures as conditions of development approval, including, but not limited to, State control measures, lighting and visibility of access points and common areas, functional and secure on-site recreational and open space improvements within residential developments, and use of State licensed, uniformed security.

Policy PU-1-d **New Police Station Locations.** Considerations will be given to co-locating new police station facilities with other public property including, but not limited to, schools, parks, playgrounds, and community centers to create a synergy of participation in the neighborhood with the potential result of less vandalism and promotion of a better sense of security for the citizens using these facilities.

Fire Protection Services

Objective PU-2 Ensure that the Fire Department's staffing and equipment resources are sufficient to meet all fire and emergency service level objectives and are provided in an efficient and cost effective manner.

Policy PU-2-b **Maintain Ability**. Strive to continually maintain the Fire Department's ability to provide staffing and equipment resources to effectively prevent and mitigate emergencies in existing and new high-rise buildings and in other high-density residential and commercial development throughout the City.

Policy PU-2-d **Station Siting.** Use the General Plan, community plans, Specific Plans, neighborhood plans, and Concept Plans, the City's Geographic Information Systems (GIS) database, and a fire station location program to achieve optimum siting of future fire stations.

Policy PU-2-g **Community Facilities District for Emergency Services.** Develop strategies on the formation of Community Facilities Districts in new Development Areas to fund emergency services.

Objective PU-3 Enhance the level of fire protection to meet the increasing demand for services from an increasing population.

Policy PU-3-a **Fire Prevention Inspections.** Develop strategies to enable the performance of annual fire and life safety inspection of all industrial, commercial, institutional, and multi-family residential buildings, in accordance with nationally recognized standards for the level of service necessary for a large Metropolitan Area, including a self-certification program.

Policy PU-3-d **Review Development Applications**. Continue Fire Department review of development applications, provide comments and recommend conditions of approval that will ensure adequate on-site and off-site fire protection systems and features are provided.

Policy PU-3-e **Building Codes.** Adopt and enforce amendments to construction and fire codes, as determined appropriate, to systemically reduce the level of risk to life and property from fire, commensurate with the City's fire suppression capabilities.

Policy PU-3-f **Adequate Infrastructure.** Continue to pursue the provision of adequate water supplies, hydrants, and appropriate property access to allow for adequate fire suppression throughout the City.

Policy PU-3-g **Cost Recovery**. Continue to evaluate appropriate codes, policies, and methods to generate fees or other sources of revenue to offset the ongoing personnel and maintenance costs of providing fire prevention and response services.

Policy PU-3-I **New Fire Station Locations.** Consideration will be given to co-locating new Fire Station facilities with other public property including, but not limited to, police

substations, schools, parks, playgrounds, and community centers to create a synergy of participation in the neighborhood with the potential result of less vandalism and promotion of a better sense of security for the citizens using these facilities.

Parks, Open Space, and Schools Chapter

Schools

Objective POSS-8 Work cooperatively with school districts to find the appropriate locations for schools to meet the needs of students and neighborhoods.

Policy POSS-8-b Appropriate School Locations. Support school locations that facilitate safe and convenient access by pedestrian and bicycle routes, are compatible with surrounding land uses, and contribute to a positive neighborhood identity and Complete Neighborhoods. Commit to the following:

- Work with representatives of public and private schools during the preparation and amendment of plans and the processing of development proposals to ensure that General Plan policies are implemented.
- Require school districts to provide necessary street improvements, pedestrian facilities, public facilities, and public services at each new school site as authorized by law.
- Continue to designate known school sites on the Land Use Diagram (Figure LU-1), and in community plans, Specific Plans, and other plans compatible with the locational criteria of each school district, and to facilitate safe and convenient walking and biking to schools in neighborhoods.
- Meet regularly with school district staff and trustees to provide ongoing communication and coordination of plans, projects, and priorities.
- Collaborate with school districts to plan and implement new school sites in a manner that supports and reinforces objectives to develop walkable Complete Neighborhoods.

Policy POSS-8-c Park and School Site Coordination. Pursue the cooperative development and use of school sites with adjacent neighborhood parks for both school activities and non-school related recreational activities.

Parks and Recreation

Objective POSS-1 Provide an expanded, high quality and diversified park system, allowing for varied recreational opportunities for the entire Fresno community.

Policy POSS-1-a Parkland Standard. Implement a standard of at least three acres of public parkland per 1,000 residents for Pocket, Neighborhood, and Community parks throughout the City, while striving for five acres per 1,000 residents for all parks throughout the City, subject to identifying additional funding for regional parks and trails.

Policy POSS-1-b **Parks Implementation Planning**. Conduct ongoing planning to implement park policies established in this General Plan and continue to strive for well-maintained and fully accessible playgrounds, with accessible amenities, throughout the City.

- Keep an up-to-date inventory of existing and planned parks, including locations mapped on the Parks and Open Space Diagram;
- Plan for acquiring new parkland designated in the General Plan, as shown in Figure POSS-1;
- Establish a standard protocol for working with new development to arrange for parkland acquisition and dedication;
- Establish a protocol for working with established neighborhoods to provide needed parks, including the fostering of neighborhood and district associations to help plan, acquire, improve and care for public parks, and coordinating new City service facilities to provide new open space;
- Establish detailed design, construction, and maintenance standards;
- Prepare an assessment of the recreation needs of existing and future residents;
- Create an action plan defining priorities, timeframes, and responsibilities;
- Adopt and implement a comprehensive financing strategy for land acquisition, park development, operations, and maintenance;
- Identify opportunities for using existing or planned park space as passive stormwater storage, treatment, and conservation areas that also provide scenic and/or recreational opportunities;
- Identify opportunities for siting and using existing or planned park space as passive “purple pipe” waste water storage, treatment, and conservation areas that also provide scenic and/or recreational opportunities; and
- Update the Parks Master Plan.

Policy POSS-1-c **Public Input in Park Planning.** Continue to provide opportunities for public participation in the planning and development of park facilities and in creation of social, cultural, and recreational activities in the community.

Policy POSS-1-d **Additional Parkland in Certain Areas**. Strive to obtain additional parkland of sufficient size to adequately serve underserved neighborhood areas and along BRT corridors in support of new and intense residential and mixed use infill development.

- Identify, where appropriate, joint-use opportunities in siting parks with other City service facility needs.

Policy POSS-1-e **Criteria for Parks in Development Areas**. Continue to use park size and service area criteria for siting new parks and planning for parks in Development Areas:

Park Type	Size Range (Acreage)	Population Served	Service Area Radius
Neighborhood	2.01 to 10	10,000 – 15,000	Up to 1 mile
Community	10.01 to 40	50,000 – 80,000	Up to 4 miles
Regional	More than 40[a]	100,000	100,000 residents

Notes:
a Or when amenities provide regional service

Policy POSS-1-f **Parks and Open Space Diagram.** Require parks to be sited and sized as shown on the Parks and Open Space Diagram (Figure POSS-1) of the General Plan, subject to the following:

- All new park designations carry dual land use designations, so that if a park is not needed, private development consistent with zoning and development standards may be approved. (See Figure LU-2: Dual Designation Diagram in the Urban Form, Land Use, and Design Element).
- Revised and/or additional park sites will be identified through subsequent implementation and planning in established neighborhoods and Development Areas.
- Locations for future park sites as shown on Figure POSS-1 are schematic to the extent that park sites may be relocated as necessity and opportunity dictate, and a General Plan amendment is not required if the park continues to serve the target areas as determined by the Planning Director.
- A park may be located on any suitable land in the general vicinity of the sites depicted. However, the zoning of potential park sites must be made consistent with the General Plan.

Objective POSS-2 Ensure that adequate land, in appropriate locations, is designated and acquired for park and recreation uses in infill and growth areas.

Policy POSS-2-a Identify opportunities to site, develop and co-locate Fire and Police stations with needed parks and open space as joint-use facilities.

- Capital Improvement Plans should be updated to reflect this policy

Policy POSS-2-b **Park and Recreation Priorities**. Use the following priorities and guidelines in acquiring and developing parks and recreation facilities:

- Acquire and develop neighborhood park space in existing developed neighborhoods that are deficient of such space and in areas along BRT corridors that are designated as priorities for encouraging new mixed use transit-oriented development.
- Provide accessible recreation facilities in established neighborhoods with emphasis on those neighborhoods currently underserved by recreation facilities.

- Improve established neighborhood parks with emphasis on those neighborhoods with the greatest need.
- Acquire and develop neighborhood and community parks in new Development Areas.
- Recognize community parks as a special need in areas that lack these facilities or are planned for transit supportive urban densities, and explore all potential sources of revenue to secure and develop appropriate sites including joint-use facilities.
- Develop new special purpose parks, such as outdoor gym equipment, natural resource based trail parks, equestrian centers, dog parks, and amphitheaters, as well as alternative recreation facilities, such as community recreation centers, passive wildlife observation park, cultural heritage and diversity park, military veterans memorial park, and universal access open space park.
- Acquire and develop park and open space in established neighborhoods and Development Areas, prioritizing existing neighborhoods with the greatest deficiencies, so that all residents have access to park or open space within 0.5-mile of their residence. Develop these facilities to be fully accessible to individuals with disabilities as required by law.

Policy POSS-2-c **Review of Development Applications.** Coordinate review of all development applications (i.e., site plans, conditional use permits, and subdivision maps) in order to implement the parks and open space standards of this Plan.

- Assure the provision of adequate active and passive open spaces and facilities as appropriate within residential subdivisions through Development Code requirements for mandatory dedication and improvement of land and/or development fees.
- Require the provision of appropriate outdoor living areas or private open space in multi-family residential developments not subject to the Subdivision Map Act.
- Request open space easements where feasible and warranted to secure appropriate public use of sensitive areas with scenic or recreation values, and for buffering space for sensitive areas.
- Require provision of appropriate open space areas in private projects, in the form of trails, enhanced landscaped setbacks, parks, and water features.
- Evaluate the merits of establishing a development bonus entitlement program in which development incentives (i.e., bonus densities, bonus floor area square footage) are provided for contributions to public recreational facilities on-site or in the vicinity of the development project.

Policy POSS-2-e **Open Space Dedication for Residential Development**. Ensure new residential developments provide adequate land for parks, open space, landscaping, and trails through the dedication of land or otherwise providing for Pocket Parks, planned trails, and other recreational space, maintained by an HOA, CFD, or other such entity.

Objective POSS-3 Ensure that park and recreational facilities make the most efficient use of land; that they are designed and managed to provide for the entire Fresno community; and that they represent positive examples of design and energy conservation.

Policy POSS-3-a **Centralized Park Locations.** Site parks central and accessible to the population served, while preserving the integrity of the surrounding neighborhood.

Policy POSS-3-b **Park Location and Walking Distance.** Site Pocket and Neighborhood Parks within a half-mile walking distance of new residential development.

Policy POSS-3-c **Link Parks with Walkways.** Link public open space to adjacent, schools, and residential uses and Activity Centers through a series of landscaped linear walkways and bikeways that enhance and encourage pedestrian use.

Policy POSS-3-d **Sidewalks to Connect Neighborhoods.** Sidewalks should be designed for internal neighborhood circulation, and to connect neighborhoods to other residential areas, parks, community trails, shopping, and major streets.

Policy POSS-3-e **Minimum Park Size for Active Recreation.** Minimize City acquisition or acceptance of dedication of park sites less than two acres in size for active recreational uses, except where maintenance costs are secured through a CFD, HOA, or other such mechanism.

Policy POSS-3-f **Park Design Guidelines.** Create, maintain, and apply park design guidelines, with provisions for appropriate amenities for each park type, which may include:

- Minimum and maximum shade.
- Protections from shading by adjacent buildings.
- Accessibility to persons with disabilities.
- Street trees and landscaped median strips in adjacent arterial roads.
- Art and points of attraction.
- Landscape and hardscape features.
- Street furniture, signage, and lighting.
- Food sales and entertainment.
- Restroom facilities play structures, and picnic shelters.
- Landscape design synthesis with input from civil engineers and hydrologists, educators and daycare providers, fitness trainers and coaches, police officers and experts in crime prevention through environmental design, as appropriate.
- Solar panels, new LED lighting, and water efficiency improvements. Sports field areas designed to allow periodic changes in field locations to minimize wear areas and provide sufficient fields to host regional, State, or national tournaments.
- Using topography to create interesting and visually appealing spaces and forms.
- Use of waterways as a key design influence, a focus of restoration, and an opportunity to provide for public enjoyment of views.

- Reflecting the agricultural and horticultural heritage of the site or area.
- Connecting with surrounding areas in a way that encourages expanded pedestrian activity.
- Creating individual places within a park that respond to the needs of a broad range of park users, from youth to the elderly.
- Creating places of delight that engage the senses.
- Creating places that engage the mind, by treating park features as opportunities for interpretation and questioning.
- Using sustainable design practices, and highlighting these as opportunities for learning.

Policy POSS-3-g **Park Security and Design.** Promote safety, attractiveness, and compatibility between parks and adjacent residential areas through design, maintenance, and enforcement of park regulations

- Require the installation of security lighting for parking, points of access, and building areas at all public recreation and park sites.
- Keep neighborhood eyes on parks to increase security.

Policy POSS-3-h **Coordination with School Districts.** Continue to coordinate with school districts to explore opportunities for joint-use of both outdoor and indoor recreation facilities, such as playgrounds, play fields, and gymnasiums, for City recreation programs.

Objective POSS-4 Pursue sufficient and dedicated funding for parks acquisition, operations, and maintenance.

Policy POSS-4-a **Supplemental Revenue**. Seek revenue sources to supplement General Fund support for basic park maintenance and basic recreational services.

Policy POSS-4-b **Operation and Maintenance Financing.** Continue to require new residential development to form lighting and landscaping maintenance districts or community facility districts or ensure other means of financing to pay for park operations and maintenance.

Policy POSS-4- **Improvements in Established Neighborhoods.** Seek agreements with formal neighborhood associations and institutions for improvements and ongoing maintenance of parks in established neighborhoods.

Policy POSS-4-d **Maintain Adopt-A-Park Program.** Continue promoting the City's Adopt-A-Park program that utilizes partnerships with local organizations to preserve, beautify and maintain Fresno's neighborhood parks.

Noise and Safety Chapter

Objective NS-6 Foster an efficient and coordinated response to emergencies and natural disasters.

Policy NS-6-f **Emergency Vehicle Access.** Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to public services:

Urban Form Element

Objective UF-1 Create complete neighborhoods in the Southeast Development Area that integrate housing, business and retail amenities. Implement a Southeast Development Area plan that balances and mixes housing, jobs, commercial businesses, services, and public facilities to help meet existing thresholds for lower vehicle miles traveled, reduced air pollution, and the efficient use of groundwater resources in compliance with the Sustainable Groundwater Management Act of 2014.

Policy UF-1.5 **Public Facilities & Open Spaces.** Support the development of public infrastructure, facilities, and parks that meet the needs of Plan Area residents according to the policies and standards set in the Open Space, Schools and Public Facilities Chapter and the General Plan.

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.1 **Active Open Space**. Maximize active recreational opportunities in the open space network. Active space includes playgrounds, fields, hardcourts, pools, and other facilities for sports and other physical activities.

Objective OS-3 Develop a hierarchy of parks in the SEDA that provides for a diverse range of recreation opportunities for all, and is well served by public transit, bike paths, and dedicated trails.

Policy OS-3.2 **Park Design for Safety.** Promote the use of Crime Prevention Through Environmental Design (CPTED) principles in park design. CPTED principles include natural surveillance, access control, territorial reinforcement and space management in promoting safety and discouraging crime. Please see the Fresno Parks Master Plan, Chapter 5, Design Guidelines for Safety starting on page 141 and Chapter 9, Goal 5 - Secure on page 268.

Policy OS-3.3 **Park Design for Accessibility.** Maximize the use of parks and trails by people of all ages and levels of physical ability, following Americans with Disabilities Act (ADA) design standards and the Title 24 California Building Code requirements as applicable.

Policy OS-3.4 **Concurrent Development**. Park acquisition and development should be concurrent with residential development.

Policy OS-3.5 **Participatory Park Planning.** To the greatest extent possible, engage the public in the parks planning process to ensure that parks respond to community needs.

Objective OS-4 Develop and maintain a greenway trail network connected to the SEDA circulation network that maximizes daily travel and recreation opportunities by linking Town Centers to destinations within and beyond the Southeast Development Area.

Policy OS-4.1 **Multiuse Trails.** Establish a planned network of multiuse greenway trails. These trails will serve bicyclists, pedestrians, and, where appropriate, equestrians. Cross sections and width requirements will be provided for specific conditions—including canal side, open space, streetside, and farm side trails.

Policy OS-4.2 **Regional Trails.** Coordinate regional trail planning with Fresno County, the City of Clovis, and other jurisdictions as appropriate. The City of Fresno Active Transportation Plan calls for Class I Bicycle Paths along each canal in the SEDA. A regional Rails to Trails Bicycle Path is planned to run parallel to California Avenue should existing railroad lines be vacated.

Policy OS-4.3 **Trail Standards.** Trails shall be designed with features that encourage use, provide safety, and are resource-efficient. Trail standards shall address shading, low-water landscaping, fencing, paving and surface materials, lighting, seating and furniture, ADA access requirements, signage, and intersection treatments.

Policy OS-4.4 **Trail Segments.** Trail segments will not be constructed until all necessary property or easements are acquired for an entire segment.

Policy OS-4.5 **SEDA Trails Master Plan.** Prior to the design and construction of the SEDA trail system, a SEDA Trails Master Plan will need to be completed that would define the final location and alignment of trails.

Policy OS-4.6 **Trail Security.** Trails will be designed with privacy and security in mind for adjacent property owners.

Objective OS-5 Promote the preservation of sensitive natural environments.

Policy OS-5.1 **Environmentally Sensitive Design.** Design parks and open space areas to respect unique natural features.

Objective OS-6 Ensure that all park, trail, and recreational facilities make the most efficient use of energy, water, and other natural resources.

Policy OS-6.1 **Green Building.** As important civic structures, park buildings shall conform to green building standards for energy and water efficiency.

Policy OS-6.3 **Renewable Energy Systems.** Explore developing renewable energy systems to provide power to park facilities.

Objective OS-7 Collaborate with school districts and local agencies to develop schools and other public facilities that meet the Southeast Development Area's goals for community, fiscal, and environmental sustainability.

Policy OS-7.1 **School District Coordination Taskforce and Joint Committee.** The City of Fresno will work with the Clovis Unified and Sanger Unified school districts to establish specific locations for high schools and middle schools. This Plan will build on the SEDA Plan to identify specific locations for major school facilities, and will coordinate all major open space, trail, and infrastructure systems with this effort. The City and school districts will also work together closely in all high, middle, and elementary school siting and facilities planning processes to ensure that school site, size, and design decisions respond optimally to community needs. The City of Fresno will:

- Work with the Clovis and Sanger school districts to formalize the collaboration process for school siting and facilities planning.
- Ensure that developers' contributions align with the SEDA standards for community-oriented schools, as described in this element and as further established through City-school district coordination.

Policy OS-7.2 **Joint Use of School and Community Facilities.** Pursue agreements to share facilities between schools and other community-serving institutions. Since the provision of shared facilities affects the siting, size, and design of schools, joint-use arrangements should be considered early in the facilities planning process.

- Create a master joint-use agreement that establishes the parameters for shared use between the City of Fresno/Fresno PARCS and school districts. Thereafter, create site-specific cooperative agreements for each facility.
- Establish joint-use agreements with schools to make school grounds (playfields and outdoor recreation areas) available for community use during non-school hours.
- Pursue partnerships among school districts, governmental agencies, higher education, and/or nonprofit organizations to fund and develop joint-use facilities with schools, such as multipurpose rooms, gymnasiums, childcare facilities, elder care facilities, adult education facilities, libraries, teacher education facilities, and schoolyard community gardens.

Policy OS-7.3 **Location of Civic Facilities.** Civic facilities should be located in proximity to parks and schools, even if facilities are not shared.

Objective OS-8 Integrate educational facilities into the urban fabric of centers and communities, where they will be served by public transit, walk and bike routes, and dedicated trails. Encouraging walk, bike, and transit travel through school location and design minimizes Vehicle Miles Traveled (VMT), reduces transportation household costs and helps to mitigate air quality impacts and greenhouse gas emissions.

Policy OS-8.1 **Location and Accessibility.** Educational facilities will be sited in proximity to homes, transit, and civic amenities to promote walk, transit, and bike trips.

1. **Elementary Schools:** Elementary schools anchor Neighborhood Town Centers and can also be located in or adjacent to Community Town Centers. All new homes in the Southeast Development Area should be located within 0.25 to 0.5 mile (5- and 10-minute walking distances) of the entrance to an elementary school. Elementary schools must be accessible by transit and safe pedestrian and bicycle routes.
2. **Middle Schools:** Middle schools are located within, or in close proximity to, Regional and Community Town Centers. The SEDA Plan places middle schools within roughly two miles of most homes. Middle schools should be linked to the dedicated trail network, as well as local bike, pedestrian, and transit routes.
3. **High Schools:** High schools are located within, or in close proximity to, the Regional and Community Town Centers. The SEDA Plan places high schools within roughly two miles of most homes. High schools must be linked to the dedicated trail network, as well as local bike and pedestrian routes. High schools should be located along connector streets and be served by local transit. Middle and high schools share the same standards for accessibility.
4. **Other Educational Facilities:** Accessibility by transit and non-auto travel options is important for all educational facilities, from early childhood to adult education, and including public and private schools. These facilities should be located in or adjacent to Mixed-Use Districts, with access to transit and local bike and pedestrian routes, and the dedicated trail network, if possible.

Policy OS-8.2 **Safe Access.** Create safe environments on streets adjacent to schools to promote walk, bike, and transit travel.

- Where warranted, streets shall feature pedestrian crossing lights.
- Traffic calming features shall be installed in collaboration with the City of Fresno Public Works Department Streets Division.
- Safe Routes to Schools program development is encouraged. Please see www.saferoutesinfo.org for more information.
- **Decrease Distance and Increase Safe Travel to Schools:** Far fewer children walk and bike to school today than in generations past. A majority of parents cited distance from school, followed by traffic safety concerns, as the primary reason

their children did not walk. The SEDA plan seeks to get more children walking and biking again by centrally locating schools where they can be easily reached by safe walk, bike, and transit routes.

With elementary schools located within a half-mile walking or biking distance from all homes, and middle and high schools located on transit lines and trail corridors, all students in the SEDA will have a wide array of travel options. Enabling children to take alternative modes of transportation not only reduces congestion, emissions, and pollution, but increases children's levels of physical activity and reduces their dependence on parents for car trips.

Policy OS-8.3 **Design and Orientation.** School environments should be designed to respond to the needs of students, educators, and the broader community. Within the SEDA, the character and orientation of school facilities should be compatible with the centers or districts in which they are located.

School districts have the authority to determine the size, design, and orientation of schools, in compliance with State standards. The criteria noted here are based on existing school buildings and best practice recommendations.

- **Site size**: Schools can be developed within a range of sizes; the optimum size should be determined on a case-by-case basis. Key factors in the site selection process include:
  - Community setting
  - Projected enrollment
  - Educational program needs
  - Provision of joint-use facilities

- **Building Size and Form**: School districts should explore innovative models for community-oriented school design. To ensure that facilities respond to community needs, school districts are encouraged to plan facilities and improvements in collaboration with the City of Fresno and with the participation of stakeholders throughout the community.

  State standards dictate square footage requirements based on area per pupil. School districts are encouraged to use participatory planning to base facilities design on an accurate projection of needs. With respect to form, schools are encouraged to consider these features:
  - Compact building design, including multistory buildings, to reduce footprint
  - Clustered buildings
  - Orientation of main buildings toward the street, with minimal setbacks
  - Orientation of main campus entrance toward the street, rather than a parking lot or drop-off zone

  - Parking lots oriented away from, rather than along, the street to prevent parking from dominating the interface between the school and the street
  - Bike parking

- **Parking**: Schools should provide minimum amounts of parking as prescribed by State standards to reduce campus footprints and discourage driving.

- **Adjacency Issues**: School grounds should not be bordered by backyard fences.

- **Design Features**: Schools should incorporate design features that foster a strong sense of place.

Objective OS-11 Provide the necessary levels of police and fire services in accordance with the City of Fresno General Plan.

Policy OS-11.1 **Provision of Police Services.** Provide police services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can make adjustments to these policies.

Policy OS-11.2 **Provision of Fire Services.** Provide fire services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can make adjustments to these policies.

Policy OS-11.3 **Coordination with Police and Fire Departments.** The City of Fresno Planning and Development Department shall work with the Police and Fire departments as appropriate to promote safe environments throughout the SEDA and ensure that services can be provided in a manner that is sensitive and responsive to the needs of the community. Coordination may address:

- Evaluation of design features for safety and crime prevention
- Siting of police and fire substations
- Facilitation of citizen involvement processes

Community Farming Element

Objective CF-2 Create a long-term transition zone between urban uses in the City of Fresno and agricultural land in Fresno County. Buffering urban and adjoining agricultural land uses reduce conflicts that can arise due to noise, pollution, or traffic.

Policy CF-2.2 **Passive Recreation.** Encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians.

What is the role of rural cluster development?

A transitional buffer. Urban areas and large agricultural operations cannot always sit side-by-side. Noise, dust, and pesticides from farms can pose health concerns for residents, while farmers need space to move machinery and goods. Rural clusters along the eastern edge of SEDA form a transition between the urban area and the agricultural lands beyond.

An attractive residential option. Rural clusters offer a rural lifestyle within an environmentally responsible land use framework that promotes active farming and open space preservation.

A means to preserve land. Rural cluster lands can be used for organic small-scale farming, equestrian activities, or other uses compatible with the nearby homes. The vast majority of the land is preserved as viable agricultural land or open space.

Conservation Element

Objective RC-4 Ensure that there will be no adverse effects on regional groundwater levels by minimizing groundwater extraction and replenishing groundwater used to serve the Southeast Development Area. Maximize multiple uses of open space by encouraging new recharge facilities to be accessible to the public.

Policy RC-4.4 Support recreation opportunities with a range of parks and multiuse trails by establishing joint-use agreements with Fresno Metropolitan Flood Control District to allow access to storm drainage/recharge basins for recreational use, when appropriate (see the Open Space, Schools and Public Facilities Chapter).

Fresno Municipal Code

Section 12-4.508 - UGM Development Restrictions

Section 12-4.508-E of the Municipal Code requires that new residential developments with four or fewer units per building must be within a 5-mile "running distance" of a fire station. The Municipal Code defines running distance as the actual distance that must be traveled on public streets or rights-of-way from a fire station to reach the scene of a fire incident. All other developments, including residential developments with more than four units per building, must be located within 3 miles of an existing fire station.

Section 12-4.7 - Park Facilities Fee

Section 12-4.7 of the Municipal Code states that in order to implement the Goals, Objectives, and Policies of the City's General Plan, and to mitigate the impacts caused by future development in the City, certain park facilities must be constructed. The City Council has determined that a Park Facilities Fee is needed in order to pay for (a) land acquisition for, and design, engineering, and construction of the public facilities designated in the Council resolution and reasonable costs of outside consultant studies related thereto; (b) to reimburse the City for designated public facilities construction by the City with funds (other than gifts or grants) from other sources together with accrued interest; (c) to reimburse developers who have designed and constructed designated public

facilities which are oversized and supplemental size, length, or capacity; and/or (d) to pay for and/or reimburse costs of program development and ongoing administration of the Park Facilities Fee program.

Section 12-4.8 - Police Facilties Fee

Section 12-4.8 of the Municipal Code states that in order to implement the goals, objectives and policies of the City's General Plan, and to mitigate the impacts caused by future development in the City, certain police facilities must be constructed. The City Council has determined that a Police Facilities Fee is needed in order to pay for (a) land acquisition for, and design, engineering, and construction of the public facilities designated in the Council resolution and reasonable costs of outside consultant studies related thereto; (b) to reimburse the City for designated public facilities construction by the City with funds (other than gifts or grants) from other sources together with accrued interest; (c) to reimburse developers who have designed and constructed designated public facilities which are oversized and supplemental size, length, or capacity; and/or (d) to pay for and/or reimburse costs of program development and ongoing administration of the Police Facilities Fee program.

Section 12-4.9 - Fire Facilities Fee

Section 12-4.9 of the Municipal Code states that in order to implement the goals, objectives and policies of the City's approved General Plan, and to mitigate the impacts caused by future development in the City, certain Fire Department facilities must be constructed. The City Council has determined that a Fire Facilities Fee is needed in order to pay for (a) land acquisition for, and design, engineering, and construction of the public facilities designated in the Council resolution and reasonable costs of outside consultant studies related thereto; (b) to reimburse the City for designated public facilities construction by the City with funds (other than gifts or grants) from other sources together with accrued interest; (c) to reimburse developers who have designed and constructed designated public facilities which are oversized and supplemental size, length, or capacity; and/or (d) to pay for and/or reimburse costs of program development and ongoing administration of the Fire Facilities Fee program.

Section 12-4.10 – Street Facilities Fee

Section 12-4.10 of the Municipal Code states the development fees for street facilities. These fees also support fire facilties by ensuring that roadways meet City standards and support FFD vehicles. The City Council established the street facilties fee to finance these public facilities and to pay for each development's fair share of the construction and acquisition costs of these improvements. Based on this determination, Council adopted, by resolution amending the Master Fee Schedule, a Citywide Regional Street Impact Fee (Citywide Street Fee) and a New Growth Area Major Street Fee (Growth Area Street Fee). Council adopts this Article to require the imposition of these street facilities fees on new development in the City.

Measure B

Measure B is a one-eighth of 1 percent sales tax intended to provide funds for the improvement of library services throughout Fresno County. Voters passed Measure B in November 1998 and again in 2004. As of June 2007, Measure B had provided more than $76 million in funds to provide more

library hours, more library materials, and more library services for Fresno County residents. Measure B has also contributed to new building and renovation projects in Kerman, Caruthers, Laton, Fowler, Orange Cove, Tranquility, Mendota, and the Woodward Park area. The Fresno County Measure B library tax has been extended for 16 years until 2029.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan Programmatic Environmental Impact Report (PEIR) contains the following mitigation measures that are applicable to the proposed project.

MM PSR-1.1 As future fire facilities are planned, environmental review of proposed facilities shall be completed to meet the requirements of CEQA. Typical impacts from fire facilities include air quality/greenhouse gas emissions, noise, traffic, and lighting.

MM PSR-1.2 As future police facilities are planned, environmental review of proposed facilities shall be completed to meet the requirements of CEQA. Typical impacts from police facilities include air quality/greenhouse gas emissions, noise, traffic, and lighting.

MM PSR-1.3 As future parks and recreational facilities are planned, environmental review of proposed facilities shall be completed to meet the requirements of CEQA. Typical impacts from park facilities include air quality/greenhouse gas emissions, noise, traffic, and lighting.

MM PSR-1.4 As future public facilities are planned by the City of Fresno (e.g., court, library, and hospital facilities), environmental review of the proposed facilities shall be completed to meet the requirements of CEQA. Typical impacts from public facilities include air quality/greenhouse gas emissions, noise, traffic, and lighting.

3.15.4 - Methodology

This analysis identifies potential impacts to fire protection, police protection, schools, libraries, other public facilities, parks, and recreational facilities based on development anticipated from the proposed project (collectively, the General Plan Update, Zoning Code Amendments, and Climate Action Plan). Impacts to public services, parks, and recreational facilities were assessed using the significance criteria established by the California Environmental Quality Act (CEQA) Guidelines, as well as State, and local plans, regulations, and ordinances.

3.15.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist as thresholds to determine whether impacts to public services and utilities are significant environmental effects.

Appendix G to the CEQA Guidelines is a sample Initial Study Checklist that includes questions for determining whether impacts to resources are significant. These questions reflect the input of planning and environmental professionals at the Governor's Office of Planning and Research and the California Natural Resources Agency, based on input from stakeholder groups and experts in various

other governmental agencies, nonprofits, and leading environmental consulting firms. Accordingly, the City has derived its significance criteria, based in part on the questions posed in Appendix G. These significance criteria are as follows:

The proposed project would be considered significant if the project would:

> Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:
>
> a) Fire protection?
> b) Police protection?
> c) Schools?
> d) Parks?
> e) Other public facilities?

3.15.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the project and provides mitigation measures where appropriate.

Fire Protection

Impact PUB-1:	**The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for fire protection.**

Impact Analysis

As described above, the FFD has a below average emergency response level when compared with other metropolitan cities of about the same size. As of 2022, Fresno employed 0.62 firefighters per 1,000 residents, lower than the Statewide average of 0.82 firefighters per 1,000 residents.[30] NFPA standards dictate the first firefighting company should arrive within 4 minutes, while an effective EFF or a commercial EFF should arrive within 8 minutes 90 percent of the time. An EFF for a residential fire consists of 15 firefighters and a commercial EFF consists of 21 firefighters on scene. According to the FFD 2021 Annual Report the FFD met the 4-minute response time 72 percent of the time, while an EFF was assembled within 8 minutes 87 percent of the time, and commercial EFF 88 percent of the time, falling short of target response times.

[30] Fresno Fire Department (FFD). 2022. Fresno Fire Department 2022 Annual Report. Website: https://www.fresno.gov/fire/wp-content/uploads/sites/6/2023/01/2022-Annual-Report.pdf. Accessed March 22, 2023.

Implementation of the proposed project would intensify residential, mixed use, and employment land uses within the Plan Area. As discussed in Section 2.0, *Project Description*, and Section 3.14, *Population and Housing*, the existing population in Plan Area is estimated to contain approximately 2,171 persons. According to the General Plan, the Plan Area is expected to be built out with approximately 15,000 housing units by 2035, resulting in a total population of 44,850. The Plan Area's total housing capacity is 45,000 housing units, resulting in a total population of up to approximately 134,550 persons. This population potential for the Plan Area is within the population growth anticipated by the General Plan.

Implementation of the proposed project would result in an increased demand for fire protection services. The Specific Plan includes a number of proposed policies related to fire protection, including Policy OS-11.2 which requires that fire services are provided in the Plan Area in accordance with the General Plan; and Policy OS-11.3 which requires that the City of Fresno Planning and Development Department work with the Fire Department as appropriate to promote safe environments throughout the Plan Area and ensure that services can be provided in a manner that is sensitive and responsive to the needs of the community. Coordination with the FFD would address design features for safety, siting of fire stations, and facilitation of citizen involvement processes. Implementation of the proposed Specific Plan policies would ensure that fire protection services are expanded to meet the needs of the intensified development and population increase in the Plan Area. Additionally, future development within the Plan Area would be required to comply with Section 12-4.901 of the Fresno Municipal Code, which requires each development to pay a Fire Facilities Fee in order to mitigate the impacts on fire protection facilities caused by future development within the City. Payment of the appropriate development impact fees would offset the construction and acquisition costs of required fire facility improvements.

The project-specific environmental impacts of constructing new or expanded fire protection facilities to support the growth anticipated under the proposed project cannot be determined at this time because the site-specific locations and designs of future new or expanded facilities are not known. However, fire protection facilities are allowed within the Community Center, Neighborhood Center, and Institutional land uses as shown in the proposed land use map (Chapter 2, Project Description, Exhibit 2-2). It can be expected that construction and operation of future new or expanded fire protection facilities would have similar impacts as would construction and operation of other types of new development under the proposed project. As the City proceeds with the construction of new or expanded fire protection facilities, those projects will be reviewed by the City for compliance with the objectives and policies of the General Plan, the Specific Plan, the Municipal Code, and the mitigation measures referenced in other sections of this Draft PEIR. Therefore, the physical effects on the environment from the construction of new or expanded fire protection facilities would be less than significant.

Furthermore, as the City receives development applications for subsequent development under the proposed project, those applications will be reviewed by the City for compliance with the policies and objectives of the General Plan to ensure that fire protection services keep pace with new development. In addition, the Municipal Code, which implements the City's General Plan would be reviewed when development applications are received. Therefore, future development under the

proposed project would not result in significant adverse effects related to fire protection services and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Police Protection

Impact PUB-2:	**The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for police protection.**

Impact Analysis

The City has a target staffing ratio of 1.5 unrestricted officers per 1,000 City residents. According to the Fiscal Year 2022 Adopted Budget, the FPD's sworn staff will increase to 850, the highest in FPD history.

Implementation of the proposed project would intensify residential, mixed use, and employment land uses within the Plan Area. As previously discussed, the existing population in Plan Area is estimated to contain approximately 2,171 persons. The Plan Area is expected to be built out with approximately 15,000 housing units by 2035, resulting in a total population of 44,850. The Plan Area's total housing capacity is 45,000 housing units, which would result in a total population of up to approximately 134,550 persons, an increase of approximately 132,379 persons. This population potential for the Plan Area is within the population growth anticipated by the General Plan.

Implementation of the proposed project would result in an increased demand for police protection services. As discussed above, the full buildout of the Plan Area would result in a population increase of up to approximately 132,379 persons. Using the current City staffing goal, at full buildout of the proposed project, approximately 265 additional officers would be required to police services to meet their goal of two officers per 1,000 residents.

The Specific Plan includes proposed policies related to police protection, including Policy OS-11.1 which requires that police services are provided in the Plan Area in accordance with the policies of the General Plan; and Policy OS-11.3 which requires that the City's Planning and Development Department work with the Police Department as appropriate to promote safe environments throughout the Plan Area and ensure that services can be provided in a manner that is sensitive and responsive to the needs of the community. Coordination with FPD would address design features for

safety and crime prevention, siting of police stations, and facilitation of citizen involvement processes. Implementation of these proposed Specific Plan policies would ensure that police services are expanded to meet the needs of the intensified development and population increase in the Plan Area. Additionally, future development within the Plan Area would be required to pay the Police Facilities Free required by Section 12-4.8 of the Municipal Code. Payment of the appropriate development impact fees would offset the construction and acquisition costs of required police facility improvements.

The project-specific environmental impacts of constructing new or expanded police facilities to support the growth anticipated under the proposed project cannot be determined at this time because the site-specific locations and designs of future new or expanded facilities are not known. However, police facilities are allowed within the Community Center, Neighborhood Center, and Institutional land uses as shown in the proposed land use map (Exhibit 2-2). It can be expected that construction and operation of future new or expanded police facilities would have similar impacts as would construction and operation of other types of new development under the proposed project. As the City proceeds with the construction of new or expanded police facilities, those projects will be reviewed by the City for compliance with the objectives and policies of the General Plan, the proposed Specific Plan, the Municipal Code, and the mitigation measures referenced in other sections of this Draft PEIR. Therefore, the physical effects on the environment from the construction of new or expanded police facilities would be less than significant.

Furthermore, as the City receives development applications for subsequent development under the proposed project, those applications will be reviewed by the City for compliance with the policies and objectives of the General Plan to ensure that police services keep pace with new development. In addition, the Municipal Code, which implements the General Plan would be reviewed when development applications are received. Therefore, future development under the proposed project would not result in significant adverse effects related to police services and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Schools

Impact PUB-3:	**The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for schools.**

Impact Analysis

Implementation of the proposed project would intensify residential, mixed use, and employment land uses within the Plan Area. As described above, the Plan Area is expected to be built out with approximately 15,000 housing units by 2035, resulting in a total population of 44,850. The Plan Area's total housing capacity is 45,000 housing units, resulting in a total population of up to approximately 134,550 persons. To determine the number of students that would be generated by the proposed project, the State of California provides a housing unit yield of 0.7 students per unit.[31] Therefore, the Plan Area would be expected to contain approximately 10,500 student by 2035 and contain up to approximately 31,500 new students at total buildout.[32] This would create significantly more demand for school services within the Plan Area.

The Specific Plan includes a number of policies that related to school facilities. For example, Policy UF-1.5 requires the construction of public infrastructure facilities that meet the needs of the Plan Area residents according to the policies and standards set in the Open Space, Schools and Public Facilities Chapter and the General Plan. Policy OS-7.1 requires that the City work with the Clovis Unified and Sanger Unified school districts to establish specific locations for high schools and middle schools. The City and school districts will work together to site all new schools and facilities to ensure that the school sites, sizes, and designs meet community needs. This policy also requires the Clovis and Sanger school districts to formalize the collaboration process for school siting and facilities planning. It also ensures that developers' contributions align with the SEDA standards for community-oriented schools, as described in Open Space element and as further established through City-school district coordination. Policy OS-8.1 requires that educational facilities are sited in proximity to homes, transit, and civic amenities to promote walk, transit, and bike trips. This would reduce environmental impacts related to emissions from transportation. This policy includes for specific guidelines for the siting of elementary schools, middle schools, high schools, and other educational facilities. Finally, Policy OS-8.3 outlines design guidelines for schools.

The project-specific environmental impacts of constructing new or expanded school facilities to support the growth anticipated under the proposed project cannot be determined at this time because the site-specific locations and designs of future new or expanded facilities are not known. However, school facilities are allowed within the Neighborhood Center and Institutional land uses as shown in the proposed land use map (Exhibit 2-2). It can be expected that construction and operation of future new or expanded school facilities would have similar impacts as would construction and operation of other types of new development under the proposed project. As the

[31] Office of Public School Construction. 2019. School Facility Program Handbook.
[32] 45,000 housing units * 0.7 students per housing unit = ~31,500

City proceeds with the construction of new or expanded school facilities, those projects will be reviewed by the City for compliance with the objectives and policies of the General Plan, the proposed Specific Plan, the Municipal Code, and the mitigation measures referenced in other sections of this Draft PEIR. Therefore, the physical effects on the environment from the construction of new or expanded school facilities would be less than significant.

Furthermore, as the City receives development applications for subsequent development under the proposed project, those applications will be reviewed by the City for compliance with the policies and objectives of the General Plan to ensure that school services keep pace with new development. In addition, the Municipal Code, which implements the General Plan would be reviewed when development applications are received. Therefore, future development under the proposed project would not result in significant adverse effects related to school services and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Parks

Impact PUB-4:	**The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for parks.**

Impact Analysis

The General Plan has established service standards by park type. These standards are 3 acres per 1,000 residents for pocket parks, neighborhood parks, and community parks; and 2 acres per 1,000 residents for regional parks, open space/natural areas, and special use parks.

As the City's population increases the amount of park land must increase to maintain the established LOS standards. The City must increase its park lands by 1,095 acres in order to meet the LOS goals for current population, and by 1,751 acres to meet the needs of the projected 2035 population.[33]

Implementation of the proposed project would intensify residential, mixed use, and employment land uses within the Plan Area. As described in Section 3.14 Population and Housing, the proposed project could result in a population increase of up to 132,379 residents as the total Plan Area

[33] City of Fresno. 2017. Fresno Parks Master Plan. December 17.

capacity would be approximately 134,550 persons. As such, there would be a corresponding increase in population and an increased demand for park facilities. However, the proposed project would meet the General Plan standard of 3 acres of public parkland per 1,000 residents through policies that would encourage new park facilities.

The proposed project's open space system would provide open spaces and parks for active and passive recreation. The proposed project would include corridors for trails and paths that connect many areas of the Plan Area, which would provide recreational opportunities for residents, employees, customers, and visitors. Neighborhood Town Centers would provide for nearly all homes to be located within walking distance of recreation areas.

Development under the proposed project would be required to comply with General Plan objectives and policies related to park facilities. Future development under the proposed project would be required to comply with General Plan Policy POSS-2-c, which requires review of development applications in order to implement the parks and open space standard, and General Plan Policy POSS-2-e, which ensures that new residential developments provide adequate land for parks and open space.

The Specific Plan includes policies to ensure adequate park access for residents. For example, Objective OS-3 requires that parks in the SEDA are well served by public transit, bike paths, and dedicated trails. Policy OS-4 requires the development and maintenance of a greenway trail network connected to the SEDA circulation network that maximizes daily travel and recreation opportunities by linking Town Centers to destinations within and beyond the SEDA. Policy OS-4.1 require the establishment of a planned network of multiuse greenway trails to serve bicyclists, pedestrians, and, where appropriate, equestrians. Policy CF-2.2 would encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians. Policy RC-4.4 would support park access with a range of parks and multiuse trails by establishing joint-use agreements with FMFCD to allow access to storm drainage/recharge basins for recreational use, when appropriate. Policy OS-7.3 aims to locate civic facilities in proximity to parks.

Finally, new development that occurs pursuant to the proposed project would be required to comply with Municipal Code Sections 12-4.701 through 12-4.706, which requires each development to pay a Park Facilities Fee in order to mitigate the impacts on park facilities caused by future development in the City. This would ensure that new development provides adequate parks that meet the citywide parks and open space standard of 3 acres per 1,000 residents. There are currently no existing parks within the Plan Area. Therefore, impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Other Public Facilities

Impact PUB-5:	**The proposed project would not result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for other public facilities.**

Impact Analysis

There are no libraries located within the Plan Area. The nearest libraries to the Plan Area are the Sunnyside Regional Library (approximately 2.01 miles west of the Plan Area Boundary) and the Sanger Branch Library (approximately 3.60 miles to the east of the Plan Area boundary).

Implementation of the proposed project would intensify residential, mixed use, and employment land uses within the Plan Area. As described in Section 3.14 Population and Housing, the proposed project could result in a population increase of up to 132,379 residents. As such, there would be a corresponding increase in population and an increased demand for library facilities. Since 1998, the County of Fresno has expanded its library services, due in part to the success of Measure B. The measure is a one-eighth of 1 percent sales tax, providing funds for improvement of library services throughout the County. The County has a funding resource available for facility improvements through March 2024, when Measure B is set to expire. The increase in population would create additional tax revenue to support the construction of new or expanded library facilities.

The project-specific environmental impacts of constructing new or expanded library facilities to support the growth anticipated under the proposed project cannot be determined at this time because the site-specific locations and designs of future new or expanded facilities are not known. However, library facilities are allowed within the Community Center, Neighborhood Center, and Institutional land uses as shown in the proposed land use map (Exhibit 2-2). It can be expected that construction and operation of future new or expanded library facilities would have similar impacts as would construction and operation of other types of new development under the proposed project. As the City proceeds with the construction of new or expanded library facilities, those projects will be reviewed by the City for compliance with the objectives and policies of the General Plan, the proposed Specific Plan, the Municipal Code, and the mitigation measures referenced in other sections of this Draft PEIR. Therefore, the physical effects on the environment from the construction of new or expanded fire protection facilities would be less than significant.

Furthermore, as the City receives development applications for subsequent development under the proposed project, those applications will be reviewed by the City for compliance with the policies and objectives of the General Plan to ensure that fire protection services keep pace with new development. In addition, the City's Municipal Code, which implements the City's General Plan would be reviewed when development applications are received. Therefore, future development

under the proposed project would not result in significant adverse effects related to fire protection services and impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.15.7 - Cumulative Impacts

The geographic scope for the analysis of cumulative impacts related to public services generally includes the Plan Area, the rest of the City, and any other communities served by FFD and FPD as well as the school districts, parks, libraries, and hospitals that would be utilized by residents of SEDA. This analysis evaluates whether impacts of the proposed project, together with impacts of cumulative development, could result in a cumulatively significant impact to public services. This analysis then considers whether the incremental contribution of impacts associated with implementation of the proposed project would be significant. Both conditions must apply for a project's cumulative effects to rise to the level of significance.

Fire Protection

The geographic scope for the analysis of cumulative impacts related to fire protection facilities includes the FFD service area. A significant cumulative environmental impact would result if cumulative growth exceeded the ability of FFD to adequately serve their service area, thereby requiring construction of new facilities or modification of existing facilities. FFD conducts a regular budgeting process where future facility and staffing needs are identified and addressed. All cumulative projects within the FFD service area would be required to comply with the Municipal Code, General Plan policies and actions, and the Specific Plan policies that address fire protection services, including payment of public safety impact fees to provide funding for adequate fire equipment, vehicles, and facilities to meet the broad range of needs of Fresno residents and employees. Because past and present development will comply with all ordinances and policies, and there are mechanisms in place to ensure provision of adequate service, there would be no significant cumulative condition with respect to fire protection services. Therefore, cumulative impacts would be less than significant.

Moreover, the proposed project's incremental contribution to the less than significant cumulative impacts would not be significant. As discussed under Impact PUB-1, implementation of the proposed project would not create a need for new or physically altered facilities for the FFD to provide fire protection services to its service area.

As previously discussed, development facilitated by the proposed project would be required to comply with the policies and actions in the General Plan and Specific Plan as well as the Municipal

Code, specifically impact fire facilities fees, to ensure that fire protection services are adequate as future development is proposed. Therefore, impacts of the proposed project on fire protection services are not cumulatively considerable and the cumulative impact would be less than significant.

Police Protection

The geographic context for the analysis of cumulative impacts related to police protection facilities includes the FPD service area. A significant cumulative environmental impact would result if this cumulative growth exceeded the ability of the FPD to adequately serve their service area, thereby requiring construction of new facilities or modification of existing facilities. All cumulative projects within the FPD service area would be required to comply with City ordinances and the General Plan and Specific Plan policies and actions that address police protection services, including payment of police facilities impact fees to provide funding for adequate police equipment, vehicles, and facilities to meet the broad range of needs of Fresno residents and employees. Therefore, cumulative impacts would be less than significant.

Moreover, the proposed project's incremental contribution to the less than significant cumulative impacts would not be significant. As discussed under Impact PUB-2, implementation of the proposed project would not create a need for new or physically altered facilities for the FPD to provide police protection services to its service area.

As previously discussed, development facilitated by the proposed project would be required to comply with the policies and actions in the General Plan and Specific Plan as well as the Municipal Code, specifically police facilities fees, to ensure that police protection services are adequate as future development is proposed. Therefore, impacts of the proposed project on police protection services are not cumulatively considerable and the cumulative impact would be less than significant.

School Facilities

The geographic context for the analysis of cumulative impacts related to school facilities includes the Clovis Unified and Sanger Unified school districts and the schools that serve the Plan Area and surrounding communities. Regional growth resulting from past, present, and reasonably foreseeable projects would result in increased demand for additional school facilities within the CUSD and Sanger USD. Like development in the Plan Area, the schools are expected to receive development impact fees from cumulative development within other jurisdictions. The payment of school impact fees, per SB 50, would ensure that school facilities can accommodate future students. Therefore, cumulative impacts would be less than significant.

Moreover, the proposed project's incremental contribution to the less than significant cumulative impacts would not be significant. As discussed under Impact PUB-3, development facilitated by the proposed project would be required to pay the school impact fees adopted by each school district, per SB 50, and this requirement is considered to fully mitigate the impacts of the proposed project on school facilities. Therefore, impacts of the proposed project on school facilities are not cumulatively considerable and the cumulative impact would be less than significant.

Parks and Recreational Facilities

The geographic context for the analysis of cumulative impacts of parks and recreational facilities includes the Plan Area. A significant cumulative environmental impact would result if this cumulative growth resulted in an increase in the use of existing parks and recreational facilities, such that substantial physical deterioration of the parks or recreational facilities would occur, be accelerated, to require the construction of new parks and recreational facilities or modification of existing parks and recreational facilities. All cumulative projects would be required to comply with City ordinances as well as the General Plan and Specific Plan policies that address parks and recreational facilities, such as paying park facilities fees and maintaining adequate parkland ratios. Therefore, cumulative impacts to parks and recreational facilities would be less than significant.

Moreover, the proposed project's incremental contribution to less than significant cumulative impacts would not be significant. As discussed under Impact PUB-4, implementation of the proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities, such that substantial physical deterioration of the facility would occur or be accelerated. The construction or expansion of parks and other recreational facilities are not expected to result in an adverse physical effect on the environment. As such, development anticipated under the proposed project would not create substantial impacts related to parks and other recreational facilities.

Further, potential future impacts to parks and recreational facilities would be further reduced through the contribution of a park facilities impact fee to ensure facilities at these locations are adequately maintained and sufficient to accommodate growth associated with cumulative development. Therefore, impacts of the proposed project on parks and other recreational facilities are not cumulatively considerable and the cumulative impact would be less than significant.

Other Public Facilities

The geographic context for analysis of cumulative impacts to other public facilities includes the Plan Area. Development and growth in the Plan Area would increase demand for other public facilities. A significant cumulative environmental impact would result if cumulative growth exceeded the ability of the City to adequately serve people within their service area, thereby requiring construction of new facilities or modification of existing facilities. All cumulative projects would be required to comply with City ordinances and other policies that address other public facilities. Therefore, cumulative impacts would be less than significant.

Moreover, the proposed project's incremental contribution to the less than significant cumulative impacts would not be significant. As discussed under Impact PUB-5, implementation of the proposed project would not create a need for new or physically altered other public facilities to maintain acceptable service ratios or other performance objectives. Therefore, impacts of the proposed on other public facilities are not cumulatively considerable and the cumulative impact would be less than significant.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.16 - Recreation

3.16.1 - Introduction

This section describes existing parks and recreational facilities in the region and project area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to parks and recreational facilities that could result from the implementation of the proposed project. Information in this section is based on information obtained from the Fresno General Plan (General Plan) and the Fresno Southeast Development Area (SEDA) Specific Plan (Specific Plan). Three public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to recreation, including the following:

- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including state and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.16.2 - Environmental Setting

Existing Parks and Recreational Facilities

The City of Fresno (City) maintains more than 1,000 acres of parks and nearly 266,000 square feet of building space dedicated to recreational/educational purposes, distributed among 115 sites. Other facilities include eight community pools, seven splash parks, 482 picnic tables, 186 barbeque grills, five amphitheaters, 52 baseball/softball fields, 54 football/soccer fields, 48 basketball courts, 16 volleyball courts, 37 tennis courts, nine skate parks, and 11 dog parks. The park system also provides and maintains paths and trails for pedestrians and bicyclists.[1]

The Plan Area does not contain any parks that are maintained by the City.[2] The nearest parks to the Plan Area are Al Radka Park, Centex, Rabe Park, and Sunnyside. Additionally, Fresno County Blossom Trail is located along East Jensen Avenue in the planning area. Table 3.16-1 below identifies the various parks and community facilities located nearest to the Plan Area that are maintained by the City.

1 City of Fresno. 2014. Fresno General Plan, Chapter 5: Parks, Open Space, and Schools. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2019/07/ConsolidatedGP6182020.pdf. Accessed May 24, 2022.
2 City of Fresno. 2022. Parks and Recreation Facilities Finder. Website: https://cityoffresno.maps.arcgis.com/apps/webappviewer/index.html?id=53f212b20a0f47efb6681df6c8ad2eaa. Accessed May 24, 2022.

Table 3.16-1: Existing Pocket, Neighborhood, and Community Parks

Facility Name	Park Type	Distance to Plan Area	Amenities
Al Radka Park	Neighborhood Park	1.25 miles	Barbecues, Baseball/Softball Fields, Children's Play Area, Field Lights, Football/Soccer Field, Parking Lot, Picnic Tables, Restrooms, Shade Structures, Shaded Tot Lot
Rabe Park	Pocket Park	0.22 mile	Open Space
Centex	Pocket Park	0.35 mile	Picnic Tables
Sunnyside	Neighborhood Park	1.5 miles	Barbecues, Baseball/Softball Fields, Children's Play Area, Football/Soccer Field, Parking Lot, Picnic Tables, Restrooms

Source: City of Fresno. 2022. Parks and Recreation Facilities Finder. Website: https://cityoffresno.maps.arcgis.com/apps/webappviewer/index.html?id=53f212b20a0f47efb6681df6c8ad2eaa. Accessed June 29, 2022.

3.16.3 - Regulatory Framework

State

Quimby Act

The Quimby Act (California Government Code § 66477) was established by the California Legislature in 1965 to preserve open space and parkland in rapidly urbanizing areas of the State. The Quimby Act allows cities and counties to establish requirements for new development to dedicate land for parks, pay an in lieu fee, or provide a combination of the two.

The Quimby Act provides two standards for the dedication of land for use as parkland. If the existing area of parkland in a community is greater than 3 acres per 1,000 residents, then the community may require dedication based on a standard of up to 5 acres per 1,000 persons residing in the subdivision based on the current ratio of parkland per 1,000 residents. If the existing amount of parkland in a community is less than 3 acres per 1,000 residents, then the community may require dedication based on a standard of only 3 acres per 1,000 persons residing in the subdivision.

The Quimby Act requires a city or county to adopt standards for recreational facilities in its general plan to establish a parkland dedication or fee ordinance.

It should be noted that the Quimby Act applies only to the acquisition of new parkland; it does not apply to the physical development of new park facilities or associated operations and maintenance costs. Therefore, the Quimby Act effectively preserves open space needed to develop park and recreation facilities, but it does not ensure the development of the land or the provision of park and recreation services to residents. In addition, the Quimby Act applies only to residential subdivisions. Nonresidential projects could contribute to the demand for park and recreation facilities without providing land or funding for such facilities. Quimby Act fees are collected by the local agency (park district, city, or county) in which the new residential development is located.

Local

Fresno Desirable Park Facility Standard

The City provides Fresno residents with several types of parks and facilities. Parks are defined as land owned, leased, or provided to the City and used for public recreational purposes. Among these are several Fresno Metropolitan Flood Control District (FMFCD) stormwater retention and detention basins which serve as passive and active parks (from April to November). The City's General Plan defines various classes of park space and sets standards for the amount of park acreage that should be provided per thousand population. Table 3.16-2 below shows the desirable park facility standards within the City.

Table 3.16-2: Desirable Park Facility Standards

Park Type	Size Range (Acreage)	Service Area Radius
Pocket	0.5 to 2	Up to 0.5 mile
Neighborhood	2.01 to 10	Up to 1 mile
Community	10.01 to 40	Up to 4 miles
Regional	More than 40[a]	100,00 residents
Trail/Greenway/Parkway	Varies	Entire City

Notes:
[a] Some parks with less than 40 acres may be classified as Regional if they provided a unique opportunity such as river access.
Source: City of Fresno General Plan, 2014. Chapter 5, Parks and Open Space, Table 5-1.

Park types in the General Plan are classified as follows:

- **Pocket Park.** A park up to 0.5 to 2.0 acres in size and intended to serve the needs of a smaller, specific neighborhood located within a 0.5-mile radius. Pocket Parks should include amenities to draw neighbors to the park such as a tot lot, picnic bench, or shade structure. New Pocket Parks developed within new subdivisions are maintained as part of a Home Owners Association (HOA) or Community Facilities District (CFD).
- **Neighborhood Park.** A park of more than 2.0 acres and up to 10 acres in size, which provides basic recreational activities for neighborhoods located generally within a 0.5-mile radius. There are two types of Neighborhood parks, active and passive. These parks contribute to neighborhood identity and accommodate a range of facilities, such as play fields and courts, children's play structures, picnic tables, and restrooms and may include a small center with a multipurpose room, but also may provide passive recreational features such as walking trails, community gardens, or nature areas.
- **Community Park.** A park of more than 10 acres and up to 40 acres in size (typically at least 20 acres), which helps to define a community or district and is intended to serve the more active recreational needs of persons who live or work up to a 2- to 4-mile radius. These parks typically include facilities such as lighted sport fields and a community center building with a

gym, meeting rooms, and restrooms. Other features may include swimming pools, tennis courts, concession stands, community-defining public art, and a courtyard or plaza.

- **Regional Park.** A large park of more than 40 acres in size, which is meant to serve a large number of residents across a broad area of the City or around 100,000 residents. Regional parks typically include community park features that allow for a variety of sports and active recreation. Some are large enough to enable Fresno to host local and regional tournaments or events that bring revenue to the City and local businesses in the form of additional patrons and tax revenue generated. Regional parks also provide unique public facilities, such as the Shinzen Japanese Garden, the Chaffee Zoological Gardens, or natural areas with hiking trails, fishing opportunities, and access to the San Joaquin River. Parks that provide unique opportunities, such as river access, have been categorized as Regional Parks even though they are less than 40 acres in size.
- **Trail/Greenway/Parkway.** A network of linear open space of varying size, typically intended to accommodate walking and bicycling opportunities for leisure, exercise, and commuting purposes. These parkways typically include paved surfaces for bicyclists and walkers and, in appropriate locations, may include equestrian trails.

The current Citywide standard for parks is a ratio of 3.0 acres per 1,000 residents for Pocket, Neighborhood, and Community Parks; this was established under the City's previous Urban Growth Management Program and current General Plan. The Parks Master Plan also exists to increase growth and management of Fresno's park system and was updated in 2017. The Parks Master Plan is continuing to be developed and will refine and adjust as necessary General Plan policies, figures, tables, narrative, open space land use designations, and trail alignments, including the General Plan Parks, Open Spaces, and Schools Element described below. Additionally, in 2021, Measure P was established within the Fresno Code of Ordinances to improve Fresno's existing parks and recreational areas.

Fresno General Plan

Parks, Open Space, and Schools Element

Objective POSS-1 Provide an expanded, high quality and diversified park system, allowing for varied recreational opportunities for the entire Fresno community.

Policy POSS-1-a **Parkland Standard.** Implement a standard of at least three acres of public parkland per 1,000 residents for Pocket, Neighborhood, and Community Parks throughout the City, while striving for five acres per 1,000 residents for all parks throughout the City, subject to identifying additional funding for regional parks and trails.

Policy POSS-1-b Parks Implementation Planning. Conduct ongoing planning to implement park policies established in this General Plan and continue to strive for well-maintained and fully accessible playgrounds, with accessible amenities, throughout the City.

- Keep an up-to-date inventory of existing and planned parks, including locations mapped on the Parks and Open Space Diagram;
- Plan for acquiring new parkland designated in the General Plan, as shown in Figure POSS-1;
- Establish a standard protocol for working with new development to arrange for parkland acquisition and dedication;
- Establish a protocol for working with established neighborhoods to provide needed parks, including the fostering of neighborhood and district associations to help plan, acquire, improve, and care for public parks, and coordinating new City service facilities to provide new open space;
- Establish detailed design, construction, and maintenance standards;
- Prepare an assessment of the recreation needs of existing and future residents;
- Create an action plan defining priorities, timeframes, and responsibilities;
- Adopt and implement a comprehensive financing strategy for land acquisition, park development, operations, and maintenance;
- Identify opportunities for using existing or planned park space as passive stormwater storage, treatment, and conservation areas that also provide scenic and/or recreational opportunities;
- Identify opportunities for siting and using existing or planned park space as passive “purple pipe” wastewater storage, treatment, and conservation areas that also provide scenic and/or recreational opportunities; and
- Update the Parks Master Plan.

Policy POSS-1-c Public Input in Park Planning. Continue to provide opportunities for public participation in the planning and development of park facilities and in the creation of social, cultural, and recreational activities in the community.

Policy POSS-1-d Additional parkland in certain areas. Strive to obtain additional parkland of sufficient size to adequately serve underserved neighborhood areas and along Bus Rapid Transit (BRT) corridors in support of new and intense residential and mixed-use infill development.

- Identify, where appropriate, joint-use opportunities in siting parks with other City service facility needs.

Policy POSS-1-e Criteria for Parks in Development Areas. Continue to use park size and service area criteria for siting new parks and planning for parks in Development Areas:

Policy POSS-1-f Parks and Open Space Diagram. Require parks to be sited and sized as shown on the Parks and Open Space Diagram (Figure POSS-1) of the General Plan, subject to the following:

- All new park designations carry dual land use designations, so that if a park is not needed, private development consistent with zoning and development standards may be approved. (See Figure LU-2: Dual Designation Diagram in the Urban Form, Land Use, and Design Element).
- Revised and/or additional park sites will be identified through subsequent implementation and planning in established neighborhoods and Development Areas.
- Locations for future park sites as shown on Figure POSS-1 are schematic to the extent that park sites may be relocated as necessity and opportunity dictate, and a General Plan amendment is not required if the park continues to serve the target areas as determined by the Planning Director.
- A park may be located on any suitable land in the general vicinity of the sites depicted. However, the zoning of potential park sites must be made consistent with the General Plan.

Policy POSS-1-g **Regional Urban Forest.** Maintain and implement incrementally, through new development projects, additions to Fresno's urban forest to delineate corridors and the boundaries of urban areas and to provide tree canopy for bike lanes, sidewalks, parking lots, and trails.

Objective POSS-2 Ensure that adequate land, in appropriate locations, is designated and acquired for park and recreation uses in infill and growth areas.

Policy POSS-2-a Identify opportunities to site, develop, and co-locate Fire and Police stations with needed parks and open space as joint-use facilities.

Capital Improvement Plans should be updated to reflect this policy.

Policy POSS-2-b Park and Recreation Priorities. Use the following priorities and guidelines in acquiring and developing parks and recreation facilities:

- Acquire and develop neighborhood park space in existing developed neighborhoods that are deficient of such space and in areas along BRT corridors that are designated as priorities for encouraging new mixed-use transit-oriented development.
- Provide accessible recreation facilities in established neighborhoods with emphasis on those neighborhoods currently underserved by recreation facilities.
- Improve established neighborhood parks with emphasis on those neighborhoods with the greatest need.
- Acquire and develop neighborhood and community parks in new Development Areas.
- Recognize community parks as a special need in areas that lack these facilities or are planned for transit supportive urban densities, and explore all potential sources of revenue to secure and develop appropriate sites including joint-use facilities.

- Develop new special purpose parks, such as outdoor gym equipment, natural resource based trail parks, equestrian centers, dog parks, and amphitheaters, as well as alternative recreation facilities, such as community recreation centers, passive wildlife observation parks, cultural heritage and diversity parks, military veterans memorial parks, and universal access open space parks.
- Acquire and develop park and open space in established neighborhoods and Development Areas, prioritizing existing neighborhoods with the greatest deficiencies, so that all residents have access to park or open space within 0.5 mile of their residence. Develop these facilities to be fully accessible to individuals with disabilities as required by law.

Policy POSS-2-c Review of Development Applications. Coordinate review of all development applications (i.e., site plans, conditional use permits, and subdivision maps) in order to implement the parks and open space standards of this Plan.

- Assure the provision of adequate active and passive open spaces and facilities as appropriate within residential subdivisions through Citywide Development Code requirements for mandatory dedication and improvement of land and/or development fees.
- Require the provision of appropriate outdoor living areas or private open space in multifamily residential developments not subject to the Subdivision Map Act.
- Request open space easements where feasible and warranted to secure appropriate public use of sensitive areas with scenic or recreation values and for buffering space for sensitive areas.
- Require provision of appropriate open space areas in private projects, in the form of trails, enhanced landscaped setbacks, parks, and water features.
- Evaluate the merits of establishing a development bonus entitlement program in which development incentives (i.e., bonus densities, bonus floor area square footage) are provided for contributions to public recreational facilities on-site or in the vicinity of the development project.

Policy POSS-2-e Open Space Dedication for Residential Development. Ensure new residential developments provide adequate land for parks, open space, landscaping, and trails through the dedication of land or otherwise providing for Pocket Parks, planned trails, and other recreational space maintained by an HOA, CFD, or other such entity.

Objective POSS-3 Ensure that park and recreational facilities make the most efficient use of land; that they are designed and managed to provide for the entire Fresno community; and that they represent positive examples of design and energy conservation.

Policy POSS-3-a Centralized Park Locations. Site parks central and accessible to the population served while preserving the integrity of the surrounding neighborhood.

Policy POSS-3-b Park Location and Walking Distance. Site Pocket and Neighborhood parks within 0.5 mile walking distance of new residential development.

Policy POSS-3-c Link Parks with Walkways. Link public open space to adjacent, schools, and residential uses and Activity Centers through a series of landscaped linear walkways and bikeways that enhance and encourage pedestrian use.

Policy POSS-3-d Sidewalks to Connect Neighborhoods. Sidewalks should be designed for internal neighborhood circulation and to connect neighborhoods to other residential areas, parks, community trails, shopping, and major streets.

Policy POSS-3-e Minimum Park Size for Active Recreation. Minimize City acquisition or acceptance of dedication of park sites less than two acres in size for active recreational uses, except where maintenance costs are secured through a CFD, HOA, or other such mechanism.

Policy POSS-3-f Park Design Guidelines. Create, maintain, and apply park design guidelines, with provisions for appropriate amenities for each park type, which may include:

- Minimum and maximum shade.
- Protections from shading by adjacent buildings.
- Accessibility to persons with disabilities.
- Street trees and landscaped median strips in adjacent arterial roads.
- Art and points of attraction.
- Landscape and hardscape features.
- Street furniture, signage, and lighting.
- Food sales and entertainment.
- Restroom facilities, play structures, and picnic shelters.
- Landscape design synthesis with input from civil engineers and hydrologists, educators and daycare providers, fitness trainers and coaches, police officers, and experts in crime prevention through environmental design, as appropriate.
- Solar panels, new LED lighting, and water efficiency improvements.
- Sports field areas designed to allow periodic changes in field locations to minimize wear areas and provide sufficient fields to host regional, state, or national tournaments.
- Using topography to create interesting and visually appealing spaces and forms.
- Use of waterways as a key design influence, a focus of restoration, and an opportunity to provide for public enjoyment of views.
- Reflecting the agricultural and horticultural heritage of the site or area.
- Connecting with surrounding areas in a way that encourages expanded pedestrian activity.
- Creating individual places within a park that respond to the needs of a broad range of park users, from youth to the elderly.
- Creating places of delight that engage the senses.

- Creating places that engage the mind, by treating park features as opportunities for interpretation and questioning.
- Using sustainable design practices, and highlighting these as opportunities for learning.

Policy POSS-3-g **Park Security and Design**. Promote safety, attractiveness, and compatibility between parks and adjacent residential areas through design, maintenance, and enforcement of park regulations.

- Require the installation of security lighting for parking, points of access, and building areas at all public recreation and park sites.
- Keep neighborhood eyes on parks to increase security.

Policy POSS-3-h **Coordination with School Districts.** Continue to coordinate with school districts to explore opportunities for joint-use of both outdoor and indoor recreation facilities, such as playgrounds, play fields, and gymnasiums, for City recreation programs.

Policy POSS-3-I **Joint Use with Drainage Facilities.** Continue to seek joint-use agreements for use of FMFCD stormwater drainage facilities.

Objective POSS-4 Pursue sufficient and dedicated funding for parks acquisition, operations, and maintenance.

Policy POSS-4-a **Supplemental Revenue.** Seek revenue sources to supplement General Fund support for basic park maintenance and basic recreational services.

Policy POSS-4-b **Operation and Maintenance Financing.** Continue to require new residential development to form lighting and landscaping maintenance districts or community facility districts or ensure other means of financing to pay for park operations and maintenance.

Policy POSS-4-c **Improvements in Established Neighborhoods.** Seek agreements with formal neighborhood associations and institutions for improvements and ongoing maintenance of parks in established neighborhoods.

Policy POSS-4-d **Maintain Adopt-A-Park Program.** Continue promoting the City's Adopt-A-Park program that utilizes partnerships with local organizations to preserve, beautify, and maintain Fresno's neighborhood parks.

Fresno Southeast Development Area Specific Plan

According to the SEDA Specific Plan, Neighborhood Town Centers would provide the majority of SEDA residents with essential walk, bike, transit, and short-drive access to civic services and amenities, including elementary schools, local parks, community gardens, and other services. Public gathering places that provide visual relief and passive recreation would be located in the mixed-use centers and should be surrounded by civic buildings and any commercial or mixed-use buildings

located in the center. The SEDA Specific Plan contains policies and objectives relevant to the provision of parks and recreation areas, which are shown below:

Urban Form Element

Objective UF-1 Create complete neighborhoods in the Southeast Development Area that integrate housing, business and retail amenities. Implement a Southeast Development Area plan that balances and mixes housing, jobs, commercial businesses, services, and public facilities to help meet existing thresholds for lower vehicle miles traveled, reduced air pollution, and the efficient use of groundwater resources in compliance with the Sustainable Groundwater Management Act of 2014.

Policy UF-1.5 **Public Facilities and Open Spaces**. Support the development of public infrastructure, facilities, and parks that meet the needs of Plan Area residents according to the policies and standards set in the Open Space, Schools, and Public Facilities Chapter and the General Plan.

Objective UF-5 Provide a well-balanced transportation network accessible to all users.

Policy UF-5.3 **Bicycle and Pedestrian Travel**. Promoting a network of pedestrian and bicycle routes, including dedicated trails, multipurpose paths, and priority Bicycle Boulevards throughout the Plan Area will serve work, school, and recreational trips and provide options for healthier outcomes within the community. In addition, both existing and proposed regional trails will be coordinated in tandem within this walkable and bikeable network. The Fresno General Plan Figure MT-2: Paths and Trails and the Active Transportation Plan (ATP) identify active trails.

Policy UF-5.6 **Performance Standards & Evaluation.** Transit will be provided as demand warrants. Upon Plan, buildout or when warranted, 10-minute peak-period headways will be provided along the BRT corridor (e.g., Kings Canyon), and 15-minute peak-period headways shall be provided for high-priority transit routes (e.g., De Wolf, Clovis).

In addition, all other transit routes in the planning area shall be operated at 30-minute headways upon Plan completion. Extended hour or late-night service shall be provided at 60-minute headways.

- Bus stop locations are generally placed at ¼ mile spacing. Bus stop placement will be prioritized at:
  - Schools and medical facilities
  - Libraries, parks, senior centers, and recreation facilities
  - Concentrated commercial areas
  - Concentrated residential and employment areas

1. **Bicycles:** A user-friendly bicycle network will be provided to welcome all riders throughout the entire Plan Area. Bicycle lanes including Class II and Class IV

facilities should be provided on all Super Arterials, Arterials, and Local Streets. A Bicycle network should be designated on Neighborhood or Local Streets. Ensuring the safety of vulnerable users will be an important priority, as the Plan will seek to create a network of easy to use, lower stress amenities that provide the ability to connect riders to key destinations throughout the City, as descripted in the Fresno Active Transportation Plan (2017).

2. **Pedestrians:** A first-class pedestrian system shall be provided, including sidewalks on all streets, bicycle/pedestrian trails, and other design elements that prioritize safety and convenience for pedestrians, as described in the Fresno Active Transportation Plan (2017).

3. **Vehicles:** A highly connected, grid-based roadway system shall be provided for efficient vehicular travel. Please see the Streets and Circulation Standards in the Development Code and the City of Fresno's Department of Public Works Standard Drawings.

Open Space Element

Objective OS-1 Collaborate with local and regional agencies and organizations to create and support the elements of the SEDA open space network.

Policy OS-1.1 **Joint Use of Open Spaces**. Establish agreements to share facilities between the City of Fresno and Fresno Metropolitan Flood Control District, Fresno Irrigation District, and other local and regional agencies and organizations. At a minimum, and as early as possible with respect to development plans, the City of Fresno shall:

- Establish joint-use agreements with Clovis Unified and Sanger Unified school districts to provide shared community access to school grounds and City-owned facilities.
- Establish joint-use agreements with the Fresno Metropolitan Flood Control District to provide access to storm drainage/recharge basins for recreational use, where appropriate.
- Establish joint-use agreements with the Fresno Irrigation District to provide public access to areas adjacent to canals and creeks. These agreements should address issues associated with the provision of canal side trails, where appropriate.
- Coordinate with Fresno County and the City of Clovis to provide regional recreational opportunities where potential exists.
- Pursue joint-use and partnership opportunities with other public and private agencies to help finance, manage, or provide services within the SEDA open space system.

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.1 **Active Open Space**. Maximize active recreational opportunities in the open space network. Active space includes playgrounds, fields, hardcourts, pools, and other facilities for sports and other physical activities.

Objective OS-4 Develop and maintain a greenway trail network connected to the SEDA circulation network that maximizes daily travel and recreation opportunities by linking Town Centers to destinations within and beyond the Southeast Development Area.

Policy OS-4.1 **Multiuse Trails.** Establish a planned network of multiuse greenway trails. These trails will serve bicyclists, pedestrians, and, where appropriate, equestrians. Cross sections and width requirements will be provided for specific conditions- including canal side, open space, streetside and farm side trails.

Policy OS-4.2 **Regional Trails.** Coordinate regional trail planning with Fresno County, the City of Clovis, and other jurisdictions as appropriate. The City of Fresno Active Transportation Plan calls for Class I Bicycle Paths along each canal in the SEDA. A regional Rails to Trails Bicycle Path is planned to run parallel to California Avenue should existing railroad lines be vacated.

Policy OS-4.3 **Trail Standards.** Trails shall be designed with features that encourage use, provide safety, and are resource efficient. Trail standards shall address shading, low-water landscaping, fencing, paving and surface materials, lighting, seating and furniture, ADA access requirements, signage, and intersection treatments.

Policy OS-4.4 **Trail Segments.** Trail segments will not be constructed until all necessary property or easements are acquired for an entire segment.

Policy OS-4.5 **SEDA Trails Master Plan.** Prior to the design and construction of the SEDA trail system, a SEDA Trails Master Plan will need to be completed that would define the final location and alignment of trails.

Policy OS-4.6 **Trail Security.** Trails will be designed with privacy and security in mind for adjacent property owners.

Objective OS-7 Collaborate with school districts and local agencies to develop schools and other public facilities that meet the Southeast Development Area's goals for community, fiscal, and environmental sustainability.

Policy OS-7.2 **Joint Use of School and Community Facilities**. Pursue agreements to share facilities between schools and other community-serving institutions. Since the provision of shared facilities affects the siting, size, and design of schools, joint-use arrangements should be considered early in the facilities planning process.

- Create a master joint-use agreement that establishes the parameters for shared use between the City of Fresno/Fresno PARCS and school districts. Thereafter, create site-specific cooperative agreements for each facility.
- Establish joint-use agreements with schools to make school grounds (playfields and outdoor recreation areas) available for community use during non-school hours.

- Pursue partnerships among school districts, governmental agencies, higher education, and/or nonprofit organizations to fund and develop joint-use facilities with schools, such as multipurpose rooms, gymnasiums, childcare facilities, elder care facilities, adult education facilities, libraries, teacher education facilities, and schoolyard community gardens.

Objective OS-10 Civic facilities, such as libraries, community centers, senior centers, post offices, and other civic buildings, will be integrated into the urban fabric of centers and communities, and will be well-served by public transit, paths, and trails.

Policy OS-10.2 **Availability of Civic Facilities**. Civic facilities will be located in proximity to homes, transit, and safe pedestrian and bicycle routes and clustered with other facilities (such as parks) and services as appropriate. The SEDA Plan contains standards for the location of civic uses within Mixed-Use Districts and Residential Districts; please refer to the Urban Form Chapter for details on the SEDA Development Code.

All civic facilities must meet accessibility standards as established by the Americans with Disabilities Act (ADA) Standards and Title 24 California Building Code.

- **Community Recreation Centers:** All homes within the SEDA will be located within 4 miles of a community recreation center. Community recreation centers must be accessible by safe pedestrian and bicycle routes and be served by local transit.
- **Libraries:** Libraries must be accessible by safe pedestrian and bicycle routes and be served by local transit.

Community Farming and Agriculture Element

Objective CF-2 Create a long-term transition zone between urban uses in the City of Fresno and agricultural land in Fresno County. Buffering urban and adjoining agricultural land uses reduce conflicts that can arise due to noise, pollution, or traffic.

Policy CF-2.2 **Passive Recreation.** Encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians.

- What is the role of rural cluster development?
  - **A transitional buffer.** Urban areas and large agricultural operations cannot always sit side-by-side. Noise, dust, and pesticides from farms can pose health concerns for residents, while farmers need space to move machinery and goods. Rural clusters along the eastern edge of SEDA form a transition between the urban area and the agricultural lands beyond.
  - **An attractive residential option.** Rural clusters offer a rural lifestyle within an environmentally responsible land use framework that promotes active farming and open space preservation.
  - **A means to preserve land.** Rural cluster lands can be used for organic small-scale farming, equestrian activities, or other uses compatible with the nearby

homes. The vast majority of the land is preserved as viable agricultural land or open space.

Greenhouse Gas Reductions and Resource Conservation Element

Objective RC-4 Ensure that there will be no adverse effects on regional groundwater levels by minimizing groundwater extraction and replenishing groundwater used to serve the Southeast Development Area. Maximize multiple uses of open space by encouraging new recharge facilities to be accessible to the public.

Policy RC-4.4 Utilization of Recreation and Open Spaces as Groundwater Recharge Areas. Support recreation opportunities with a range of parks and multiuse trails by establishing joint-use agreements with Fresno Metropolitan Flood Control District to allow access to storm drainage/recharge basins for recreational use, when appropriate (see the Open Space, Schools and Public Facilities Chapter).

Parks Master Plan

The Fresno Parks Master Plan was created in 2017 and articulates a vision for improving Fresno's park and open space system based on community engagement and thorough analysis.[3] Through the examination of the City's General Plan parkland acreage goals, population growth, and demographic information, the provision of parks, recreational programs, and recreational amenities by neighborhoods was examined. This information was used to create a master plan that aims to improve the quality of existing parks, improve park safety, and close systematic gaps between park land and resource allocations.

Fresno Municipal Code

Section 12-4.701 of the Fresno Municipal Code (Municipal Code) discusses the park facilities required to implement the goals, objectives, and policies of the General Plan and to mitigate the impacts caused by future development in the City. The City Council has determined that a Park Facilities Fee is needed in order to pay for (a) land acquisition for and design, engineering, and construction of the public facilities designated in the Council resolution and reasonable costs of outside consultant studies related thereto; (b) to reimburse the City for designated public facilities construction by the City with funds (other than gifts or grants) from other sources together with accrued interest; (c) to reimburse developers who have designed and constructed designated public facilities which are oversized and supplemental size, length, or capacity; and/or (d) to pay for and/or reimburse costs of program development and ongoing administration of the Park Facilities Fee program.

3.16.4 - Methodology

FCS reviewed information about parks and recreation providers in and near the Plan Area and in the City of Fresno. The General Plan, Specific Plan, the Parks Master Plan and City websites were reviewed for relevant information.

[3] City of Fresno. 2017. Fresno Parks Master Plan. Website: https://www.fresno.gov/darm/wp-content/uploads/sites/10/2016/10/FinalDraftoftheFresnoParksMasterPlanwithAppendixA.pdf. Accessed January 24, 2023.

3.16.5 - Thresholds of Significance

Recreation

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist to determine whether impacts to recreation are significant environmental effects. Would the project:

a) Increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?

b) Include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment?

3.16.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the project and provides mitigation measures where appropriate.

Increase Use of Parks

Impact REC-1:	**The proposed project would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.**

Impact Analysis

The City provides various parks, trails, and community facilities throughout the City. It is estimated that the proposed project would add approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre Plan Area by the year 2050. As such, there would be a corresponding increase in population and an increased demand for parks and recreational facilities. The proposed project would meet the General Plan standard of 3 acres of public parkland per 1,000 residents and the General Plan standard of 2 acres of regional parks, open space/natural areas, and special use parks/facilities per 1,000 residents through policies that would encourage new parks and recreational facilities.

The proposed project's open space system would provide open spaces and parks for active and passive recreation. The proposed project would include corridors for trails and paths that connect many areas of the Plan Area, which would provide recreational opportunities for residents, employees, customers, and visitors. Neighborhood Town Centers would provide for nearly all homes to be located within walking distance of recreation areas. Trail systems would connect regional and sub-regional destinations for bicyclists, pedestrians, and equestrians (where appropriate). Multiuse trails would be parallel to canals and other east–west open space networks within the Plan Area. There will also be a network of bicycle lanes reflective of the Fresno Active Transportation Plan (ATP). This will consist of Class I and Class II Bike Lanes and other bicycle facilities as described in the Caltrans Bikeway Classification Guide and Figure MT-2 of the Fresno City General Plan. The bicycle/pedestrian network would at least consist of on-street bike lanes (Class II facilities), and on-street bicycle facilities with a barrier between the bikeway and traffic (Class IV facilities) and sidewalks. Class I Bike/Pedestrian Paths within the Plan Area would exist along East Jensen Avenue,

East Kings Canyon Road, parallel to the Fresno Canal near Olive Road, and parallel to the Gould Canal near East Clinton Avenue.

Development under the proposed project would be required to comply with General Plan objectives and policies related to parks and recreational facilities. Future development under the proposed project would be required to comply with General Plan Policy POSS-2-c, which requires review of development applications in order to implement the parks and open space standard, and General Plan Policy POSS-2-e, which ensures that new residential developments provide adequate land for parks and open space, along with other recreational space.

The Specific Plan includes policies to create recreational opportunities for residents. For example, Policy OS-2.1 would maximize active recreational opportunities in the open space network. Active space includes playgrounds, fields, hardcourts, pools, and other facilities for sports and other physical activities. Policy CF-2.2 would encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians. Policy RC-4.4 would support recreational opportunities with a range of parks and multiuse trails by establishing joint-use agreements with FMFCD to allow access to storm drainage/recharge basins for recreational use, when appropriate.

Finally, new development that occurs pursuant to the proposed project would be required to comply with Municipal Code Sections 12-4.701 through 12-4.706, which requires each development to pay a Park Facilities Fee in order to mitigate the impacts on park facilities caused by future development in the City. This would ensure that new development provides adequate parks and recreational facilities that meet the Citywide parks and open space standard of 3 acres per 1,000 residents. There are currently no existing City parks within the Plan Area. The nearest City park to the Plan Area is Melody Park located 1.6 miles from the project site. At this distance, the proposed project would not impact currently existing parks. Therefore, impacts would be less than significant.

Level of Significance

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Recreational Facilities Physical Effect on Environment

Impact REC-2:	**The proposed project could include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment.**

Impact Analysis

Implementation of the proposed project is projected to generate an increase in the population, requiring the dedication of new parks and recreational facilities. As discussed in Section 3.14,

Population and Housing, the addition of up to 45,000 new residential units could accommodate 136,800 residents by 2050.

The Plan Area does not currently contain any parkland that is maintained by the City. In order to meet the Citywide parks and open space standard of 3 acres per 1,000 residents, the proposed project would require approximately 410.4 acres of parks by 2050. The proposed project would facilitate the creation of parks and recreational facilities. As discussed previously, Policy OS-2.1 would maximize active recreational opportunities in the open space network. Active space includes playgrounds, fields, hardcourts, pools, and other facilities for sports and other physical activities. Policy CF-2.2 would encourage the creation of regional trails and open spaces in Rural Cluster Districts that connect urban uses to agricultural uses with trails for pedestrians, bicyclists, and equestrians. Policy RC-4.4 would support recreational opportunities with a range of parks and multiuse trails by establishing joint-use agreements with FMFCD to allow access to storm drainage/recharge basins for recreational use, when appropriate. Furthermore, development within the Plan Area would be required to comply with Municipal Code Section 12-4.701 through 12-4.706, which requires payment of park facilities fees to finance park facility improvements.

The population increase projected under the proposed project is within the population growth contemplated by the General Plan, and the General Plan PEIR has already addressed impacts related to the provision of new or altered park facilities. However, the proposed project would incorporate new zone districts and planned land use types, resulting in the need for up to 410.4 acres of additional parkland. Therefore, impacts related to the provision of parks and recreation services would require mitigation. Mitigation Measure (MM) REC-1 would require the City to monitor residential population growth compared to development of new parklands to meet the ratio of 3 acres of parkland per 1,000 population. With implementation of MM REC-1, impacts would be less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM REC-1 As new development occurs in the Plan Area, the City shall periodically (every 5 years) monitor residential population growth compared to development of new parklands for the purpose of evaluating the strength of this Plan to meet the ratio of 3 acres of parkland per 1,000 population. If the ratio is not met, the City shall explore additional ways to increase the amount of dedicated parkland in the Plan Area, including but not limited to designating additional lands for parkland development.

Level of Significance After Mitigation

Less than significant impact with mitigation incorporated.

3.16.7 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for Recreation impacts is the Plan Area and portions of the City of Fresno, City of Clovis, and unincorporated Fresno County adjacent to the Plan Area. This analysis evaluates whether impacts of the Specific Plan, together with impacts of cumulative development, would result in a cumulatively significant impact with respect to lands use and planning. This analysis then considers whether incremental contribution of the impacts associated with implementation of the Specific Plan would be significant. Both conditions must apply for cumulative effects to rise to the level of significance.

As stated above, implementation of the proposed project would result in up to 45,000 new residential units, which could accommodate 136,800 residents by 2050. At full buildout, the proposed project would require approximately 410.4 acres of usable parkland to meet the Citywide parks and open space standard of 3 acres per 1,000 residents. Parkland refers to Pocket, Neighborhood, and Community parks. The Plan Area currently does not have any City-managed parkland.

The General Plan identified the need for nearly 2,313 acres of new Pocket, Neighborhood, and Community parks by the General Plan horizon year of 2035 in the City's Sphere of Influence (SOI). As identified under impact REC-2 discussion above, future development under the proposed project could include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment. Individual development projects would be required to comply with the Park Facilities Impact Fee, which would allow new parks to be constructed at appropriate sites within the cumulative setting and adequately maintained. However, cumulative impacts could be significant, as the proposed project would incorporate new zone districts and planned land use types, resulting in the need for up to 410.4 acres of parkland to meet the Citywide parks and open space standard of 3 acres per 1,000 residents. Therefore, implementation of MM REC-1, which requires the City to monitor residential population growth compared to development of new parklands to meet the ratio of 3 acres of parkland per 1,000 population, would ensure potential impacts would be addressed and mitigated to meet the parkland requirements. Cumulative impacts would be less than significant with mitigation incorporated.

Level of Cumulative Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Cumulative Mitigation Measures

None.

Project Specific Cumulative Mitigation Measures

Implement MM REC-1.

Level of Cumulative Significance After Mitigation

Less than significant impact with mitigation incorporated.

3.17 - Transportation and Traffic

3.17.1 - Introduction

This section describes existing conditions related to transportation in the project area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to transportation that could result from implementation of the project. Information in this section is based on the project-specific Transportation Impact Assessment (TIA) (included as Appendix H).

As further discussed in Chapter 1, Introduction, 15 public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to the project's potential Transportation and Traffic impacts.

- Recommends that a peak-hour ramp queue is completed at each of the following SR-180 intersections to determine potential impacts: De Wolf Avenue, Highland Avenue, and McCall Avenue.
- Requests all future development evaluate traffic safety impacts on the State Highway Systems due to new pedestrian and bicyclist needs due to the proposed project, specifically SR-180 interchanges at Fowler Avenue and Temperance Avenue and intersections at De Wolf Avenue, Highland Avenue, and McCall Avenue.
- Requests that all future development under the proposed project should conduct a Vehicle Miles Traveled (VMT) analysis and determine whether development under the proposed project would be required to pay a VMT Mitigation Impact Fee.
- Requests that all future residential development under the proposed project include affordable housing units.
- Recommends that the City establish policies for the installation of Level 2 Electric Vehicle (EV) charging for single-and multi-family residential units as well as DC Fast Charging EV charging stations for retail, commercial, park, and public facilities.
- Recommends that the Draft PEIR includes implementation guidelines for multimodal strategies, such as those that originate from Transit Oriented Development (TOD), in an effort to further reduce future projects' traffic-related impacts.
- Support of active transportation plans and smart growth efforts that aid the State's 2050 Climate goals.
- Requests early engagement on all future development under the proposed project that could affect the State right-of-way.
- Recommends that a Traffic Impact Study be prepared.
- States that any work done within the County-road right-of-way to construct a new driveway or improve an existing driveway will require an Encroachment Permit from the Road from the Fresno Department of Public Works.

- States that any grading will require either an engineered grading and drainage plan, road improvement plan, and permit or voucher and must comply with the City standards/requirements forwarded to the City of Fresno.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.17.2 - Environmental Setting

Project Site

The project proposes to develop 9,000 acres of mixed-use development in the southeast corner of the City of Fresno (City). In total, there would be approximately 45,000 housing units (split between 26,000 single-family dwelling units and 19,000 multi-family dwelling units), 12,000 retail employees, 8,000 office employees, and 17,000 civic institutional employees, for a total of 37,000 employees at full buildout.

The location of the nearly 9,000-acre Plan Area is in the southeast portion of the City, in Fresno County, California. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the west by Locan, Temperance, and Minnewawa Avenues.

Roadway Facilities

Regional roadway facilities providing access to the proposed Southeast Development Area (SEDA) are via SR-180. Local access to the SEDA Specific Plan Area (Plan Area) is provided by various arterials and collectors. Exhibit 3.17-1 shows the proposed major street circulation network for the proposed project.

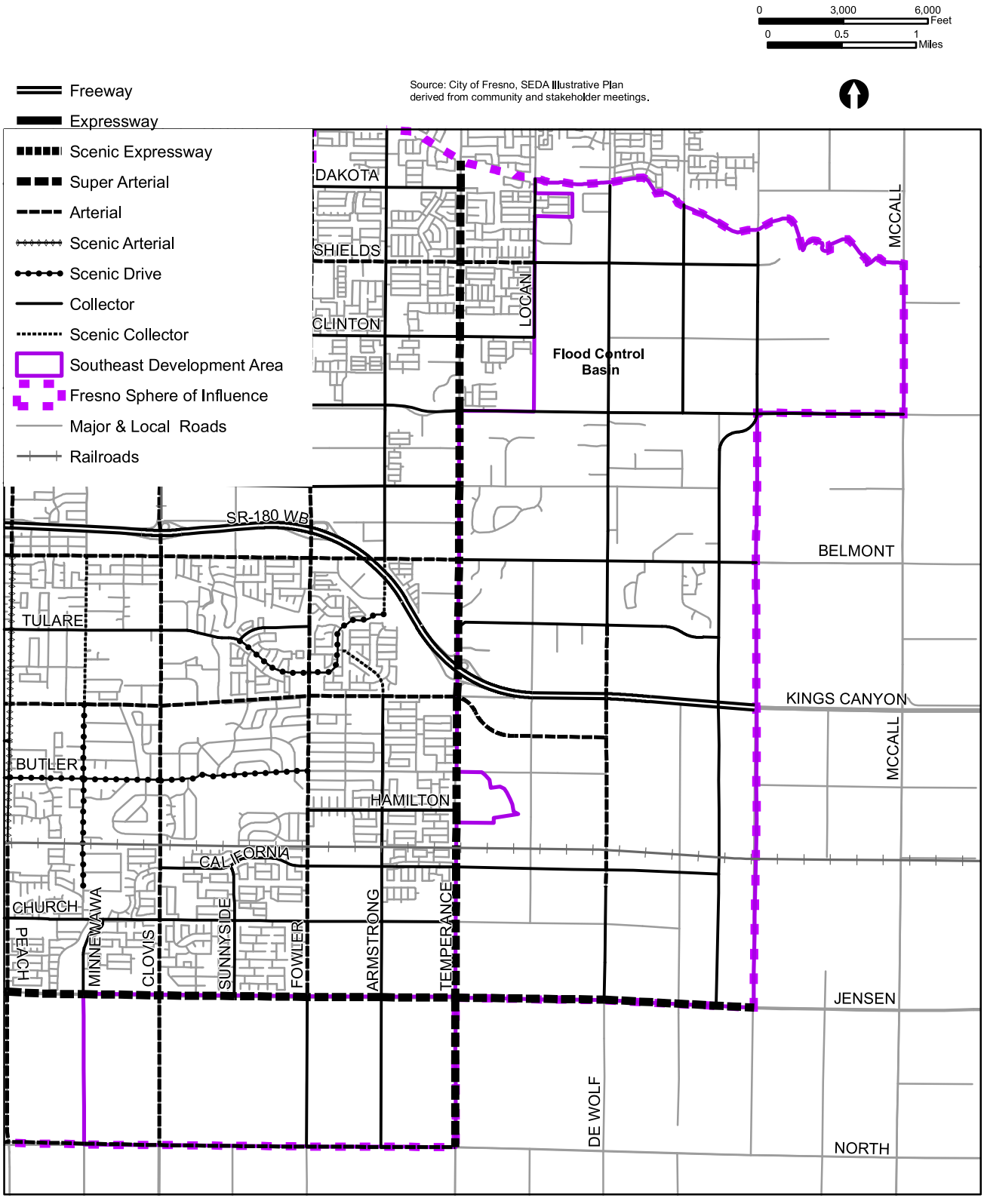
SR-180 is a six-lane, east–west State Highway in Fresno County (County) connecting Centerville to the east and Mendota to the west. It runs through the central portion of SEDA, and its speed limit is 65 miles per hour (mph). The highway merges with Kings Canyon Road when the highway portion ends near De Wolf Avenue.

Kings Canyon Road is a four-lane, east–west arterial that connects downtown Fresno to SR-180 in the east. It runs through the central portion of the SEDA development, and its speed limit is 40 mph.

Clovis Avenue is primarily a four-lane, north–south arterial in eastern Fresno, connecting residents from Clovis to SR-99. It is primarily a six-lane arterial within the Plan Area, and surrounding land uses include single-family and commercial/retail uses. The speed limit along Clovis Avenue is 45 mph.

PROPOSED MAJOR STREET CIRCULATION

Southeast Development Area



Source: City of Fresno

FIRSTCARBON SOLUTIONS™

Exhibit 3-17.1
Proposed Major Street Circulation Network

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Temperance Avenue is a four-lane, north–south arterial in Fresno with an interchange at SR-180. Land adjacent to Temperance Avenue consists of mostly farmland, and the road becomes a two-lane facility south of Hamilton Avenue. The speed limit along Temperance Avenue is 40 mph.

De Wolf Avenue is a two-lane, north–south collector in eastern Fresno County that runs perpendicular to SR-180. Land adjacent to the road consists of mostly farmland, and the road connects multiple elementary schools. It runs through the central portion of the Plan Area. The speed limit along De Wolf Avenue is 45 mph.

McCall Avenue is a two-lane, north–south collector in eastern Fresno County that intersects with SR-180. Land adjacent to the road consists of mostly farmland, and the road connects the City of Selma to Fresno. It runs through the eastern edge of the Plan Area. The speed limit along McCall Avenue is 40 mph.

Jensen Avenue is a four-lane, east–west arterial in southern Fresno that connects SR-99 with the City of Sanger. The land adjacent to Jensen Avenue consists mostly of farmland, and the road runs through the southern portion of the SEDA Specific Plan Area. The speed limit along Jensen Avenue is 45 mph.

Belmont Avenue is a two-lane, east–west collector in eastern Fresno that runs north of and parallel to SR-180. The land adjacent to the road consists of mostly farmland, and the road runs through the central portion of the Plan Area. The speed limit along Belmont Avenue is 45 mph.

Tulare Avenue is a two-lane, east–west collector in eastern Fresno that runs south of and parallel to SR-180. The land adjacent to the road consists of mostly suburban tracts, and the road runs through the central portion of the Plan Area. The speed limit along Tulare Avenue is 40 mph.

Armstrong Avenue is a two-lane, north–south collector in eastern Fresno that runs parallel to Temperance Ave. The land adjacent to the road consists of mostly rural tracts, and the road runs through the western portion of the Plan Area. The speed limit along Armstrong Avenue is 45 mph.

Fowler Avenue is a two-lane, north–south collector in eastern Fresno that runs parallel to Temperance Ave. The land adjacent to the road consists of mostly rural tracts, and the road is located at the western boundary of the Plan Area. The speed limit along Fowler Avenue is 45 mph.

North Avenue is a two-lane, east–west collector in eastern Fresno that runs parallel to Jensen Avenue. The land adjacent to the road consists of mostly rural tracts and agricultural fields, and the road runs through the southern portion of the Plan Area. The speed limit along North Avenue is 40 mph.

Pedestrian Facilities

Walkability is defined as the ability to travel easily, safely, and comfortably between various origins and destinations without having to rely on automobiles or other motorized travel. The ideal "walkable" community includes wide and shaded sidewalks, a mix of vertical and horizontal land uses abutting the street, such as residential, employment, and shopping opportunities, a mix of

densities, a limited number of conflict points with vehicle traffic, easy access to transit facilities and services, and a network of pedestrian facilities. Pedestrian facilities consist of crosswalks, sidewalks, bulb-outs, pedestrian refuges, pedestrian signals, and off-street paths, which provide safe and convenient routes for pedestrians to access the destinations such as institutions, businesses, public transportation, and recreation facilities. Pedestrian facilities must be Americans with Disabilities Act (ADA)-compliant.

As this project is a Specific Plan proposed in an area that is currently rural and developed in Fresno County, there are very limited pedestrian facilities in the project vicinity.

Bicycle Facilities

The 2016 City of Fresno Active Transportation Plan (ATP) outlines policies and objectives to improve the current active transportation system that includes walking and biking. The various bicycle facilities throughout the City and its Sphere of Influence are described below.

- **Class I Shared-Use Path**: Class I bikeways are a completely separate right-of-way designed for the exclusive use of cyclists and pedestrians, with minimal crossings for motorists. These paths are often located along creeks, canals, and rail lines. There is one small Class I bike path near Temperance Avenue and Shields Avenue on the northwestern portion of the Plan Area.
- **Class II Bike Lanes**: Class II bike lanes use special lane markings, pavement legends, and signage. Bike lanes provide designated street space for bicyclists, typically adjacent to outer vehicle travel lanes. Buffered bike lanes increase separation through painted buffers between vehicle lanes and/or parking, and green paint at conflict zones (e.g., driveways or intersections). There are no existing Class II facilities, but there are many planned in the Fresno General Plan (General Plan) and in the SEDA plan for the project area.
- **Class III Bike Routes**: Bike routes provide enhanced mixed-traffic conditions for bicyclists through signage, shared arrow (sharrow) striping, and/or traffic calming treatments and provide continuity to a bikeway network. Bike routes are typically designated along gaps between bike trails or bike lanes or along low-volume, low-speed streets. Bicycle boulevards further enhance bike routes by encouraging slower speeds and discouraging non-local vehicle traffic using traffic diverters, chicanes, traffic circles, and speed tables. There are no existing Class III facilities in the project area, but there are many planned in the SEDA plan for the future.
- **Class IV Bikeway**: Bikeways are also known as cycle tracks or separated bikeways and are set aside for the exclusive use of bicycles and physically separated from vehicle traffic. Separated bikeways were adopted by the California Department of Transportation (Caltrans) in 2015. Separation may include grade separation, flexible posts, physical barriers, or on-street parking. There are no existing Class IV facilities in the project area, but there are many planned Class IV facilities in the future within SEDA.

Transit Facilities

Fresno Area Express (FAX) is the local bus system for the City. Currently, there are no bus lines that run through the Plan Area. Bus Routes 1, 22, and 35 run on Clovis Street near the Plan Area but do

not directly serve the Plan Area. There are plans to extend the Fresno bus rapid transit line (Route 1) into the Plan Area in the future and to add local transit routes to significant origins and destinations with the project area.

Existing Peak-hour Traffic Volumes For Study Segments

The existing operations of the study roadway segments were evaluated for the highest 1-hour volumes during weekday morning and evening peak periods. In addition to peak-hour, daily volumes were also evaluated. Table 3.17-1, below, shows the list of segments that have count data from Fresno County.

Table 3.17-1: Existing Conditions Study Segment Traffic Volumes

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
Clovis Avenue south of American Avenue	1	1,037	1,154	14,404
De Wolf Avenue north of McKinley Avenue	2	472	326	2,766
De Wolf Avenue south of McKinley Avenue	3	282	248	1,881
De Wolf Avenue south of Clinton Avenue	4	332	228	2,271
De Wolf Avenue north of Jensen Avenue	5	187	174	1,693
De Wolf Avenue south of Jensen Avenue	6	95	120	1,139
Jensen Avenue east of Bethel Avenue	7	924	1,057	13,941
Jensen Avenue east of De Wolf Avenue	8	608	718	9,710
Jensen Avenue west of De Wolf Avenue	9	503	715	8,609
Jensen Avenue east of Temperance Avenue	10	1,015	801	9,856
Jensen Avenue west of Temperance Avenue	11	1,019	876	10,748
Kings Canyon Road east of Temperance Avenue	12	4	4	52
Locan Avenue north of Tulare Avenue	13	18	17	162
Locan Avenue south of Tulare Avenue	14	12	19	154
McCall Avenue north of McKinley Avenue	15	500	382	4,197
McCall Avenue north of Ashlan Avenue	16	390	439	5,167
McCall Avenue north of Belmont Avenue	17	485	518	5,730
Tulare Avenue east of Locan Avenue	18	24	27	248
Tulare Avenue west of Locan Avenue	19	38	54	595
North Street west of Temperance Avenue	20	193	216	2,442
Source: Transportation Impact Assessment (TIA). 2022.				

Existing Vehicle Miles Traveled

For existing conditions VMT, the Plan Area was overlaid on top of the Fresno County Council of Government's (Fresno COG) Activity Based Travel Demand Model (FresnoABM) loaded vehicle assignment network. Total VMT for the SEDA Specific Plan (Specific Plan) was calculated by multiplying daily volumes on the model's loaded network by distance traveled. In addition, VMT per Service Population (which is the sum of population and employees) was calculated using the FresnoABM's land use database. Table 3.17-2 summarizes the existing VMT from the FresnoABM for the Plan Area.

Table 3.17-2: Existing Conditions VMT

Category	2015 Base Year Model
SEDA VMT	330,350
Population	3,410
Employment	2,306
SEDA VMT per Service Population	57.79
Notes: SEDA = Southeast Development Area VMT = Vehicle Miles Traveled Source: Transportation Impact Assessment (TIA). 2022.	

3.17.3 - Regulatory Framework

Federal

Applicable federal regulations pertaining to transportation are addressed in other sections of this Draft PEIR, including Air Quality, Greenhouse Gas Emissions, and Hazardous Materials.

The federal Clean Air Act, the Infrastructure Investment and Jobs Act (IIJA), and the ADA may have some relevance or influence for individual projects or actions as part of subsequent implementation of the proposed project.

Federal Highway Administration/Federal Transit Administration

The Moving Ahead for Progress in the 21st Century Act (MAP-21) established new requirements for Metropolitan Planning Organizations (MPOs) to set Transportation Performance Management (TPM) targets and to integrate those targets and plans into their planning documents by certain dates. The Bipartisan Infrastructure Law carries forward performance-based planning requirements. Beginning in 2018, federal rules require that state departments of transportation and MPOs implement federal performance measures. In response, the Federal Highway Administration (FHWA) and Federal Transit Administration (FTA) have worked with state and regional agencies to identify performance measures that meet the requirements. In California, Caltrans is directly responsible for submitting performance targets and periodic progress reports to federal agencies in a timely manner. MPOs are required to establish targets for the same performance measures on all public roads in the MPO planning area within 180 days after the state establishes each target. MPOs may elect to support the

statewide targets, establish numerical targets specific to their region, or use a combination of both approaches. Furthermore, each MPO must incorporate these short-range targets into their planning and programming processes, including the long-range plan and Transportation Improvement Program (TIP). Transportation performance measures are managed through different metrics, including safety, bridge and pavement conditions, congestion/system performance, Transit Asset Management (TAM), and transit agency safety plan. States and MPOs must integrate performance-based planning and programming into the long-range transportation plans. Regional transportation plans must include performance measures and targets, as well as a description of progress toward the targets. In addition, the TIP must provide a description on how investment in the TIP will contribute toward achieving those targets in the Regional Transportation Plan (RTP).

The FHWA defines TPM as a strategic approach that uses system information to make investment and policy decisions to achieve national performance goals by setting and tracking the targets. TPM is systematically applied, a regular ongoing process that provides key information to help decision-makers, allowing them to understand the investment consequences across transportation assets or modes. It ensures that the targets and measures are developed in cooperative partnerships among decision-makers, stakeholders, and the traveling public, and that those targets are based on data and objective information. The Statewide and Non-metropolitan Transportation Planning and Metropolitan Planning Final Rule establishes that states and MPOs must coordinate their respective targets with each other to ensure consistency to the maximum extent practical. The individual state Departments of Transportation and MPOs are expected to use information and data generated to inform their transportation planning and programming decisions. TPM provides a means to achieve national transportation goals, increase federal aid programs' accountability and transparency, and improve project decision-making through performance-based planning and programming.

State

California Department of Transportation Level of Service Goals

California Department of Transportation (Caltrans) builds, operates, and maintains the State highway system, including the interstate highway system. Caltrans's mission is to improve mobility Statewide. The department operates under strategic goals to provide a safe transportation system, optimize throughput and ensure reliable travel times, improve the delivery of State highway projects, provide transportation choices, and improve and enhance the State's investments and resources. Caltrans controls the planning of the State highway system and accessibility to the system. Caltrans establishes Level of Service (LOS) goals for highways and works with local and regional agencies to assess impacts and develop funding sources for improvements to the State highway system. Caltrans requires encroachment permits from agencies or new development before any construction work may be undertaken within the State's right-of-way. For projects that would impact traffic flow and levels of services on State highways, Caltrans would review measures to mitigate the traffic impacts. Caltrans has adopted the 2020 Transportation Analysis Framework (TAF), which sets the standards criteria used to identify impacts in the project-specific TIA and this Draft PEIR.

California Public Utilities Commission

The California Public Utilities Commission (CPUC) sets guidelines for interactions between railroad facilities and ground transportation facilities. This includes location and type of crossing guards, design of railroad crossings, and other design criteria in and around railroad facilities. The guidelines come in the form of general orders. General Order No. 75-D: Regulations Governing Standards for Warning Devices for At-Grade Highway-Rail Crossings in the State of California provides regulations that govern the standards for warning devices for at-grade highway-rail crossings for motor vehicles, pedestrians, and/or bicycles. All warning devices shall be in substantial conformance with the applicable Standards, Guidance, and Options set forth in the Manual on Uniform Traffic Control Devices adopted by Caltrans.

Senate Bill 375

Senate Bill (SB) 375, The Sustainable Communities and Climate Protection Act of 2008 (Chapter 728, Statues of 2008) provides guidance regarding curbing emissions from cars and light trucks. There are four major components to SB 375. First, SB 375 requires regional greenhouse gas (GHG) emissions reduction targets. These targets must be updated every 8 years in conjunction with the revision of the housing and transportation elements of local general plans. Second, MPOs are required to create a Sustainable Communities Strategy (SCS) that provides a plan for meeting regional targets. Third, SB 375 requires regional housing elements and transportation plans to be synchronized on 8-year schedules. Finally, MPOs must use transportation and air emissions modeling techniques that are consistent with the guidelines prepared by the California Transportation Commission (CTC).

Under SB 375, some development and transportation projects assumed as a part of the proposed project may be eligible to use a streamlined version of the environmental review process. Among other criteria, these projects must be consistent with the land use designation, density, intensity, and policies of the Fresno COG's RTP and fall within the identified criteria for development and transportation projects.

California Complete Streets Act of 2008

Assembly Bill (AB) 1358, also known as the California Complete Streets Act of 2008, requires cities and counties to include "complete street" policies in their general plans. These policies address the safe accommodation of all users, including bicyclists, pedestrians, motorists, public transit vehicles and riders, children, the elderly, and the disabled. These policies can apply to new streets as well as the redesign of corridors. The City adopted their Complete Streets Policy (Resolution 2019-205) in 2019.

Senate Bill 743

In November 2017, the Governor's Office of Planning and Research (OPR) released a technical advisory containing recommendations regarding the assessment of VMT, proposed thresholds of significance, and potential mitigation measures for lead agencies to use while implementing the required changes contained in SB 743. Also in November 2017, OPR released the proposed text for Section 15064.3, "Determining the Significance of Transportation Impacts," which summarized the

criteria for analyzing transportation impacts for land use projects and transportation projects and directs lead agencies to "choose the most appropriate methodology to evaluate a project's vehicle miles traveled, including whether to express the change in absolute terms, per capita, per household or in any other measure." OPR recommends that, for most instances, a per Service Population threshold should be adopted and that a 15 percent reduction below that of existing development would be a reasonable threshold.

As noted in the OPR Guidelines, agencies are directed to choose metrics that are appropriate for their jurisdiction to evaluate the potential impacts of a project in terms of VMT. The current deadline for adopting policies to implement SB 743 was July 2020; the change to VMT was formally adopted as part of updates to the California Environmental Quality Act (CEQA) guidelines in December 2018.

The updated guidelines eliminate the use of automobile delay metrics, such as LOS, from determining significant environmental impacts from vehicle travel. VMT has been identified as the most appropriate metric to evaluate a project's transportation impacts as projects that result in lower-than-average VMT support goals of reducing GHG emissions, while projects that result in higher-than-average levels of vehicle travel contribute to an increasing rate of GHG emissions.

Projects that are within 0.5-mile of an existing major transit stop, which is defined as a rail transit station, ferry terminal served by bus or rail transit, or at the intersection of two or more major bus routes with service frequencies of 15-minutes or less during the morning and afternoon peak commute periods, are presumed to be less than significant if the project has the following characteristics:

- Has a floor area ratio (FAR) greater than 0.75.
- Does not include more parking for use by residents, customers, or employees of the project than required by the jurisdiction (if the jurisdiction requires the project to supply parking).
- Is consistent with the applicable SCS (as determined by the lead agency, with input from the MPO).
- Does not replace affordable residential units with a smaller number of moderate or high-income residential units.

If a project meets the screening requirements, it is presumed to have a less than significant impact related to VMT.

Since there are no standards in effect on VMT analysis, a preliminary assessment of the VMT generated by the proposed project was prepared for informational and disclosure purposes only. No determination on the significance of VMT impacts is made in this document since none is legally required.

Evacuation Routes Assembly Bill 747

AB 747 requires local governments, on or after January 1, 2022, to review and update their safety element to identify evacuation routes and their capacity, safety, and viability under a range of emergency scenarios. A county or city that has adopted a local hazard mitigation plan, emergency operations plan, or other document that fulfills commensurate goals and objectives may use that

information in the safety element to comply with this section and, in that event, shall summarize and incorporate into the safety element that other plan or document.

Residential Emergency Evacuation Routes Senate Bill 99

SB 99 requires all cities and counties, upon the next revision of the housing element on or after January 1, 2020, to update the safety element to include information identifying residential developments in any hazard area identified in the safety element that do not have at least two emergency evacuation routes.

California Bicycle Transportation Act

The California Bicycle Transportation Act (1994) requires all cities and counties to have an adopted bicycle master plan to apply for the Bicycle Transportation Account (BTA) funding source. The City's existing plan, the ATP includes the City's plans for bicycle and pedestrian infrastructure.

Regional Regulations

Fresno Council of Governments

The Fresno Council of Governments (Fresno COG) is an association of local governments in Fresno County. Fresno COG provides transportation planning and funding for the region and serves as a forum for the study and resolution of regional issues. In addition to preparing the region's long-range transportation plan, Fresno COG assists in planning for transit, bicycle networks, clean air, and airport land uses.

2022-2046 Fresno COG Regional Transportation Plan and Sustainable Communities Strategy

California's SB 375 (Steinberg, 2008) encourages coordinated transportation and land use planning to reduce greenhouse gas (GHG) emissions and requires each MPO to prepare an SCS as an integrated element of the RTP that is updated every four years. The SCS is intended to identify integrated land use and transportation strategies that lower per capita GHG emissions from cars and light-duty trucks and to foster communities that are more equitable, healthy, and sustainable.

The 2022-2046 Fresno COG RTP/SCS (Fresno COG 2022) is a federally mandated, long-range, fiscally constrained transportation plan for Fresno County. As a fiscally constrained plan, it includes only those projects which can be delivered with funds expected to be available and that will help attain and maintain air quality standards. The RTP/SCS also includes an integrated land use and transportation plan to meet greenhouse gas emission reduction targets set forth by the California Air Resources Board (ARB). The RTP/SCS comprehensively assesses all forms of transportation available in Fresno County as well as travel and goods movement needs through 2046.

The 2022-2046 RTP/SCS contains the following goals and policies relevant to the proposed project:

Goal 1 Improved mobility and accessibility for all.

Policy 1 Encourage and prioritize full, fair, and equitable participation by all affected communities in transportation decision-making and planning processes.

Policy 2 Actively work to ensure equitable distribution of the benefits and burdens of transportation projects.

Policy 3 Promote the improvement and expansion of accessible transportation options to serve the needs of all residents, especially those who have historically faced disproportionate transportation burdens.

Goal 2 Vibrant communities that are accessible by sustainable transportation options.

Policy 4 Encourage alternatives to single-occupancy vehicles that reduce Vehicle Miles Traveled (VMT) and greenhouse gas emissions.

Policy 5 Support investment in and promotion of active transportation and transit to improve public health and mobility, especially in historically underinvested areas.

Policy 6 Encourage sustainable development that focuses growth near activity centers and mobility options that achieve greater location efficiency.

Policy 7 Support local jurisdictions' efforts to minimize the loss of farmland, environmentally sensitive areas, and natural resources.

Policy 8 Support local jurisdictions' efforts to facilitate the development of diverse housing choices for all income groups.

Policy 9 Facilitate and promote interagency coordination and consistency across planning efforts.

Policy 10 Incentivize and support efforts to improve air quality and minimize pollutants from transportation.

Goal 3 A safe, well-maintained, efficient, and climate-resilient multimodal transportation network.

Policy 11 Prioritize investment in and promote multimodal safety measures to reduce traffic fatalities and incidents in the region.

Policy 12 Promote enhanced Transportation Systems Management (TSM) and Transportation Demand Management (TDM) strategies to reduce congestion and vehicle miles traveled.

Policy 13 Encourage improvements in travel connections across all modes to create an integrated, accessible, and seamless transportation network.

Policy 14 Maximize the cost-effectiveness of transportation improvements.

Policy 15 Encourage investments that increase the system's resilience to extreme weather events, natural disasters, and pandemics.

Policy 16 Preserve and maintain existing multimodal transportation assets in a state of good repair.

Goal 4 A transportation network that supports a sustainable and vibrant economy.

Policy 17 Support local and regional economic development by leveraging planning and transportation funds that foster public and private investment.

Policy 18 Facilitate efficient, reliable, resilient, and sustainable goods movement.

Goal 5 A region embracing clean transportation, technology, and innovation.

Policy 19 Support innovative mobility solutions that are accessible, affordable, reduce greenhouse gas emissions, and improve air quality.

Policy 20 Support efforts to expand broadband access throughout the region.

Fresno-Clovis Metropolitan Area Short Range Transit Plan

The Fiscal Year (FY) 2022-2026 is the biennial update to the operating plans and capital programs of Fresno County's two urban transit providers—FAX and Clovis Transit. The purpose of the Fresno-Clovis Metropolitan Area (FCMA) Short Range Transit Plan (SRTP) is to promote a comprehensive, coordinated, and continuous planning process for transit service in the FCMA over a 5-year planning horizon. This short-range plan proposes specific recommendations for implementing the long-range objectives of Fresno County's 2022-2046 Fresno COG RTP/SCS and will guide the provision of transit services in the FCMA over the next 5 years.

Local Regulations

Fresno County Regional Bicycle and Recreational Trails Master Plan (2013)

The Fresno County Regional Bicycle and Recreational Trails Master Plan provides a comprehensive long-range view for the development of an extensive regional bikeway and recreational trails network that connects cities and unincorporated areas countywide. The plan also implements the October 2000 Fresno County General Plan, according to Transportation and Circulation Element Policy TR-D.1 - 8, and meets the requirements of Proposition 116, the Clean Air and Transportation Improvement Act of 1990, as set forth in Section 891.2 (items a–k) of the California Streets and Highways Code. With an approved plan, Fresno County and local municipalities are eligible for non-motorized transportation infrastructure project funding, including BTA grants.

Fresno General Plan

The General Plan (2014) contains the following objectives and policies relevant to the proposed project:

Objective MT-1 Create and maintain a transportation system that is safe, efficient, provides access in an equitable manner, and optimizes travel by all modes.

Policy MT-1-a **Transportation Planning Consistent with the General Plan.** Continue to review local, regional and inter-regional transportation plans and capital improvement plans, and advocate for the approval and funding of State highway and rail projects, consistent with the General Plan and discourage projects inconsistent with the General Plan.

Policy MT-1-b **Circulation Plan Diagram Implementation.** Design and construct planned streets and highways that complement and enhance the existing network, as well as future improvements to the network consistent with the goals, objectives and policies of the General Plan, as shown on the Circulation Diagram (Figure MT-1), to ensure that each new and existing roadway continues to function as intended.

Policy MT-1-d **Integrate Land Use and Transportation Planning.** Plan for and maintain a coordinated and well-integrated land use pattern, local circulation network and transportation system that accommodates planned growth, reduces impacts on adjacent land uses, and preserves the integrity of established neighborhoods.

Policy MT-1-e **Ensure Interconnectivity Across Land Uses.** Update development standards and design guidelines applicable to public and private property to achieve Activity Centers, neighborhoods and communities which are well connected by pedestrian, bicycle, appropriate public transportation and automobile travel facilities.

Policy MT-1-f **Match Travel Demand with Transportation Facilities**. Designate the types and intensities of land uses at locations such that related travel demands can be accommodated by a variety of viable transportation modes and support Complete Neighborhoods while avoiding the routing of excessive or incompatible traffic through local residential streets.

Policy MT-1-g **Complete Streets Concept Implementation.** Provide transportation facilities based upon a Complete Streets concept that facilitates the balanced use of all viable travel modes (pedestrians, bicyclists, motor vehicle and transit users), meeting the transportation needs of all ages, income groups, and abilities and providing mobility for a variety of trip purposes, while also supporting other City goals.

Policy MT-1-j **Transportation Improvements Consistent with Community Character.** Prioritize transportation improvements that are consistent with the character of surrounding neighborhoods and supportive of safe, functional and Complete Neighborhoods; minimize negative impacts upon sensitive land uses such as residences, hospitals, schools, natural habitats, open space areas, and historic and cultural resources.

Policy MT-1-k **Multimodal Level of Service Standards.** Develop and use a tiered system of flexible, multimodal Level of Service standards for streets designated by the Circulation Diagram (Figure MT-1). Strive to accommodate a peak-hour vehicle LOS of D or better on-street segments and at intersections, except where Policies MT-1-m through MT-1-p provide greater specificity. Establish minimum acceptable service

levels for other modes and use them in the development and environmental review process.

Objective MT-2 Make efficient use of the City's existing and proposed transportation system and strive to ensure the planning and provision of adequate resources to operate and maintain it.

Policy MT-2-b **Reduce Vehicle Miles Traveled and Trips.** Partner with major employers and other responsible agencies, such the San Joaquin Valley Air Pollution Control District and the Fresno Council of Governments, to implement trip reduction strategies, such as eTRIP, to reduce total vehicle miles traveled and the total number of daily and peak-hour vehicle trips, thereby making better use of the existing transportation system.

Policy MT-2-c **Reduce VMT through Infill Development.** Provide incentives for infill development that would provide jobs and services closer to housing and multimodal transportations corridors in order to reduce citywide Vehicle Miles Traveled (VMT).

Policy MT-2-f **Optimization of Roadway Operations.** Optimize roadway operations by continuing to expand the use of techniques such as the City's Intelligent Transportation System (ITS) to manage traffic signal timing coordination in order to improve traffic operations and increase traffic-carrying capacity, while reducing unnecessary congestion and decreasing air pollution emissions.

Policy MT-2-g **Transportation Demand Management and Transportation System Management.** Pursue implementation of Transportation Demand Management and Transportation System Management strategies to reduce peak-hour vehicle traffic and supplement the capacity of the transportation system.

Objective MT-4 Establish and maintain a continuous, safe, and easily accessible bikeways system throughout the metropolitan area to reduce vehicle use, improve air quality and the quality of life, and provide public health benefits.

Policy MT-4-b **Bikeway Improvements**. Establish and implement property development standards to assure that projects adjacent to designated bikeways provide adequate right-of -way and that necessary improvements are constructed to implement the planned bikeway system shown on Figure MT-2 to provide for bikeways, to the extent feasible, when existing roadways are reconstructed; and alternative bikeway alignments or routes where inadequate right-of-way is available.

Policy MT-4-c **Bikeway Linkages.** Provide linkages between bikeways, trails and paths, and other regional networks such as the San Joaquin River Trail and adjacent jurisdiction bicycle systems wherever possible.

Policy MT-4-h **Bicycle Parking Facilities.** Promote the installation of bicycle locking racks and bicycle parking facilities at public buildings, transit facilities, public and private

parking lots, and recreational facilities. Establish standards for bicycle parking in the Development Code.

Policy MT-4-I **Bicycling and Public Transportation.** Promote the integration of bicycling with other forms of transportation, including public transit. Continue to provide bike racks or space for bicycles on FAX buses.

Objective MT-5 Establish a well-integrated network of pedestrian facilities to accommodate safe, convenient, practical, and inviting travel by walking, including for those with physical mobility and vision impairments.

Policy MT-5-a **Sidewalk Development.** Pursue funding and implement standards for development of sidewalks on public streets, with priority given to meeting the needs of persons with physical and vision limitations; providing safe routes to school; completing pedestrian improvements in established neighborhoods with lower vehicle ownership rates; or providing pedestrian access to public transportation routes.

Policy MT-5-b **Sidewalk Requirements.** Assure adequate access for pedestrians and people with disabilities in new residential developments per adopted City policies, consistent with the California Building Code and the Americans with Disabilities Act.

Policy MT-5-c **New Subdivision Design.** Do not approve new single-family residential subdivisions with lots that front and access on to a major roadway, unless the City Traffic Engineer determines that no other feasible alternative means of vehicle access can be provided and that sufficient design measures can be implemented, such as an on-site driveway turnaround, landscaped buffering, or an on-street parking lane to assure a desirable and enduring residential environment.

Policy MT-5-d **Pedestrian Safety.** Minimize vehicular and pedestrian conflicts on both major and non-roadways through implementation of traffic access design and control standards addressing street intersections, median island openings and access driveways to facilitate accessibility while reducing congestion and increasing safety. Increase safety and accessibility for pedestrians with vision disabilities through the installation of Accessible Pedestrian Signals at signalized intersections.

Objective MT-8 Provide public transit options that serve existing and future concentrations of residences, employment, recreation and civic uses and are feasible, efficient, safe, and minimize environmental impacts.

Policy MT-8-a **Street Design Coordinated with Transit.** Coordinate the planning, design, and construction of the major roadway network with transit operators to facilitate efficient direct transit routing throughout the Planning Area.

Policy MT-8-b **Transit Serving Residential and Employment Nodes.** Identify the location of current and future residential and employment concentrations and Activity Centers throughout the transit service area in order to facilitate planning and

implementation of optimal transit services for these uses. Work with California State University, Fresno to determine locations within the campus core for bus stops.

Policy MT-8-c **New Development Facilitating Transit.** Continue to review development proposals in transportation corridors to ensure they are designed to facilitate transit. Coordinate all projects that have residential or employment densities suitable for transit services, so they are located along existing or planned transit corridors or that otherwise have the potential for transit orientation to FAX, and consider FAX's comments in decision-making.

Objective MT-9 Provide public transit opportunities to the maximum number and diversity of people practicable in balance with providing service that is high in quality, convenient, frequent, reliable, cost- effective, and financially feasible.

Policy MT-9-a **Equitable Transit Provision.** Provide transit that can serve all residents, including older residents and persons with disabilities.

City of Fresno Active Transportation Plan

The Fresno ATP, adopted in 2017, is a comprehensive guide outlining the vision for active transportation in the City and a roadmap for achieving that vision. The ATP envisions a complete, safe, and comfortable network of trails, sidewalks, and bikeways that serves all residents of Fresno. This plan seeks to achieve the following goals:

- Equitably improve the safety and perceived safety of walking and bicycling in Fresno
- Increase walking and bicycling trips in Fresno by creating user-friendly facilities
- Improve the geographic equity of access to walking and bicycling facilities in Fresno
- Fill key gaps in Fresno's walking and bicycling networks

To achieve these goals, the ATP proposes a long-term, comprehensive network of citywide bikeways, trails, and sidewalks that connect all parts of Fresno. Since this buildout network will take many years to complete, the ATP also identifies a priority network of connected bikeways and priority pedestrian areas to focus the City's efforts in the near-term. These priority networks provide links to key destinations, support existing and future walking and biking activity areas, and equitably serve neighborhoods throughout the City.

The recommended buildout network would add 166 miles of Class I Bike Paths, 691 miles of Class II Bike Lanes, 69 miles of Class III Bike Routes, 21 miles of Class IV Separated Bikeways, and 661 miles of sidewalks. This recommended network only includes planned Class IV facilities in locations identified in the Downtown Neighborhoods Community Plan, Fulton Corridor Specific Plan, and on Maroa Avenue and Fresno Street as alternatives to Blackstone Avenue. However, recommendations out of the Fresno Council of Governments Separated Bikeway Feasibility Study may identify additional corridors for Class IV implementation, and some corridors planned for Class II bike lanes in this plan may be considered for Class IV treatment during the project development phases.

This plan updates and supersedes the existing City Bicycle, Pedestrian, & Trails Master Plan (CF BMP) that was adopted in 2010. In addition to updating elements of the CF BMP, the ATP includes more robust planning for pedestrian travel and infrastructure than presented in the CF BMP. While the CF BMP focused primarily on bicycling, the ATP includes goals and plans for all forms of active transportation by expanding analysis of pedestrian facilities. Therefore, this plan serves as the City's bicycle master plan and pedestrian master plan.

The City ATP contains the following goals relevant to transportation and circulation:

- Equitably improve the safety and perceived safety of walking and bicycling in Fresno
- Increase walking and bicycling trips in Fresno by creating user-friendly facilities
- Improve the geographic equity of access to walking and bicycling facilities in Fresno
- Fill key gaps in Fresno's walking and bicycling networks

Fresno Complete Streets Policy

The Fresno Complete Streets Policy's intent is to aid in the planning, design, and construction of transportation facilities that balance safety, access, and mobility for users of all abilities and ages. This Complete Streets Policy is implemented in all neighborhoods, with particular attention to areas identified as priority areas in the ATP and corridors with high collision rates. This policy is intended to guide implementation of the complete street and multimodal objectives and policies outlined in the General Plan. Prioritization of projects will be determined using the adopted Active Transportation Project Prioritization Tool. The policy requires that all development—public and private—and new construction projects within the public right-of-way, such as reconstruction/retrofit, resurfacing, repaving, restriping, and rehabilitation transportation projects, shall be planned, designed, constructed, operated, and maintained so that all modes of transportation allow all users to move safely, comfortably, conveniently, and independently.

CEQA Guidelines for Vehicle Miles Traveled

The City of Fresno adopted SB 743 guidelines in June 2020 and set significance thresholds for land use plans in Chapter 4 of the SB 743 guidance document. It shares that the ARB establishes greenhous gas (GHG) emission targets for 18 MPOs in the State.[1] The ARB established a 13 percent GHG reduction target for Fresno County, which can be accomplished by reducing VMT by 13 percent. Therefore, the City has established a threshold for land use developments of 13 percent reduction or more than existing regional VMT per capita, indicating a significant environmental impact.

Fresno Southeast Development Area Specific Plan

The SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these

[1] Fresno Council of Governments. 2021. Fresno County SB 743 Implementation Regional Guidelines. Website: https://fresnocog.wpenginepowered.com/wp-content/uploads/2021/01/Fresno-COG-VMT-Report_01-08-2021.pdf. Accessed January 5, 2023.

overlapping goals. The proposed Specific Plan contains the following policies and programs related to traffic and circulation:

Urban Form Element

Objective UF-5 Provide a well-balanced transportation network accessible to all users.

Policy UF-5.1 **Circulation Plan and Street Standards.** Implement a circulation plan which provides a variety of transportation options necessary to meet the needs of residents and employees within the SEDA.

In order to promote connectivity throughout the Plan Area, all SEDA streets rights-of-way shall be publicaly accessible and shall not include gates or access controls, except where permitted through special review by the City of Fresno.

Policy UF-5.2 **Transit Service.** Safe, convenient and frequent transit service will be provided to and within the SEDA via regional transit connections along Kings Canyon Boulevard alignment and potentially, along existing rail right-of-ways. Local service will be provided along primary internal circulation corridors, including Arterials and Collectors.

- **Regional transit planning:** Thoughtful transit planning must occur in order to incorporate the primary centers, particularly the Regional Town Center along Kings Canyon. A Bus Rapid Transit (BRT) extension study including planning, design, and environmental analysis should be completed to evaluate the potential costs and benefits of extending the BRT to the SEDA Plan Area.
- **Station location:** The location of transit stations and stops will better serve local community members if they are placed within or adjacent to major activity centers, schools, medical facilities, public places such as libraries, parks, senior centers, and recreation facilities, commercial uses and high-density residential and employment areas.
- **Station connectivity and accessibility:** To provide opportunities for the highest possible transit use, stations will feature a convenient and accessible path of travel and will include pedestrian and bicycle connections to the surrounding street network and transit transfer points. Bus stops and stations will be oriented toward major streets and public spaces, with primary commercial entrances opening directly toward bus stops. Important to ensuring all members within the SEDA community have access to transit opportunities, bus stops and stations will comply with the accessibility requirements of the Americans with Disabilities Act (ADA).

Policy UF-5.3 **Bicycle and Pedestrian Travel.** Promoting a network of pedestrian and bicycle routes, including dedicated trails, multi-purpose paths, and priority Bicycle Boulevards throughout the Plan Area will serve work, school, and recreational trips and provide options for healthier outcomes within the community. In addition, both existing and proposed regional trails will be coordinated in tandem within this

walkable and bikeable network. The Fresno General Plan Figure MT-2: Paths and Trails and the Active Transportation Plan (ATP) identify active trails.

Policy UF-5.4 **Safe Streets.** Streets are designed for drivers, pedestrians, bicyclists and transit users within the Southeast Fresno Development Area and will enhance safety within the community. SEDA street design will reflect best practice standards as included in the City of Fresno Complete Streets Policy, adopted by the City in 2019.

Policy UF-5.5 **Ranking of Travel Modes.** In order to create a cohesive network between all modes of travel within the SEDA, the Plan will prioritize the following travel modes:

1. Pedestrian
2. Bicycle
3. High-capacity transit
4. Automobile

Policy UF-5.6 **Performance Standards and Evaluation.** Transit will be provided as demand warrants. Upon Plan, buildout or when warranted, 10-minute peak-period headways will be provided along the BRT corridor (e.g., Kings Canyon), and 15-minute peak-period headways shall be provided for high-priority transit routes (e.g., De Wolf, Clovis).

In addition, all other transit routes in the planning area shall be operated at 30-minute headways upon Plan completion. Extended hour or late-night service shall be provided at 60-minute headways.

- Bus stop locations are generally placed at ¼ mile spacing. Bus stop placement will be prioritized at:
  - Schools and medical facilities
  - Libraries, parks, senior centers, and recreation facilities
  - Concentrated commercial areas
  - Concentrated residential and employment areas

1. **Bicycles:** A user-friendly bicycle network will be provided to welcome all riders throughout the entire Plan Area. Bicycle lanes including Class II and Class IV facilities should be provided on all Super Arterials, Arterials, and Local Streets. A Bicycle network should be designated on Neighborhood or Local Streets. Ensuring the safety of vulnerable users will be an important priority, as the Plan will seek to create a network of easy to use, lower stress amenities that provide the ability to connect riders to key destinations throughout the City, as descripted in the Fresno Active Transportation Plan (2017).

2. **Pedestrians:** A first-class pedestrian system shall be provided, including sidewalks on all streets, bicycle/pedestrian trails, and other design elements that

prioritize safety and convenience for pedestrians, as described in the Fresno Active Transportation Plan (2017).

3. **Vehicles:** A highly connected, grid-based roadway system shall be provided for efficient vehicular travel. Please see the Streets and Circulation Standards in the Development Code and the City of Fresno's Department of Public Works Standard Drawings.

Policy UF-5.7 **Level of Service (LOS).** To promote Complete Streets and provide safe mobility for all users throughout the entire SEDA streets will be designed with no more than four through lanes and a continuous two-way left-turn lane (portions of Jensen and Temperance Avenues may have more than four lanes). In addition, these LOS standards are complemented by several other transportation related policies to reduce overall vehicle miles traveled (such as Complete Streets and Transportation Demand Management). The following LOS standards apply to SEDA roadways:

- LOS 'E' for Arterials, Collectors, and Local (both intersection and segment operations) during peak traffic hours.
- LOS 'F' Exception. LOS 'F' in areas with ample transit, pedestrian, and/or bicycle options, including in and around the Mixed-Use Districts of the SEDA, particularly if achieving a LOS with less delay would violate the four-lane maximum as described above.

Objective UF-6 Integrate urban form with a multimodal transportation network.

Policy UF-6.1 **Land Use and Circulation Integration.** The network of streets within the Mixed-Use Districts, Residential Districts, and Employment Center Districts will not only link districts to one another, but to other destinations beyond the Plan area, as shown in Table 2.1 Network of Streets below.

Category	Arterial	Collector	Local
Mixed-Use Districts			
Regional Town Center	X	X	X
Community Town Center	X	X	X
Neighborhood Center	–	X	X
Residential Districts			
Mixed Residential	X	X	X
Neighborhood Residential	–	X	X
Rural Residential	–	X	X
Rural Cluster Residential	–	X	X
Employment Centers			
Office Center	X	X	X

Category	Arterial	Collector	Local
Flexible Research and Development	X	X	X
Institutional	X	X	X
Source: City of Fresno 2020.			

Objective UF-8 Manage transportation demand as it occurs.

Policy UF-8.1 **SEDA Transportation Demand Management Program.** Develop a TDM Plan consistent with the City's VMT program. A mix of uses are inteded in the Plan which seek to create a more compact lifestyle and reduce VMT to meet State requirements. The program should include physical design credits (i.e., bicycle storage, on-site showers, shared parking), lifestyle credits (i.e., on-site childcare, telecommuting, flex hour programs), and credits for auto-alternative programs (i.e., shuttle service, subsidized transit, guaranteed ride home programs). Please refer to the Transportation Demand Management Programs inset for more information on these credits.

Open Space Element

Objective OS-4 Develop and maintain a greenway trail network connected to the SEDA circulation network that maximizes daily travel and recreation opportunities by linking town centers to destinations within and beyond the Southeast Development Area.

Policy OS-4.1 **Multiuse Trails.** Establish a planned network of multiuse greenway trails. These trails will serve bicyclists, pedestrians, and, where appropriate, equestrians. Cross sections and width requirements will be provided for specific conditions- including canal side, open space, streetside and farm side trails.

Policy OS-4.2 **Regional Trails.** Coordinate regional trail planning with Fresno County, the City of Clovis, and other jurisdictions as appropriate. The City of Fresno Active Transportation Plan calls for Class I Bicycle Paths along each canal in the SEDA. A regional Rails to Trails Bicycle Path is planned to run parallel to California Avenue should existing railroad lines be vacated.

Policy OS-4.4 **Trail Segments.** Trail segments will not be constructed until all necessary property or easements are acquired for an entire segment.

Policy OS-4.5 **SEDA Trails Master Plan.** Prior to the design and construction of the SEDA trail system, a SEDA Trails Master Plan will need to be completed that would define the final location and alignment of trails.

Objective OS-14 Provide water, stormwater, and wastewater infrastructure necessary to serve development in the SEDA.

Policy OS-14.2 **Curb, Gutter and Sidewalk Infrastructure.** Require all necessary infrastructure, such as curb, gutter, sidewalk, street trees, public benches, bike parking and amenities to be installed prior to the development of new residential neighborhoods and associated facilities.

3.17.4 - Methodology

Study Area

The Traffic Impact Analysis evaluated traffic conditions at 20 study segments during the AM and PM peak hours and daily conditions for a typical weekday. The study segments were based on availability of count data from the County of Fresno count database. From the count data, the AM peak-hour was between 6:30 a.m. to 8:30 a.m., while the PM peak-hour was between 4:30 p.m. to 6:30 p.m. Figure 1 of the TIA (Appendix H) illustrates the Plan Area and the roadways analyzed. The study segments and associated traffic controls are as follows:

- Clovis Avenue south of American Avenue
- De Wolf Avenue north of McKinley Avenue
- De Wolf Avenue south of McKinley Avenue
- De Wolf Avenue south of Clinton Avenue
- De Wolf Avenue north of Jensen Avenue
- De Wolf Avenue south of Jensen Avenue
- Jensen Avenue east of Bethel Avenue
- Jensen Avenue east of De Wolf Avenue
- Jensen Avenue west of De Wolf Avenue
- Jensen Avenue east of Temperance Avenue
- Jensen Avenue west of Temperance Avenue
- Kings Canyon Road east of Temperance Avenue
- Locan Avenue north of Tulare Avenue
- Locan Avenue south of Tulare Avenue
- McCall Avenue north of McKinley Avenue
- McCall Avenue north of Ashlan Avenue
- McCall Avenue north of Belmont Avenue
- Tulare Avenue east of Locan Avenue
- Tulare Avenue west of Locan Avenue
- North Avenue west of Temperance Avenue

Study Area Levels of Service

LOS grades are generally defined as follows:

A represents free-flow travel with excellent level of comfort and convenience and the freedom to maneuver.

B represents stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.

C represents stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream.

D represents high-density, but stable flow. Users experience severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.

E represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.

F represents forced or breakdown conditions. This conditions exists when volume of traffic exceeds the capacity of the roadways. Long queues form and stop-and-go traffic becomes the norm.

Table 3.17-3 shows the roadway functional class and peak-hour LOS thresholds.

Table 3.17-3: Roadway Functional Class and Peak-hour LOS Thresholds

Functional Class	Median	Lane	Peak-hour Level of Service Capacity Thresholds				
			A	B	C	D	E
Freeway	N/A[1]	4	2,720	4,460	6,630	7,720	8,630
		3+Aux[2]	2,360	3,860	5,640	3,730	7,530
		3	2,000	3,270	4,660	5,740	6,430
		2+Aux	1,650	2,700	3,850	4,760	5,340
		2	1,300	2,130	3,050	3,790	4,260
State Expressway	Divided	6	2,410	3,960	5,730	7,450	8,450
		4	1,610	2,650	3,810	4,960	5,630
		2	810	1,340	1,890	2,470	2,810
City Expressway	Raised Median	6			1,860	6,170	6,520
		5			1,520	5,110	5,430
		4			1,180	4,050	4,340
		2			520	1,910	2,160
Super Arterial	Raised Median	6				4,910	6,240
		5				4,040	5,195
		4				3,170	4,150
Arterial	Raised Median	8			2,120	7,070	7,490
		6			1,560	5,270	5,610
		5			1,280	4,370	4,670
		4			1,000	3,470	3,730
		3			720	2,555	2,795

Functional Class	Median	Lane	Peak-hour Level of Service Capacity Thresholds				
			A	B	C	D	E
		2			440	1,640	1,860
	TWLTL	4			940	3,290	3,550
		2			420	1,550	1,760
	Undivided	4			770	2,740	2,980
		2			340	1,270	1,480
Collector	TWLTL	4			940	3,290	3,550
		2			420	1,550	1,760
	Undivided	4			770	2,740	2,980
		2			340	1,270	1,480
One-Way	Undivided	3		1960	2,240	2,430	2,610
		2		1250	1,490	1,620	1,740
		1		550	740	800	870
Rural State Highway	Undivided	2	310	570	1,020	1,730	2,470
Rural Arterial	Divided	4			1,950	3,580	3,780
	Undivided	2			570	1,230	1,310
Rural Collector/Local	Undivided	2			700	930	1,000

Notes:
[1] N/A–Not applicable for operational class
[2] Aux–Auxiliary Lane
- Level of Service (LOS) is not achievable because of the type of facility.
Source: Transportation Impact Assessment (TIA). 2022..

For daily segment volume LOS analysis, the Transportation Research Board's Highway Capacity Manual Special Report 209 was used. Table 3.17-4 shows the LOS criteria for daily segment volumes based on volume-to-capacity ratios.

Table 3.17-4: LOS Thresholds for Daily Segment Volumes based on V/C Ratios

Level of Service	Description	V/C Ratios
A	Free-flow conditions with unimpeded maneuverability. Stopped delay at signalized intersection is minimal.	0.00 to 0.60
B	Reasonably unimpeded operation with slightly restricted maneuverability. Stopped delays are not bothersome.	0.61 to 0.70
C	Stable operations with somewhat more restrictions in making mid-block lane changes than LOS B. Motorists will experience appreciable tension while driving.	0.71 to 0.80

Level of Service	Description	V/C Ratios
D	Approaching unstable operations where small increases in volume produce substantial increase in delay and decrease in speed.	0.81 to 0.90
E	Operations with significant intersection approach delays and low average speeds.	0.91 to 1.00
F	Operations with extremely low speeds caused intersection congestion, high delay, and adverse signal progression.	Greater Than 1.00
Source: Transportation Research Board. Highway Capacity Manual, Special Report 209. 1994.		

The City adopted its General Plan in December 2014 and it serves as the community's guide for continued development, enhancement, and revitalization of the Fresno metropolitan area. The General Plan's policies and standards for specific plans such as the SEDA project require a transportation impact study to assess the impact on existing and planned streets. Since the SEDA project is located in Traffic Impact Zone III (TIZ-II), the General Plan standards require that the project maintain a LOS standard of D or better for all roadway segments. However, the SEDA specific plan calls for a standard of LOS E or better, which is the standard used in the traffic analysis.

Vehicle Miles Traveled

SB 743, which was signed into law by Governor Brown in 2013 and codified in Public Resources Code (PRC) 21099, tasked OPR with establishing new criteria for determining the significance of transportation impacts under CEQA. SB 743 requires the new criteria to "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." SB 743 changes the way that public agencies evaluate the transportation impacts of projects under CEQA, recognizing that roadway congestion, while an inconvenience to drivers, is not itself an environmental impact (see PRC § 21099(b)(2)). In December 2018, OPR circulated its most recent Technical Advisory on Evaluating Transportation Impacts in CEQA, which provides recommendations and describes various options for assessing VMT for transportation analysis purposes. "Vehicle miles traveled" refers to the amount and distance of automobile travel "attributable to a project." Other relevant considerations may include the effects of the project on transit or non-motorized travel. The VMT analysis options described by OPR are primarily tailored toward single-use development residential, office, or office projects, not mixed-use projects and not athletic facility projects. OPR recommends the following methodology and criteria for specific land uses:

- For residential projects, OPR recommends that VMT impacts be considered potentially significant if a residential project is expected to generate VMT per capita (i.e., VMT per resident) at a rate that exceeds 85 percent of a regional average. However, the City's VMT threshold is 87 percent of a regional average.
- For office projects, OPR recommends that VMT impacts be considered potentially significant if an office project is expected to generate VMT per employee at a rate that exceeds 85 percent of a regional average. However, the City's VMT threshold is 87 percent of a regional average.

- For retail projects, OPR recommends that VMT impacts be considered potentially significant if a project results in a net increase in total VMT. This approach takes into account the likelihood that retail developments may lead to increases or decreases in VMT, depending on previously existing retail travel patterns. This approach may also be used for other types of projects with customer components.
- OPR also indicates that local serving retail (projects smaller than 50,000 square feet) may be presumed to have a less than significant VMT impact.
- OPR does not provide specific guidance on evaluating other land use types, except to say that other land uses could choose to use the method applicable to the land use with the most similarity to the proposed project.
- For mixed-use projects, OPR describes several options that include (1) evaluating each land use separately; or (2) evaluating mixed-use projects based on the method applicable to the dominant land use. Evaluating each land use separately would potentially fail to measure the positive effects of mixed-use projects in reducing VMT.

OPR also recommends exempting some project types from VMT analysis based on the likelihood that such projects will generate low rates of VMT:

- OPR recommends that projects generating less than 110 trips per day generally may be assumed to cause a less than significant transportation impact.
- OPR notes that residential and office projects located in areas with low VMT, and that incorporate similar features, will tend to exhibit similar low VMT and can be screened out.
- OPR states that residential, retail, office, and mixed-use projects near transit stations or major transit stops should be screened out based on the likelihood that such projects will have a less than significant impact on VMT.

VMT Screening Criteria

City of Fresno guidelines include the following screening criteria for identifying projects that can be presumed to have a less than significant impact:

- Residential, retail, office projects, or mixed-use projects proposed within 0.5 mile of an existing major transit stop or an existing stop along a high-quality transit corridor.
- Projects involving local serving retail space of less than 50,000 square feet.
- Projects having a high level of affordable housing units.
- Projects that generate or attract fewer than 110 daily vehicle trips.
- Projects generating less than 500 Average Daily Trips (ADT).
- Projects that develop institutional/government and public service uses that support community health, safety, and welfare.
- Residential and office projects located in areas with low VMT and incorporate similar features.

- Consistency with other plans to reduce GHG emissions.

Fresno Activity Based Travel Demand Model

The latest approved version of the Fresno Activity Based Travel Demand Model (FresnoABM) was obtained for use in travel demand forecasting and VMT analysis for this project. All traffic volume forecasts were adjusted, using the difference (delta) method, to account for the difference between existing counts and base year model forecasts. The FresnoABM has a base year of 2019 and a forecast year of 2035, while the count data collected from the Fresno City count database were from the year 2018.

3.17.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist to determine whether transportation and traffic impacts are significant environmental effects. Would the project:

a) Conflict with a program plan, ordinance or policy of the circulation system, including transit, roadway, bicycle and pedestrian facilities?

b) Conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b)?

c) Substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?

d) Result in inadequate emergency access?

3.17.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the proposed project and provides mitigation measures where necessary.

Effect to Circulation System

Impact TRANS-1:	**The proposed project would not conflict with a program plan, ordinance or policy of the circulation system, including transit, roadway, bicycle and pedestrian facilities.**

Impact Analysis

Proposed Project Trip Generation

Table 3.17-5 summarizes daily and PM peak-hour trip generation for the proposed project. Institute of Traffic Engineers (ITE) Trip Generation 11th Edition was used to generate the trip rates for the four types of land uses in the proposed project.

Table 3.17-5: Proposed Project Trip Generation

Land Use (units)	Size		Daily		PM Peak-hour	
			Rate	Trips	Rate	Trips
Housing (dwelling units)	45,274	Dwelling units	8.35	378,038	0.77	34,861
Retail/Commercial (employees)	12,648	Employees	26.60	336,437	3.49	44,142
Office (employees)	8,069	Employees	3.33	26,870	0.45	3,631
Government/Civic (employees)	16,681	Employees	7.50	125,108	0.71	11,844
Total Trips				**866,452**		**94,477**
Source: Transportation Research Board. Highway Capacity Manual, Special Report 209. 1994.						

In total, the proposed project is expected to generate 866,452 total daily trips and 94,477 PM peak-hour trips from the 45,274 total dwelling units and 37,398 total employees at full buildout.

Roadway Impact Analysis–Traffic Increase

The proposed project would not have an impact on the existing roadways within the project area. Other roadways within the Plan Area would be upgraded into a network of Complete Streets as defined by the Fresno Complete Streets Policy adopted in 2019. A Complete Street is defined as a transportation facility that is planned, designed, operated, and maintained to provide safe mobility for all users—including bicyclists, pedestrians, transit vehicles, trucks, and motorists. In addition to Complete Streets, the safety of the designed roadway network environment would be implemented such that driver, pedestrian, and bicyclist safety are paramount.

The proposed project would be consistent with General Plan Policy MT-1-k, which calls for planning and design of roadway systems to meet LOS D on major roadways. Roadway improvements to increase capacity and maintain LOS standards would be planned and programmed based on consideration of the total overall needs of the roadway system, recognizing the priority of maintenance, rehabilitation, and operation of the existing road system. Convenient transit stops would be provided in the Plan Area, and sidewalks would be constructed pursuant to City standards,

Further, the proposed project would be consistent with the General Plan objectives and policies to create and maintain a transportation system that is safe, efficient, provides access in an equitable manner, and optimizes travel by all modes. The proposed project is a comprehensive planning document for the nearly 9,000-acre growth area and addresses wide-ranging infrastructure and community challenges associated with accommodating a large increment of the City's growth. Planning at this scale allows design and phasing of infrastructure improvements that are more efficient, environmentally sensitive, and cost-effective. The plan provides for mobility within and across town centers, neighborhoods, schools, and open spaces by comprehensively planning roadways, high-quality transit service, and safe walking and biking connections. The plan also provides for variety of transportation options necessary to meet the needs of the residents and employees within the Plan Area. Centers would be designed with a clear pattern of pedestrian-

scaled streets, blocks, buildings, and public spaces based on the block connectivity and size standards specified in the SEDA Development Code Update, including a transportation network that is based on a high-density grid system. These policies would ensure consistency with applicable goals, objectives, and policies of the various transportation plans locally and regionally.

Because site-specific designs showing driveway locations have not been developed, there are no specific details to review and assess impacts on pedestrian, bicycle, and transit facilities. As part of the standard development review process, the City will require all future proposed development of parcels to go through a review of pedestrian, bicycle, and transit facilities in the area surrounding the individual development project to ensure that future developments do not conflict with existing or planned facilities supporting those travel modes. All pedestrian, bicycle, and transit facilities proposed would be designed using the appropriate design standards. The impact on these facilities would be less than significant.

Level of Significance Before Mitigation

None.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM TRANS-1a Provide more options for shorter trips by encouraging vertical mixed uses and locating residential uses in walking distance (0.5 mile) to retail and employment uses.

MM TRANS-1b Provide pedestrian and bicycle network improvements within the development connecting complementary uses (i.e., residential, employment, retail, and transit stops) internally and to existing off-site facilities.

MM TRANS-1c Ensure that design of key intersections and roadways encourage the use of walking, biking, and transit.

MM TRANS-1d Collaborate with the Fresno Transit (FAX) to provide new transit services to the proposed project and within the proposed project area.

MM TRANS-1e In addition, the following Transportation Demand Management (TDM) strategies may be applicable at the implementing project level:

- Reduce Parking Supply for Retail Uses (maximum reduction: 12.5 percent)
- Add Transit Rerouting and Transit Stops (maximum reduction: 5 percent)
- Implementation of Local Shuttle Service (grouped strategy with transit system improvements)
- Mandatory Travel Behavior Change Program, Promotions and Marketing (maximum reduction: 1 percent)
- Promotions and Marketing (maximum reduction: 1 percent)

- Emergency Ride Home (ERH) Program (maximum reduction: 3 percent)
- School Carpool Program (maximum reduction: 15 percent)
- Bike Share (maximum reduction: 0.25 percent)
- Implement/Improve On-street Bicycle Facility (maximum reduction: 0.625 percent)
- Traffic Calming Improvements (maximum reduction: 1 percent)
- Pedestrian Network Improvements (maximum reduction: 2 percent)

Level of Significance After Mitigation

Less than significant impact with mitigation incorporated.

Conflict with CEQA Guidelines Section 15064.3, Subdivision (b)

Impact TRANS-2: The proposed project would not conflict or be inconsistent with CEQA Guidelines Section 15064.3, subdivision (b).

Impact Analysis

The primary components of Section 15064.3 include:

- Identifies VMT (amount and distance of automobile traffic attributable to a project) as the most appropriate measure of transportation impacts;
- Declares that a project's effect on automobile delay shall not constitute a significant environmental impact (except for projects increasing roadway capacity);
- Creates a rebuttable presumption of no significant transportation impacts for (a) land use projects within 0.5 mile of either an existing major transit stop or a stop along an existing high quality transit corridor, (b) land use projects that reduce VMT below existing conditions, and (c) transportation projects that reduce or have no impact on VMT;
- Allows a lead agency to qualitatively evaluate VMT if existing models are not available; and
- Gives lead agencies discretion to select a methodology to evaluate a proposed project's VMT but requires lead agencies to document that methodology in the environmental document prepared for the proposed project (OPR's technical advisory provides recommendation on preferable methodology).

The City of Fresno CEQA standards for land use plans, such as SEDA, states that the project should be compared base year existing VMT per capita and/or VMT per employee with the horizon year with project VMT per capita and/or VMT per employee. If the horizon year with project VMT is higher than the base year, then there will be an impact. The project generates fewer VMT/capita and VMT/employee in the horizon year, and thus the impact would be less than significant.

Year 2035 No Project Conditions Vehicle Miles Traveled

For the Year 2035 baseline no project conditions VMT, the SEDA project area was overlaid on top of the FresnoABM loaded vehicle assignment network and the total VMT for the SEDA project was calculated by multiplying daily volumes by distance traveled. In addition, VMT per Service Population

(which is the sum of population and employees) was calculated. Table 3.17-6 summarizes the 2035 baseline no project VMT from the FresnoABM for the SEDA project area. In the forecast year no project condition, VMT per Service Population for the SEDA project area falls slightly compared to the existing base year condition.

Table 3.17-6: Year 2035 No Project Conditions VMT

Category	2035 Base Year Model
Plan Area VMT	371,397
Population	5,046
Employment	3,077
SEDA VMT per Service Population	45.72
Notes: SEDA = Southeast Development Area VMT = Vehicle Miles Traveled Source: Transportation Impact Assessment (TIA). 2022.	

Year 2035 With Project Conditions Vehicle Miles Traveled

For the Year 2035 with project conditions VMT, the SEDA project area was overlaid on top of the FresnoABM loaded vehicle assignment network and the total VMT for the SEDA project was calculated by multiplying daily volumes by distance traveled. In addition, VMT per Service Population (which is the sum of population and employees) was calculated. Table 3.17-7 summarizes the 2035 baseline with project VMT from the FresnoABM for the project area.

Table 3.17-7: Year 2035 With Project Conditions VMT

Category	2035 With Project Model (SEDA)
Plan Area VMT	974,369
Population	151,670
Employment	40,490
SEDA VMT per Service Population	5.07
Notes: SEDA = Southeast Development Area VMT = Vehicle Miles Traveled Source: Transportation Impact Assessment (TIA). 2022.	

The VMT per Service Population in the project area with the project built out in 2035 drops from 45.72 to 5.07. The transition from a mostly rural area (which the project area currently is) to a developed urbanized mixed-use site results in a large VMT reduction. This is because trip distances for both the production side (residential) and attraction side (commercial) are shortened since residents and employees are now better connected to jobs and services within the project area.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Hazards

Impact TRANS-3: The proposed project would not substantially increase hazards due to a geometric design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment).

Impact Analysis

The proposed project does not approve or entitle any specific development and specific project design is unknown at this time. Development consistent with the proposed project would undergo individual planning review at the time of application and additional project-specific environmental review may be required. It is not anticipated that development would substantially increase hazards due to a geometric design feature or incompatible uses because the City would require review proposed future developments for consistency with applicable regulations, including the policies in the General Plan, designed to ensure safety, during planning review to eliminate any such hazards. The impact would be less than significant.

Level of Significance

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Level of Significance After Mitigation

Less than significant impact.

Emergency Access

Impact TRANS-4: The proposed project would not result in inadequate emergency access.

Impact Analysis

The proposed project may require temporary lane closures or detours during construction activity. However, all lane closures or detours would be coordinated with the sheriff and fire departments to ensure that access to existing businesses and through circulation are maintained as well as emergency access. The construction contractor would provide signage, cones, and/or flag persons as

deemed necessary through a project-specific Construction Management Plan (CMP) to ensure adequate emergency access. All development will be required to prepare a CMP to demonstrate to the City and the associated sheriff and fire departments that emergency access would be maintained at all times during construction. Preparation of a CMP, as required by MM TRANS-4, would reduce any impact of temporary lane closures or detours to less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM TRANS-4 At the time of planning application submittal, the project applicant shall prepare a Construction Management Plan (CMP) that shall specify traffic controls required to maintain adequate circulation and access throughout the Southeast Development (SEDA) Specific Plan Area. At least one lane shall remain open in each direction during construction and access to all existing businesses shall be maintained. This plan shall be subject to approval by the jurisdictional police and fire departments prior to commencement of construction.

Level of Significance After Mitigation

Less than significant impact with mitigation incorporated.

3.17.7 - Cumulative Impacts

The geographic context for an analysis of cumulative impacts to transportation and circulation is the City of Fresno and the existing transportation network.

Year 2035 Baseline (No Project) Conditions

The following presents the results of the LOS calculations under the year 2035 baseline conditions without the project. LOS analysis at the study segments were conducted for 2035 no project conditions to establish a base to evaluate the impacts due to the addition of traffic from the proposed project. Study segment volumes were forecasted using the Fresno Activity Based Travel Demand Model. Table 3.17-8 shows the forecasted study segment volumes for the year 2035 baseline (no project) conditions.

Table 3.17-8: Year 2035 Baseline (No Project) Conditions Study Segment Traffic Volumes

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
Clovis Avenue south of American Avenue	1	1,071	1,163	15,309
De Wolf Avenue north of McKinley Avenue	2	688	495	4,237
De Wolf Avenue south of McKinley Avenue	3	282	258	1,881

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
De Wolf Avenue south of Clinton Avenue	4	484	347	3,470
De Wolf Avenue north of Jensen Avenue	5	187	174	1,693
De Wolf Avenue south of Jensen Avenue	6	95	137	1,221
Jensen Avenue east of Bethel	7	1,006	1,105	15,079
Jensen Avenue east of De Wolf Avenue	8	705	830	11,518
Jensen Avenue west of De Wolf Avenue	9	597	850	10,143
Jensen Avenue east of Temperance Avenue	10	1,606	1,095	13,894
Jensen Avenue west of Temperance Avenue	11	1,333	1,107	12,676
Kings Canyon Road east of Temperance Avenue	12	4	4	52
Locan Avenue north of Tulare Avenue	13	18	32	218
Locan Avenue south of Tulare Avenue	14	12	34	199
McCall Avenue north of McKinley Avenue	15	500	382	4,197
McCall Avenue north of Ashlan Avenue	16	390	439	5,167
McCall Avenue north of Belmont Avenue	17	485	518	5,730
Tulare Avenue east of Locan Avenue	18	38	45	363
Tulare Avenue west of Locan Avenue	19	59	90	861
North Avenue west of Temperance Avenue	20	193	216	2,442
Source: Transportation Impact Assessment (TIA). 2022.				

Study Segment Level of Service Analysis–Year 2035 No Project Conditions

The study segment LOS analysis for the forecasted volumes are presented in Table 3.17-9**.** All of the study segments in the year 2035 no project conditions are forecasted to perform at a LOS of D or better.

Table 3.17-9: Year 2035 Baseline (No Project) Conditions Study Segment LOS

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
Clovis Avenue south of American Avenue	1	C	C	B
De Wolf Avenue north of McKinley Avenue	2	D	D	C
De Wolf Avenue south of McKinley Avenue	3	C	C	B
De Wolf Avenue south of Clinton Avenue	4	D	C	B
De Wolf Avenue north of Jensen Avenue	5	C	C	A
De Wolf Avenue south of Jensen Avenue	6	B	B	A

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
Jensen Avenue east of Bethel Avenue	7	C	C	B
Jensen Avenue east of De Wolf Avenue	8	B	B	A
Jensen Avenue west of De Wolf Avenue	9	B	B	A
Jensen Avenue east of Temperance Avenue	10	C	C	B
Jensen Avenue west of Temperance Avenue	11	C	C	B
Kings Canyon Road east of Temperance Avenue	12	A	A	A
Locan Avenue north of Tulare Avenue	13	A	A	A
Locan Avenue south of Tulare Avenue	14	A	A	A
McCall Avenue north of McKinley Avenue	15	D	D	C
McCall Avenue north of Ashlan Avenue	16	D	D	C
McCall Avenue north of Belmont Avenue	17	D	D	C
Tulare Avenue east of Locan Avenue	18	A	A	A
Tulare Avenue west of Locan Avenue	19	A	A	A
North Avenue west of Temperance Avenue	20	A	A	A
Source: Transportation Impact Assessment (TIA). 2022.				

Level of Service

This analysis presents the results of the LOS calculations for the year 2035 conditions with the proposed project. LOS analysis at the study segments were conducted for 2035 with project conditions. Study segment volumes were forecasted using delta method, using the FresnoABM. Table 3.17-10 shows the forecasted study segment volumes for the year 2035 with project conditions.

Table 3.17-10: Year 2035 With Project Conditions Study Segment Traffic Volumes

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
Clovis Avenue south of American Avenue	1	1,266	1,367	18,223
De Wolf Avenue north of McKinley Avenue	2	838	544	5,510
De Wolf Avenue south of McKinley Avenue	3	457	357	3,614
De Wolf Avenue south of Clinton Avenue	4	610	395	4,678
De Wolf Avenue north of Jensen Avenue	5	322	305	3,549
De Wolf Avenue south of Jensen Avenue	6	178	235	2,166
Jensen Avenue east of Bethel	7	1,135	1,375	18,813
Jensen Avenue east of De Wolf	8	1,040	1,179	16,757

Segment Name	#	AM Peak-hour	PM Peak-hour	Daily
Jensen Avenue west of De Wolf	9	866	1,180	15,122
Jensen Avenue east of Temperance	10	2,096	1,519	20,017
Jensen Avenue west of Temperance Avenue	11	1,862	1,562	19,744
Kings Canyon Road east of Temperance Avenue	12	8	8	111
Locan Avenue north of Tulare Avenue	13	44	44	392
Locan Avenue south of Tulare Avenue	14	29	48	320
McCall Avenue north of McKinley Avenue	15	831	651	6,377
McCall Avenue north of Ashlan Avenue	16	562	612	5,662
McCall Avenue north of Belmont Avenue	17	867	919	9,956
Tulare Avenue east of Locan Avenue	18	54	61	582
Tulare Avenue west of Locan Avenue	19	80	118	1,391
North Avenue west of Temperance Avenue	20	193	286	2,442
Source: Transportation Impact Assessment (TIA). 2022.				

Compared to the 2035 no project condition, Jensen Way and McCall Lane saw the most growth in AM peak-hour, PM peak-hour, and daily volumes with the proposed project built out. Because of the existing low volumes from the City of Fresno count data, the forecasted with project volumes are not as high as raw FresnoABM output volumes.

Study Segment Level of Service Analysis–Year 2035 With Project Conditions

The study segment LOS analysis for the forecasted volumes are presented in Table 3.17-11. All of the study segments in the year 2035 with project conditions are forecasted to perform at a LOS of D or better.

Table 3.17-11: Year 2035 With Project Conditions Study Segment LOS

Segment Name	#	AM Peak-hour	PM Peak - hour	Daily
Clovis Avenue south of American Avenue	1	C	C	B
De Wolf Avenue north of McKinley Avenue	2	D	D	D
De Wolf Avenue south of McKinley Avenue	3	D	D	D
De Wolf Avenue south of Clinton Avenue	4	D	D	D
De Wolf Avenue north of Jensen Avenue	5	D	D	D
De Wolf Avenue south of Jensen Avenue	6	D	D	D
Jensen Avenue east of Bethel Avenue	7	C	C	B
Jensen Avenue east of De Wolf Avenue	8	C	C	B

Segment Name	#	AM Peak-hour	PM Peak - hour	Daily
Jensen Avenue west of De Wolf Avenue	9	C	C	B
Jensen Avenue east of Temperance Avenue	10	C	C	B
Jensen Avenue west of Temperance Avenue	11	C	C	A
Kings Canyon Road east of Temperance Avenue	12	A	A	A
Locan Avenue north of Tulare Avenue	13	A	A	A
Locan Avenue south of Tulare Avenue	14	A	A	A
McCall Avenue north of McKinley Avenue	15	D	D	C
McCall Avenue north of Ashlan Avenue	16	D	D	C
McCall Avenue north of Belmont Avenue	17	D	D	C
Tulare Avenue east of Locan Avenue	18	A	A	A
Tulare Avenue west of Locan Avenue	19	A	A	A
North Avenue west of Temperance Avenue	20	A	A	A
Source: Transportation Impact Assessment (TIA). 2022..				

Proposed project development in combination with future cumulative development in the City could result in localized impacts on the transportation network in the City. It is anticipated that cumulative development would be required to implement similar mitigation measures as the proposed project to reduce potential impacts on the transportation system, although there may be residual significant and unavoidable impacts. MM TRANS-1 through TRANS-6 would apply to the proposed project to reduce any project-level impacts to less than significant. Therefore, the proposed project would not make a cumulatively considerable contribution to potential cumulative transportation and circulation impacts and the cumulative impact would be less than significant.

Level of Cumulative Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Cumulative Mitigation Measures

None.

Project Specific Cumulative Mitigation Measures

MM TRANS-1 through MM TRANS-6 would apply.

Level of Cumulative Significance After Mitigation

Less than significant impact.

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3.18 - Utilities and Service Systems

3.18.1 - Introduction

This section describes the existing conditions related to utilities and service systems (water, wastewater, stormwater, and solid waste) in the City of Fresno (City) and Plan Area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to such utilities and service systems that could result from implementation of the proposed project. Information in this section is based on information provided by the planning documents for each utility type. Water supply and facilities information was obtained from the City of Fresno 2020 Urban Water Management Plan prepared by Water Systems Consulting, Inc. in 2021; the technical memorandum prepared by West Yost Associates in 2013 for the Hydraulic Evaluation of the Proposed 2035 General Plan (General Plan) Land Use Update for the Master Environmental Impact Report (MEIR) as part of the City of Fresno General Plan Update MEIR; and the Water Technical Study prepared for the Specific Plan by Blair, Church & Flynn in 2022 (see Appendix I). Recycled water supply and facilities information was obtained from the Recycled Water Master Plan prepared by Carollo in 2010; the Engineering Report for the Production, Distribution and Use of Recycled Water prepared by Blair, Church & Flynn in 2015; and the Recycled Water Technical Study prepared for the Specific Plan by Blair, Church & Flynn in 2022 (see Appendix I). Wastewater collection and facilities information was obtained from the Wastewater Collection System Master Plan Update prepared by Carollo in association with Blair, Church & Flynn in 2015 and the Wastewater Technical Study prepared for the Specific Plan by Blair, Church & Flynn in 2022 (see Appendix I). Storm drain collection and facilities information was obtained from the Fresno Metropolitan Flood Control District (FMFCD) 2016 District Services Plan; the FMFCD Storm Drain and Flood Control Master Plan; and the Storm Drain Technical Study prepared for the Specific Plan by Blair, Church & Flynn in 2022 (see Appendix I).

As further discussed in Chapter 1, Introduction, 12 public comments were received during the Draft Program Environmental Impact Report (Draft PEIR) scoping period related to the proposed project's potential Utilities and System Services impacts:

- States that the County has a water-providing Community Service Area (CSA) (CSA 14) which is interested in connecting to the City of Fresno's (the City's) water system and that the County has several road CSAs within the Plan Area.
- States that many of the existing facilities will need to be upgraded to meet the current urban standards or relocated by the developer to accommodate new urban developments which will require new pipelines and new exclusive easements.
- Requires that all open channels and existing pipelines impacted by the project area development to be upgraded to meet Fresno Irrigation District's (FID's) current standards for urban, rural, and industrial areas. Requires that development impacts to large canal crossings to be designed to protect the canals' integrity for an urban setting, including the need for access and full right-of-way widths for FID's operations and maintenance needs.

- Requires that development within the Plan Area will not result in an increase in the City's surface water allocation from FID.
- Requests that the Draft PEIR evaluate whether the City's Water Master Plan needs to be updated and how the Cooperative Agreement between the City and FID may impact development within the Plan Area.
- Requests that the Draft PEIR evaluate whether previous projects proposed under the City's Water Master Plan resulted in the benefits anticipated.
- Requests that the Draft PEIR require that any future development minimize water demand and/or reduce impacts to groundwater.
- Requires that if any future development under the Southeast Development Area (SEDA) uses treated surface water during a period when the City has a deficit water supply or groundwater levels continue to drop, then the City must acquire additional water from a water purveyor as to not impact water supplies or exacerbate the deficit.
- Identifies that groundwater overdraft is an issue in the City and requires that the Draft PEIR evaluates the Specific Plan's impact on groundwater resources.
- Requests that the Draft PEIR accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the Planning Area.
- Requests that the Draft PEIR identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impact.
- Requests that the Draft PEIR analyzes and creates mitigation measures consistent with all applicable laws, including State and federal fair housing, civil rights, and climate laws such as Senate Bill (SB) 743.

3.18.2 - Environmental Setting

The study area for project impacts regarding utilities and service systems is the SEDA Specific Plan Area (Plan Area).

Water

This section describes existing City water supply sources, distribution and storage infrastructure, and treatment facilities, as well existing and projected demand and supply for the current General Plan and proposed Specific Plan.

Water Source and Supply

Key planning documents for the City's water source and supplies include the 2020 Urban Water Management Plan (UWMP); the City of Fresno General Plan (General Plan); and the City of Fresno Metropolitan Water Resources Management Plan Update (Metro Plan).[1]

[1] City of Fresno. 2007. Metropolitan Water Resources Management Plan Update. Accessed July 8, 2022.

The City's Water Division manages and operates the City's water system. The City provides potable water to over 550,000 customers, including residential, commercial, and industrial users, in an approximately 115-square-mile (73,500-acre) area that includes many County islands (unincorporated areas within the City), and areas within the City's Sphere of Influence (SOI). Fresno's domestic water supplies include groundwater, surface water, and reclaimed water. According to the most recent available water supply data for 2020, extracted groundwater supply totaled 55,028 acre-feet (AF), surface water supply totaled 108,739 AF, and recycled water supply totaled 912 AF.[2] Projected water supply for 2035 is 346,610 AF (149,100 AF of groundwater, 191,600 AF of surface water, and 5,910 AF of recycled water) during normal water years.[3]

The 2020 UWMP describes current and planned water conservation plans, provides a water shortage contingency plan should it need to be implemented in the event of a severe water shortage or water supply emergency, and includes future water supply plans for a variety of water sources including treated surface water, groundwater, and recycled water. The 2020 UWMP is in accordance with the Urban Water Management Planning Act that stipulates that every urban water supplier in California supplying water directly or indirectly to 3,000 or more customers or supplying more than 3,000 AF of water annually shall adopt and submit an Urban Water Management Plan to the California Department of Water Resources. Failure to submit a plan as required could result in ineligibility to receive certain grants or receive drought assistance from the State.

Groundwater Supply

The City is located within the Kings River Subbasin of the San Joaquin Valley Groundwater Basin. Historically, the City has relied heavily on groundwater pumped from the underground basin and aquifers to meet its water demands. The City has a network of over 270 municipal water wells and operates approximately 202 active municipal supply wells that access groundwater from said basin.[4] The production capacity from the active wells is approximately 403 million gallons per day (mgd), and the total capacity including inactive wells is approximately 487 mgd. The wells are located around the City, and most are directly connected into the water distribution system. The City's water system depended completely on groundwater as a water source until 2004 when the first Surface Water Treatment Facility (SWTF) was commissioned. Today, groundwater is still heavily relied upon as a primary water source for the City; however, the City is working to maximize the use of its surface water supplies to reduce future dependance on groundwater.

Groundwater quality generally meets primary and secondary drinking water standards for municipal water use; however, the groundwater basin has been impacted by several chemical contaminant plumes, as well as nitrates, all of which require monitoring and wellhead treatment. Treatment efforts and removal of specific wells from service are conducted as required to maintain drinking water supply quality and standards.

Fresno is located within the North Kings Groundwater Sustainability Agency (GSA), which is working to reach groundwater sustainability in accordance with the Sustainable Groundwater Management Act (SGMA). SGMA requires governments and water agencies of "critically overdrafted" basins to

[2] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[3] Ibid.
[4] Ibid.

reach sustainability by 2040; the Kings River Subbasin was identified as a critically overdrafted basin. As a result, the City has placed a higher priority on developing its surface water supply and decreasing its reliability on groundwater to allow the basin to recharge. The City actively works to recharge the groundwater basin. As a result of the City's investment in other water supplies, groundwater levels in Fresno have already begun to recover from low levels experienced during the recent droughts.[5]

The City replenishes groundwater by three methods: natural recharge, subsurface inflow, and intentional recharge.

Natural recharge occurs as precipitation, irrigation, canal, and/or stream flows infiltrate the soils and seep down to the water table to replenish the aquifer. Per the 2020 UWMP, the Kings Basin Integrated Groundwater and Surface Water Model (IGSM), completed in 2007, provides the best available information on the City's groundwater yield. As such, the annual natural recharge from 1964 to 2004 was determined to be 42,700 acre-feet per year (AFY), however, this was projected to decline steadily from 2005 to General Plan buildout within the City's SOI due to increased urbanization and development and a reduction in pervious surfaces. It can be noted though that as future growth areas are annexed, the amount of natural recharge may increase. The UWMP estimated a total of 24,970 AFY of natural recharge for 2020, and projects that natural recharge will total 26,280 AFY in the General Plan buildout year of 2035, and 26,790 AFY by 2045 assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[6]

Subsurface recharge occurs from the movement of groundwater from external sources into the local aquifer. Subsurface water tends to flow from surrounding areas with a higher groundwater table than the City's into the aquifer within the City SOI, including the Plan Area. It is likely that the subsurface inflow will increase with future annexation and development as the SOI is built out. Per the 2020 UWMP, net annual subsurface inflow into the City SOI was determined to be 64,800 AFY for the period of 1964-2004. The UWMP estimated a total subsurface inflow for 2020 of 47,510 AFY and projects that the total will reach 54,720 AFY in 2035 and 59,530 AFY in 2045 assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[6]

Intentional recharge occurs by directing surface water into the underground aquifer with the use of groundwater recharge basins or wells. Fresno mainly uses recharge basins, which are located throughout the City, in an effort to offset declining groundwater levels and overdraft conditions. The City's primary recharge facility is Leaky Acres, located northwest of the Fresno–Yosemite International Airport. It consists of 26 basins covering approximately 225 acres. Additionally, the City has agreements with the FMFCD and the FID to utilize their facilities (basins, canals, etc.) for additional groundwater recharge activities. According to the 2020 UWMP, the City recharged an average of approximately 60,000 AFY from 2000 to 2019. However, the amount has not historically been consistent and can fluctuate based on available surface water. This amount dropped to 34,700 AFY in 2014 and to 19,800 AFY in 2015. In 2019 though, the City recharged 82,993 AF, the highest

[5] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan., July.
[6] Ibid.

amount within this measurement period. Over the last five years, the City has averaged at least 60,000 AFY in recharge, and will plan on increasing the amount gradually by 540 AFY each year moving forward when possible. During wet years, the City will recharge more water when it is available to help offset potential increased reliance on groundwater during dry years. The UWMP projects a total recharge volume of 60,000 AF starting in 2020 and increasing to 68,100 AFY in 2035 and 73,500 AFY in 2045 during normal water years.[7]

The total groundwater recharge amount for 2020 was 132,480 AFY (24,970 AFY of natural recharge, 47,510 AFY of subsurface inflow, and 60,000 AFY of intentional recharge); the total projected groundwater recharge amount for 2035 is 149,100 AFY (26,280 AFY of natural recharge, 54,720 AFY of subsurface inflow, and 68,100 AFY of intentional recharge) and for 2045 is 159,820 AFY (26,790 AFY of natural recharge, 59,530 AFY of subsurface inflow, and 73,500 AFY of intentional recharge) during normal water years and assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.[7] Groundwater pumping has been greatly reduced since the activation of the first SWTF in 2004 and has only further declined as a result of a second SWTF; per the 2020 UWMP, groundwater pumping has decreased from 165,200 AFY in 2003 to 55,000 AFY in 2020.[8] Surface water has allowed the City to reduce its dependance on groundwater as a water supply. Prior to 2004, 100 percent of Fresno's water demand was met with groundwater. In 2004, the City's first SWTF, the Northeast Surface Water Treatment Facility (NESWTF), was constructed and activated; it provided 10-15 percent of the City's potable water demand from 2005-2014 and 15 percent from 2016-2020. With the addition of the T-3 Water Storage and modular SWTF (T-3 SWTF) in 2015 and the Southeast Surface Water Treatment Facility (SESWTF) in 2018, the City was able to provide greater than 50 percent of its potable water supply with surface water in 2019 and 2020.[9] The City plans on expanding surface water treatment capacities and groundwater recharge activities to maintain the reduction in groundwater reliance.

Surface Water Supply

As stated in the Groundwater Supply section, the City owns and operates two main SWTFs in Fresno. In 2004, the City commissioned the NESWTF. The facility, located at Chestnut and Behymer Avenues, is designed for a 30-mgd capacity and is planned to be expanded to a total of 60 mgd as development in Fresno continues.[10] The NESWTF has reduced the City's dependance on groundwater and allowed an increased degree of groundwater recharge to occur. The City also constructed the T-3 SWTF in 2015 in southeast Fresno, which has a design capacity of 8 mgd.

Most recently, the City completed construction of the SESWTF in 2018, which is a 54-mgd facility with an ultimate capacity of 80 mgd.[11] This included a 72-inch raw water transmission main to convey surface water from the FID's Fresno Canal to the SESWTF. T-3 was shut down after the SESWTF was activated; however, the City has indicated that there are future plans to reactivate the site.

[7] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan July.
[8] Ibid.
[9] Ibid.
[10] Ibid.
[11] Ibid.

The surface water available to the City is supplied via agreements that the City maintains with the United States Bureau of Reclamation (USBR) and the FID.

In the 1960s, the City contracted with the USBR Central Valley Project (CVP) Friant Division to receive 60,000 AF of Class 1 surface water per year. Per the 2020 UWMP, this agreement was last renewed in 2010 to provide water from the San Joaquin River in perpetuity.[12] The USBR CVP Friant Division facilities include the Friant Dam (Millerton Reservoir), the Friant-Kern Canal, and the Madera Canal. Class 1 water (intended to be a supply that would be dependable every year regardless of the type of hydrologic water year) has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement; projected availability of surface water to the City is determined by the USBR based on simulations for the 2006 settlement agreement, with an average simulated delivery of 53,680 AFY and a median simulated delivery of 60,000 AFY. However, there have been extremely dry years in which no water is supplied; this previously occurred in 2014 and 2015. The most recent data available for USBR deliveries shows that in 2020, the City received 37,447 AF.[13]

The City signed an agreement with FID in 1976 for the delivery of surface water supplies from the Kings River based on the City's pro rata share of FID's water entitlements. The agreement pertained only to natural flows in the Kings River and excludes Class 2 entitlement water provided to FID by the USBR, as well as water stored in Pine Flat Reservoir. The agreement identifies the City's contracted percentage of FID's King's River water based on the City's water service area located within FID's service area as a percentage of the FID land area. FID land area varies each year because it is dependent upon the acreage receiving water deliveries that year rather than the total acreage within FID. Thus, as the City incorporates new land areas (including SEDA) into its service area, the percentage of FID supply will increase. However, the most recent agreement with FID made in 2016 placed a maximum percentage of FID water at 29 percent, even though the City's service area is expected to surpass 29 percent of FID's service area between 2025 and 2030.[14] In 2020, the City's percentage of FID water was 25.79 percent. The City has historically not used all of its available allocation in any given year, and the remaining unused water is reallocated by FID to its other customers. The average FID delivery between 1964 and 2019 was 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29 percent City supply percentage.[14] The average total FID water supply from the King's River is 453,800 AFY, and by buildout, the 2020 UWMP projects that the City will be projected to receive 131,600 AFY. The most recent data available shows that in 2020, the City received 71,292 AF.[15]

The City also has maintained another agreement with FID since 1974 for the exchange of recycled water for surface water. The Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) discharges secondary-treated wastewater into recharge basins surrounding the facility for percolation into the groundwater aquifer. The RWRF owns and operates a number of groundwater wells that extract the percolated water from under the RWRF. As part of this agreement, the extracted water is conveyed to FID's Dry Creek and Houghton Canals for delivery to growers west of the City. In exchange, FID agreed to deliver 46 percent of the total from either its Kings River

[12] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[13] Ibid.
[14] Ibid.
[15] Ibid.

entitlement or USBR Class 2 supply to growers or basins in the eastern portion of FID "insofar as is feasible and practical." The agreement includes a minimum of 100,000 AF delivered over a 10-year period and no more than 30,000 AF in any given year.[16] Since 2016, the City has reduced RWRF groundwater exchange deliveries, and is currently discussing an update to the agreement with FID, while exploring other beneficial uses for the RWRF's percolated effluent. Per the 2020 UWMP, the most recent data available shows that in 2020, 5,809 AF was delivered.[17]

Project Site

The City Metropolitan Water Resources Management Plan (Metro Plan) and UWMP include several objectives, goals, and policies to improve and develop water infrastructure as development progresses in the City. The critical focal points of the water system development are the implementation of further water conservation measures, installation of new municipal groundwater wells, increased groundwater recharge efforts to bring the City's groundwater pumpage into balance with its recharge rate, maximized use of available surface water, increased use of recycled water for landscape irrigation and other nonpotable uses, and the acquisition of future water supplies when available.

Water supply for the Specific Plan Area will be met with existing supplies initially but will require additional supplies to meet buildout demands. The City is developing an update to the Metro Plan, which will include revised and updated recommendations for water supply facilities to supply the Plan Area with water. Among these proposed improvements are new municipal groundwater wells to be drilled in the Plan Area to supply new developments with groundwater.[18]

The City will also construct expansions to the SWTFs to allow higher capacities of surface water to be treated and delivered to City customers, including those in the Plan Area, as well as multiple recharge inter-ties to FMFCD basins to facilitate groundwater recharge in the Plan Area.

Recycled Water

Recycled water, an important water source for the City in conserving potable water supplies, is not yet utilized in the Plan Area. However, there are existing recycled water facilities throughout the City that may contribute to the future delivery of recycled water to the Plan Area.

With the completion of various portions of the City's recycled water distribution system, and the upgrades at the Fresno-Clovis RWRF to allow disinfected tertiary treatment of collected wastewater, the City has been using recycled water for beneficial uses in an effort to reduce reliance on potable water for nonpotable uses. Disinfected tertiary treated wastewater can be used for a number of nonpotable uses, including but not limited to landscaping irrigation, industrial processes, golf course irrigation, and agricultural irrigation.

Recycled Water Source and Supply

In partnership with the City of Clovis, the City of Fresno owns and operates the Fresno-Clovis RWRF located near the intersection of Jensen and Cornelia Avenues in southwest Fresno. The RWRF

[16] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[17] Ibid.
[18] Buche, Brock. Department of Public Utilities Director, City of Fresno. Personal communication: email. May 23, 2022.

receives and treats the majority of domestic, commercial, and industrial wastewater generated within the Cities of Fresno and Clovis, as well as some unincorporated areas of Fresno County. The RWRF is currently operated by the City, who holds responsibility for ensuring regulatory compliance with Waste Discharge Requirements (WDRs) and the Central Valley Regional Water Quality Control Board (RWQCB) Order No. 5-01-254, "Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County."

The RWRF has a rated annual monthly average daily discharge flow of 80 MGD and an maximum monthly average daily discharge flow of 88 MGD,[19]but the average annual flow is approximately 68 mgd.[20] The RWRF produces undisinfected secondary-treated wastewater and disinfected tertiary treated wastewater. The undisinfected secondary-treated wastewater is disposed of into on-site disposal ponds and conveyed to farmers for restricted irrigation of non-food crops on agricultural land on surrounding properties. The City also allows the secondary-treated wastewater to percolate through the soil into the aquifer, which is then extracted for delivery through FID facilities for agricultural users, as stated in the Water Supply section.

The disinfected tertiary treated wastewater is delivered through a network of pipelines to various recycled water use areas around the City, mainly for irrigation of landscaping at sites including, but not limited to, parks, median landscape strips, and cemeteries.

The City also owns and operates the North Fresno Wastewater Reclamation Facility (NFWRF) located in northeast Fresno on the north side of Copper Avenue between Cedar and Maple Avenues. This facility receives and treats wastewater generated within a small area of the City generally bound by Copper, Friant, and Willow Avenues, including wastewater generated from Copper River Ranch. The NFWRF is a tertiary level treatment facility and the treated wastewater is mainly used for irrigation of the Copper River Country Club and Golf Course. The permitted capacity of the plant is 0.71 mgd average monthly flow and 1.07 mgd maximum daily flow.[21]

Flows received at the Fresno-Clovis RWRF have averaged approximately 63,000 AFY over the last 5 years, and the City projects that recycled water deliveries will increase to 5,800 AFY per year of nonpotable demand.[22] These supplies will continue to help reduced potable water demand and lend themselves to water conservation efforts.

Recycled Water Demand and Use

The primary use of recycled water in Fresno is that of irrigation. The undisinfected secondary-treated wastewater produced by the Fresno-Clovis RWRF is used to irrigate non-food crops in the areas adjacent to the facility and is discharged into on-site basins for percolation to the aquifer and subsequent extraction for use by FID customers for irrigation. The disinfected tertiary treated

[19] City of Fresno, "Engineering Report for the Production, Distribution and Use of Recycled Water," prepared by Blair, Church & Flynn. September 18, 2015.

[20] City of Fresno, Department of Public Utilities. Wastewater Facilities and Infrastructure, Fresno/Clovis Regional Wastewater Reclamation Facility (RWRF). Website: https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-2. Accessed April 8, 2022.

[21] City of Fresno, Department of Public Utilities. Wastewater Facilities and Infrastructure, North Fresno Wastewater Reclamation Facility (NFWRF). Website: https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-3. Accessed April 8, 2022.

[22] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.

wastewater produced by the RWRF is used to irrigate landscape for users served by the City's recycled water distribution system. The disinfected tertiary treated wastewater produced by the NFWRF is used to irrigate the nearby Copper River golf course.

Recycled water use has varied over the last few years due to fluctuations in the number of customers utilizing recycled water services. Per the 2020 UWMP, total recycled water use in 2020 was 4,757 AFY (3,845 AFY of undisinfected secondary-treated wastewater for non-food crop irrigation, 858 AFY of disinfected tertiary treated wastewater from the Fresno-Clovis RWRF, and 54 AFY of disinfected tertiary treated wastewater from the NFWRF), with an average from 2015 to 2020 of 6,568 AFY.[23]

Undisinfected secondary-treated wastewater reuse is projected to continue to be used to irrigate non-food crops adjacent to the RWRF for the foreseeable future. It is predicted that disinfected tertiary treated wastewater use will increase as the City's recycled water distribution system continues to be built out and the number of customers increases. The use of recycled water for the Copper River golf course is assumed to remain constant through buildout of the City's General Plan. Per the 2020 UWMP, recycled water use is projected to be 14,220 AFY in any given year from 2025 through buildout of the City's General Plan, comprised of 7,900 AFY of secondary undisinfected recycled water for use as agricultural irrigation, and 6,320 AFY of tertiary treated recycled water to be used for landscape irrigation and limited agricultural irrigation (5,800 AFY for landscape irrigation excluding golf courses, 410 AFY for limited agricultural irrigation, and 110 AFY for golf course irrigation).[24] As noted in the UWMP, recycled water for agricultural irrigation does not offset the City's potable water demands, and as such is excluded from projected recycled water. Thus, the total projected recycled water available to offset potable water demands is 5,910 AFY (5,800 AFY for landscape irrigation excluding golf courses, and 110 AFY for golf course irrigation).

Recycled Water Distribution

Since the adoption of the City's Recycled Water Master Plan in 2010, a number of recycled water facilities have been constructed and are currently in service throughout the Fresno area. Segments of the recycled water distribution system outlined in the Recycled Water Master Plan have been designed and constructed over the last several years, mainly within the southwest quadrant of the distribution system as well as some small portions of the Northeast and Northwest systems. The southwest quadrant of the recycled water system includes a 3.2 million gallon recycled water reservoir at the RWRF, a 6,000 gallons per minute (gpm) (8.64 mgd) recycled water pump station located at the RWRF, a 640 gpm booster pump station at Roeding Park, and 15.7 miles of 10-inch to 54-inch recycled water pipeline; approximately 7.5 miles of pipeline remain to be constructed as part of the southwest quadrant.[25]

Project Site

Recycled water is not yet utilized in the Plan Area; however, Master Plan documents include proposed improvements to facilitate the availability of recycled water in the Plan Area.

[23] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[24] Ibid.
[25] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.

Two alternatives for recycled water supply and distribution systems were presented in the Recycled Water Master Plan,[26] both with proposed improvements that provided a path to conveying recycled water to the Plan Area. The first alternative was based on the idea that the Fresno-Clovis RWRF would be the main source of recycled water for the City and would supply recycled water to all four quadrants of the recycled water distribution system via numerous pipelines and pump stations. The second alternative assumed that a number of satellite recycled water facilities would be built around the City to assist in providing recycled water supplies, thereby alleviating the Fresno-Clovis RWRF of the requirement to supply the entire system.

The Southeast Quadrant includes southeast Fresno and the Plan Area. Alternative 1 of the Master Plan included backbone piping only up to the intersection of Butler and Fowler Avenues, stopping short of the Plan Area. Alternative 2 included backbone piping leading to a proposed satellite recycled water facility (wastewater scalping facility) near the intersection of North and Temperance Avenues, within the limits of the Plan Area. Per the Engineering Report prepared by Blair, Church & Flynn,[27] it would appear that Alternative 2 is the recommended option. The construction of a satellite facility within SEDA would allow the area to be self-sustaining and provide a path for wastewater collection and treatment that would directly benefit the Plan Area. However, the City is still analyzing the two alternatives presented in the Recycled Water Master Plan as well as other options for use of recycled water in the Plan Area.

Per the Recycled Water Master Plan, urban reuse provides the City with the best opportunity to implement recycled water projects that directly offset potable water and are highly visible to the community. However, urban reuse is much more distribution system-intensive than other alternatives like groundwater recharge, since potential recycled water users are spread out around the City. The Recycled Water Master Plan recommended aligning the distribution system to serve large water users first to ensure efficient use of the recycled water supply. Smaller users can then be connected to the main distribution system at a later time.

The Recycled Water Master Plan includes assumptions of recycled water capacities and demands for each quadrant of the distribution system based on whether they were supplied via the RWRF or satellite Regional Wastewater Facilities (RWFs) (Alternative 1 versus Alternative 2, respectively). The Southeast Quadrant was projected to have a treatment capacity of 2.8/5.1 mgd (2.8 mgd without residential or commercial reuse/5.8 mgd with residential and commercial reuse) for Alternative 1 and 3.0 mgd for Alternative 2, and a demand of 995/1,820 AFY for Alternative 1 and 951 AFY for Alternative 2.[28] It should be noted that the Master Plan Alternative 1 does not include any delivery of recycled water to the SEDA area, and thus the demands presented are not accurate for planning purposes. Alternative 2 includes the proposed satellite facility potentially located within SEDA boundaries, and thus could be used in estimating demands. However, the timeline for recycled water development within the Plan Area has not been fully developed, and thus updates to the Recycled

[26] Carollo Engineers. 2010. City of Fresno Recycled Water Master Plan. December.
[27] Blair, Church & Flynn Consulting Engineer, Inc. 2015. Engineering Report for the Production, Distribution and Use of Recycled Water. September.
[28] Carollo Engineers. 2010. City of Fresno Recycled Water Master Plan. December.

Water Master Plan are required to determine the extent to which recycled water would be available to the SEDA users.

Water Demand and Use

The previous version of the UWMP (2015) established baseline daily per capita water use values for a 10-year and 5-year average, as well as a 2020 target for per capita water use. The 2020 target was based on the requirements of SB x7-7 for a reduction in urban per capita water use Statewide by 20 percent. Per the 2020 UWMP, the 10-year baseline per capita water use (from 1999-2008) was 309 gallons per capita per day (GPCD), and the 5-year baseline per capita water use (from 2003-2007) was 304 GPDC.[29] The confirmed 2020 target per capita water use was 247 GPDC; the actual per capita water use for the City in 2020 was 198 GPCD, meeting and exceeding the 2020 target. Water use reduction can be accredited to substantial water conservation measures and the metering of all water services served by the City system.

The City breaks its water usage into five customer classes: single-family residential, multi-family residential, commercial/institutional, industrial, and landscape irrigation. Per the 2020 UWMP, total water consumption for the City was 121,993 AFY in 2020 (60,065 AFY for single-family residential, 18,842 AFY for multi-family residential, 16,971 AFY for commercial/institutional, 5,729 AFY for industrial, 10,478 AFY for landscape irrigation, 340 AFY for travel meters, and 9,568 AFY for distribution system losses).[30] Single-family and multi-family residential are historically the largest users of potable water in Fresno. The UWMP also presents projected water demands for the City. Projected total potable water demands are 154,210 AFY for 2035 and 167,947 AFY for 2045; projected total nonpotable water demands are 68,100 AFY for 2035 and 73,500 AFY for 2045.

Project Site

An analysis of the water demand for the Plan Area was completed as part of the Water Technical Study prepared for this Draft PEIR (see Appendix F). The analysis was completed based on land use classifications proposed for the Plan Area and compared to the water demand for the Plan Area as defined in the General Plan. The total water demand for the Plan Area under General Plan conditions was obtained from the technical memorandum prepared for the City's General Plan Update MEIR.[31] The total water demand projected for the Plan Area under General Plan buildout conditions was found to be 21,843 AFY (19.5 mgd).

The analysis to determine the projected water demand for the Plan Area under the Specific Plan conditions was completed using updated water demand factors for the General Plan land use classifications,[32] and correlating each land use water demand factor with the proposed SEDA Specific Plan land use classification. Each water demand factor was used in conjunction with the total area of each land use classification to determine a baseline projected water demand for the Plan Area under the proposed Specific Plan. The projected water demand for the Plan Area under the Specific Plan was determined to be 19.83 mgd; this results in an increase in water demand from the General Plan

[29] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[30] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[31] West Yost Associates. 2013. Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report. January.
[32] Akel Engineering Group Inc. 2020. Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update. October.

of 0.33 mgd, or 1.7 percent. This increase can be considered minimal, and the existing and planned water supplies and facilities should be sufficient for the Plan Area.

Per the 2020 UWMP, total projected water demand for Fresno in 2035 is 222,310 AF (154,210 potable demand and 68,100 AF nonpotable demand), and total water supply for Fresno in 2035 is 346,610 AF (149,100 AF of groundwater, 191,600 AF of surface water [60,000 AF from USBR and 131,600 AF from FID], and 5,910 AF of recycled water).[33] Excluding recycled water, the available water supply for potable use for Fresno in 2035 is 340,700 AF. A Water Supply Assessment (WSA) was prepared for the proposed Specific Plan and is included Appendix I. Per the WSA, there will be sufficient water supply to compensate for the 1.7 percent increase in water demand as a result of the Specific Plan. With the additional 0.33 mgd (370 AFY) of water demand for SEDA, the total water demand for Fresno in 2035 becomes 222,680 AFY, with a potable demand of 154,580 AFY. There will be sufficient water supply to compensate for the 1.7 percent increase in water demand as a result of the Specific Plan. See the prepared WSA for additional information.

Water Distribution

The City's water distribution system consists of approximately 1,800 miles of distribution pipeline ranging in size from 0.75-inch to 66 inches, 140,000+ service connections, 12,000+ fire hydrants, 18,000+ main line valves, and several booster pumps and storage tanks.

Generally, the Transmission Grid Mains (TGMs) convey water directly from municipal supply wells to customers, and Regional Transmission Mains (RTMs) convey water from surface water treatment plants to TGMs. TGM pipes range in size from 10 to 16 inches in diameter, and RTM pipes are 18 inches and larger. There is also a network of smaller distribution mains that serve individual customers via TGMs. Fire hydrants are located at regular intervals throughout the City and served from the same distribution mains as all other customers. Main line valves are located at regular intervals and are used to shut down and isolate sections of the distribution system for emergency repairs, regular maintenance, or replacement projects. These valves are also used to regulate flows between the pressure zones. Booster pump stations help maintain the pressure within the system. There are a number of other miscellaneous appurtenances associated with the distribution system designed to assist regular operation, including air release/vacuum breaker assemblies, blow-off valves, backflow preventers, and access manways.

Project Site

The City's Metro Plan includes a number of recommended improvements to the water distribution system to account for future development. As mentioned, the City is currently updating the Metro Plan. Per the City, some of the proposed improvements to the water distribution system in the Plan Area include: new water storage tanks and booster pump stations, the extension of the 48-inch diameter RTM in Olive Avenue, and new TGMs.[34]

[33] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[34] Buche, Brock. Department of Public Utilities Director, City of Fresno. Personal communication: email. May 23, 2022.

Wastewater

This section describes existing City wastewater collection infrastructure and treatment facilities, as well as existing and projected wastewater generation for the current General Plan and proposed Specific Plan.

Wastewater Collection System

The City owns, operates, and maintains the majority of the wastewater collection system that conveys wastewater to the Fresno-Clovis RWRF and all of the wastewater collection system that conveys wastewater to the NFWRF. The wastewater collection system serves Fresno and other participating agencies, including the County of Fresno, the City of Clovis, the Pinedale Public Utility District, and the Pinedale Water District. The area served by the City's collection system includes residential, commercial, and industrial uses. A majority of the City's wastewater is collected and conveyed to the RWRF for treatment, with a small portion being treated by the NFWRF. Wastewater service for Clovis is also provided by City facilities and the RWRF, however a small portion of Clovis is served by their own wastewater treatment facility. The Wastewater Management Division (WMD) of the City's Department of Public Utilities is responsible for the collection, conveyance, treatment, and reclamation of wastewater generated by users in the Fresno-Clovis Metropolitan Area.

The City's wastewater collection system consists of approximately 1,500 miles of gravity sewer lines ranging from 8 inches to 84 inches in diameter, 15 active lift stations, 1.7 miles of force mains, 23,000+ manholes, and 54 junction structures. The wastewater collection system primarily conveys wastewater via gravity flow from the northeast to the southwest, ultimately to the Fresno-Clovis RWRF. The system consists of pipe of varying material, with the majority being composed of either vitrified clay pipe (VCP) (56.2 percent of system piping) or polyvinyl chloride (PVC) pipe (30.8 percent of system piping).[35]

Wastewater collection begins at each user/land type, in which a house branch connects the user to the wastewater collection system. The house branches (typically 4 to 12 inches in size) will normally connect to a sewer lateral (collection pipelines, typically 13 to 33 inches in size), which will convey wastewater to a main or trunk sewer (typically 34 inches or larger in size). Main or trunk sewers collect wastewater from a number of services as they make their way toward a treatment plant. Manholes are placed within runs of sewer mains at regular intervals to facilitate access for maintenance of the mains, as well as at changes in direction of the sewer main. Lift stations may be located strategically throughout the system to provide the necessary lift when the natural alignment of a gravity pipeline becomes inefficient (e.g., too deep or insufficient slope). The City has a number of monitoring stations that actively collect and log flow data for the wastewater system. Additionally, the City has many junction structures/special structures that can be used to control flow distribution between downstream sewers.

Since 1968, the City has administered a Mandatory Sewering Ordinance which is included in the City's Municipal Code (Section 6-303, "Sewer Connection Required"), which requires that all properties within the City's service area shall be connected to the City's sanitary sewer system if it is

[35] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

available, and all septic tank/cesspool systems shall be abandoned. A sewer system is considered "available" if a sewer main has been constructed and is available for use in a public street, alley, or right-of-way within 100 feet for the first unit plus 50 feet for each additional unit, to be measured along the public street, alley, or right-of-way from the nearest property line to the sewer main. Any existing development within the Plan Area currently served by a septic tank system will be required to connect to the future sewer mains constructed to serve the area within 3 years after the sewer system becomes available and pay all associated fees.

The most recent version of the Wastewater Master Plan is the Wastewater Collection System Master Plan Update (Wastewater Master Plan), completed in September 2015.[36] The Wastewater Master Plan is intended to be the guiding document in planning and implementing sewer system improvements to accommodate future growth to buildout of the General Plan. The Wastewater Master Plan includes in depth analysis of the existing and projected wastewater flows of the City based on the General Plan development buildout conditions and includes a number of proposed facilities to accommodate future development, including those for the Plan Area.

Under the Statewide General Wastewater Discharge Requirements for Sanitary Sewer Systems, the City was required to develop and maintain a Sewer System Management Plan (SSMP) to provide a mechanism to properly manage, operate, and maintain all parts of the sanitary sewer system with the goal of reducing and preventing sanitary system overflows (SSOs), which is a release of untreated or partially treated wastewater resulting in public exposure, regardless of whether the wastewater reaches waters of the United States or not, or wastewater backups into buildings and onto private property that are caused by blockages in the City's portion of the sanitary sewer system. The City's first SSMP was approved in 2009 and several revisions have been issued since; the latest revision was approved in 2019.[37]

The City's SSMP must:

- Establish the legal authority to prevent illicit discharges into its sanitary sewer system;
- Require that sewers and connections be properly designed and constructed;
- Ensure access for maintenance, inspection, or repairs for those portions of the lateral owned or maintained by the City;
- Limit the discharge of fats, oils, and grease and other debris that may cause blockages; and
- Enforce any violation of its sewer ordinances.

Project Site

The SEDA Specific Plan Area is referred to as an "Area of Change" in the Wastewater Master Plan (specifically as a "New Growth Area") and is characterized as a growth area that will contribute to an expansion of the service area and increased wastewater flows.

[36] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

[37] City of Fresno Wastewater Management Division. 2019. Sewer System Management Plan. March.

Several new sewer pipelines were proposed to accommodate projected wastewater flows analyzed in the Wastewater Master Plan. These included a number of proposed sewer mains and related facilities for the Plan Area. These include a series of trunk sewers and laterals, as well as a satellite wastewater reclamation/scalping plant.

The proposed improvements for the Plan Area included in the Wastewater Master Plan were determined based on wastewater modeling and analysis of the General Plan buildout condition, which assumes full development of all developable sites within the General Plan boundary. The Wastewater Master Plan defined its study area boundary as the City's SOI as defined in the General Plan, which includes all land within the city limits (excluding the RWRF), County islands (unincorporated land surrounded by the City), and lands that are expected to be annexed by the City, which include the land beyond the outer city limits on all sides. The Wastewater Master Plan study area was intended to include the existing city limits and development that could occur through buildout of the City's General Plan. The proposed improvements in the Plan Area were developed to accommodate future growth as identified by the hydraulic analysis completed as part of the Wastewater Master Plan.

Long-Term Treatment Capacity Plans

In partnership with the City of Clovis, the City of Fresno owns and operates the Fresno-Clovis RWRF located near the intersection of Jensen and Cornelia Avenues in southwest Fresno. The RWRF receives and treats the majority of domestic, commercial, and industrial wastewater generated within the Cities of Fresno and Clovis, as well was some unincorporated areas of Fresno County. The RWRF is currently operated by the City, who holds responsibility for ensuring regulatory compliance with WDRs and the Central Valley RWQCB Order No. 5-01-254, "Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County." The City also owns and operates the NFWRF located in northeast Fresno on the north side of Copper Avenue between Cedar and Maple Avenues. This facility receives and treats wastewater generated within a small area of the City generally bound by Copper, Friant, and Willow Avenues, including wastewater generated from Copper River Ranch.

Wastewater is treated via primary (removal of materials that will float or settle) and secondary (biological processes to remove suspended and dissolved solids) treatment, after which it is deposited into infiltration ponds to allow percolation through the soil, serving as another level of treatment. The City operates federally mandated industrial pretreatment programs to prevent the introduction of pollutants into publicly owned treatment works that could impact the collection infrastructure and pass through to receiving waters. Industries are also billed for sewer service depending on the amount of water used or effluent discharged, and the strength of their wastewater measured as pounds of biochemical oxygen demand and pounds of total suspended solids. Reducing the strength of their wastewater to reduce sewerage costs becomes an incentive for industries to improve the water quality of their wastewater effluent.

Fresno-Clovis Regional Wastewater Reclamation Facility

The RWRF has a rated annual monthly average daily discharge flow of 80 MGD and an maximum monthly average daily discharge flow of 88 MGD,[38] but the average annual flow is approximately 68 mgd.[39] The RWRF uses an activated sludge wastewater treatment process which produces undisinfected secondary-treated wastewater. Most of the treated wastewater is disposed into on-site disposal ponds for percolation through the underlying soils and into the groundwater basin. Some of the treated wastewater is also conveyed to farmers for restricted irrigation of non-food crops on agricultural land on surrounding properties. The RWRF also owns and operates a number of reclamation wells that extract water from on-site percolation ponds and discharges that water into FID canals for irrigation use of farmland downstream of the RWRF.

The RWRF also generates disinfected tertiary treated wastewater. The disinfected tertiary treated wastewater is delivered through a network of pipelines to various recycled water use areas around the City, mainly for irrigation of landscaping at sites including but not limited to parks, median landscape strips, and cemeteries.

North Fresno Wastewater Reclamation Facility

The NFWRF is a tertiary level treatment facility, and the treated wastewater is mainly used for irrigation of the Copper River Country Club and Golf Course. The permitted capacity of the plant is 0.71 mgd average monthly flow and 1.07 mgd maximum daily flow.[40]

Wastewater Generation

Generally, wastewater consists of base wastewater flow and wet weather flow. Base wastewater flow is generated by routine water usage in the residential, commercial, business, and industrial sectors of the collection system. Wet weather flow includes stormwater inflow, trench infiltration, and wet weather ground water infiltration. Base wastewater flow also includes dry weather groundwater infiltration, which is groundwater that enters the sewer system when the relative depth of the groundwater table is higher than the depth of the pipeline and defects exist in the pipe, such as cracks, misaligned joints, or breaks which allows infiltration into the system. In Fresno, the depth to groundwater table is substantial, and therefore dry weather groundwater infiltration has little to no influence on the collection system.[41] Wet weather flow includes those flows listed above; the stormwater inflow and trench infiltration comprise the term “Infiltration and Inflow,” also known as I/I. Wet weather flow can also be affected by groundwater infiltration in that the groundwater table elevation may rise during storm events. As mentioned though, the depth to groundwater level in the City is very large, and thus has no noticeable effect on wastewater flow.

[38] Blair, Church & Flynn Consulting Engineer, Inc. 2015. Engineering Report for the Production, Distribution and Use of Recycled Water. September.

[39] City of Fresno, Department of Public Utilities. Wastewater Facilities and Infrastructure, Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF). Website: https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-2. Accessed April 8, 2022.

[40] City of Fresno, Department of Public Utilities. Wastewater Facilities and & Infrastructure, North Fresno Wastewater Reclamation Facility (NFWRF). Website https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-3. Accessed April 8, 2022.

[41] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

Base wastewater flows are diurnal in nature, taking on patterns of generation that depend on the type of use and hours of use. Commercial and industrial patterns typically have higher flows during business hours and lower flows at night, and weekend flow patterns may vary when compared to weekday flows.

I/I affects all sewer systems. Infiltration occurs when stormwater slowly seeps into the sewer system by percolating through the soil and entering through defects in the pipes, manholes, and joints. Inflow occurs when stormwater rapidly flows into the sewer system through more readily available entrances, such as storm drain cross connections, leaky manhole covers, illegal storm drain connections, and sewer cleanouts. I/I increases the flow volume and peak flows and can cause overflows if the sewer system is operating at capacity at the time of I/I occurrence. Per the Wastewater Master Plan, the City's wastewater collection system exhibits relatively low I/I as a whole, though some areas experience higher rates of I/I.

Per the Wastewater Master Plan, the peak wet weather flow (PWWF) is the highest observed hourly flow that occurs following the design storm event, and that the City's sewer and lift stations were evaluated based on their capacity to convey this flow, referred to synonymously as the "design flow." Analysis was also completed for the base wastewater flow. The Wastewater Master Plan indicates that the buildout base wastewater flow will be 129.9 mgd,[42] and that the PWWF will be 202.4 mgd. The peak dry weather flow (PDWF) was also calculated as 164.7 mgd at buildout.[42] The base wastewater flow, also known as the average dry wastewater flow, will be used for analysis of the General Plan and Specific Plan wastewater capacities presented in this report. The RWRF has a buildout capacity of 88 mgd.

Project Site

The proposed improvements for the Plan Area included in the Wastewater Master Plan were determined based on wastewater modeling and analysis of the General Plan buildout condition, which assumes full development of all developable sites within the General Plan boundary. The Wastewater Master Plan defined its study area boundary as the City's SOI as defined in the General Plan, which includes all land within the city limits (excluding the RWRF), County islands (unincorporated land surrounded by the City), and lands that are expected to be annexed by the City, which include the land beyond the outer city limits on all sides. The Wastewater Master Plan study area was intended to include the existing city limits and development that could occur through buildout of the City's General Plan. The proposed improvements in the Plan Area were developed to accommodate future growth as identified by the hydraulic analysis completed as part of the Wastewater Master Plan.

The land use assumptions in the Wastewater Master Plan were based on the General Plan and projected future developments within the City's proposed growth boundary. The Wastewater Master Plan includes wastewater flow factors that were established based on the average wastewater flow generated for each existing land use type in Fresno and calculated from the General Plan land use

[42] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

classifications in gallons per day per acre (gpd/ac).[43] These factors were used to project the estimated wastewater flow through buildout of the City's General Plan boundary and were used in the analysis of the Plan Area wastewater generation.

The technical analysis of the impacts of land use changes in the Plan Area was focused on comparing the change in wastewater flow generation from the General Plan land use case to the Specific Plan land use case to determine potential impacts to the wastewater collection system as completed in the Wastewater Technical Study (See Appendix I). The SEDA Specific Plan does not use the same land use classifications as defined in the General Plan and instead has developed SEDA-specific land use classifications. The SEDA-specific land uses are similar in nature to many of the General Plan land uses, and similarities can be drawn between the two land use categories. Thus, a number of reasonable assumptions were made to determine equivalent General Plan land uses for each SEDA-specific land use in order to utilize the wastewater flow factors for General Plan land uses previously established in the Wastewater Master Plan.

Total wastewater generations were determined by utilizing the wastewater generation rates in the Wastewater Master Plan, and the land use classification areas for the General Plan and the Specific Plan. The total wastewater produced by the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in wastewater generation for the Plan Area. The total General Plan base wastewater flow for the Specific Plan Area was found to be 9.86 mgd, and the Specific Plan base wastewater flow for the Specific Plan Area was found to be 11.32 mgd, resulting in an increase of wastewater flow of approximately 1.46 mgd, or 15 percent.

Stormwater

This section describes existing City of Fresno stormwater collection infrastructure, as well as existing and projected stormwater runoff for the current General Plan and proposed Specific Plan.

Generation and Collection

Stormwater runoff collection and disposal for the Fresno-Clovis Metropolitan Area is provided by the FMFCD. The FMFCD provides flood control within an approximately 400 square mile watershed in Fresno County, generally located between the Kings River and San Joaquin River, and extending up into the Sierra Nevada foothills. FMFCD also provides urban storm drainage, groundwater recharge, and recreation spaces in the Fresno-Clovis Metropolitan Area, as well as Clean Water Act (CWA) pollution prevention compliance assistance.

FMFCD's flood control program consists of a system of major facilities and operations that control flows from a number of low-elevation streams that drain a portion of the west slope of the Sierra Nevada between the San Joaquin and Kings Rivers. The system consists of numerous flood control facilities including various dams and reservoirs, as well as many related streams and channels. The FMFCD is responsible for flood control and stormwater planning and management; the District Services Plan (DSP)[44] provides comprehensive policies and implementation actions for flood control,

[43] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

[44] Fresno Metropolitan Flood Control District. 2016. District Services Plan.

rural streams management, local stormwater drainage, stormwater quality management, water conservation, recreation, and related wildlife management. The FMFCD coordinates with cities and the County of Fresno via a framework provided in the Storm Drainage and Flood Control Master Plan (Storm Drain Master Plan), which is prepared by the FMFCD as a specific element within the general plan of each agency. The Storm Drain Master Plan identifies urban and rural drainage area boundaries, computes runoff flows based on planned land use, identifies facility size and location, establishes street grades necessary to accomplish drainage of the runoff from the point of origin to the nearest collector facility, and identifies natural channels requiring preservation.

Stormwater collection in the City is typically completed via FMFCD facilities. It begins with street gutters that collect and convey stormwater runoff to storm drain inlets. The runoff is collected in these inlets and delivered to FMFCD's pipe networks, pump stations, and infiltration basins for groundwater recharge. Most runoff is discharged into recharge basins, but during heavy rainfall events, excess runoff overflows into a system of relief channels and canals that discharge to the San Joaquin River, its tributary streams, local agricultural canals, and FID facilities.

The Storm Drain Master Plan divides FMFCD's service area into many local drainage areas of one to two square miles throughout the City. All inlets, pipes, and pump stations within each drainage area are maintained by the FMFCD. The gutters, along with public streets and sidewalks, are maintained by the City's Street Maintenance Division. It is assumed that this maintenance agreement will remain in place for the foreseeable future. The FMFCD's Storm Drain Master Plan includes 164 adopted or proposed drainage areas, with all but five areas served by a retention or detention facility. FMFCD basins have been sized for capacities of two-year storms and for at least 60 percent of average rainfall;[45] FMFCD allows a 20 percent change in volume before basins need to be resized or relocated.[46] Retention basins are designed to provide storage for up to 6 inches of rainfall on the drainage area watershed given typical runoff to rainfall ratios used for urban drainage design.

FMFCD pipes range in size from 15 to 108 inches, and basins range in size from 5 to 25 acres. The drainage areas are delineated along topographic boundaries and are limited in size from 200 to 600 acres. This size limitation helps reduce the size requirements of the collection and disposal facilities.

FMFCD utilizes three means to implement drainage systems for the Metropolitan Area. One method is the use of Community Block Grants and low interest infrastructure loans from the State of California to construct drainage facilities in the older, previously developed areas of the City. A second method is to form assessment districts under the provisions of the 1915 Bond Act; assessment districts were formed based on drainage area boundaries, the parcels within the assessment districts were assessed a proportional share of the cost of the collection and disposal system, and the drainage system for the drainage area was constructed. The third and currently employed method is to collect drainage fees from parcels as they develop based on their prorated share of the cost of the drainage area collection and disposal systems. The implementing ordinance for the drainage fee structure is adopted by the City, and the drainage fees are collected by the City when entitlements are granted or building permits are issued.

[45] Fresno Metropolitan Flood Control District. 2016. District Services Plan.
[46] Placeworks. 2017. Southwest Fresno Specific Plan Environmental Impact Report. August.

FMFCD is also a primary participant in groundwater recharge for the City. Unlined retention basins provide recharge of both stormwater runoff and imported water from the San Joaquin River and Kings River. Through a cooperative agreement, the City uses FID canals to deliver allocated water from the San Joaquin and Kings Rivers to these basins for groundwater recharge.

Flood Control

FMFCD provides flood control measures on major creeks and waterways that drain to the City; these waterways include Big Dry Creek, Alluvial Drain, Pup Creek, Dog Creek, Redbank Creek, Mud Creek, and Fancher Creek. The flood control measures maintained are designed for the 0.5 percent exceedance interval (i.e., 200-year-return frequency) flood flow event, which include a series of dams and detention basins. These include the Big Dry Creek Dam, Fancher Creek Dam, Redbank Dam, Friant Dam, Alluvial Drainage Detention Basin, Pup Creek Detention Basin, Redbank Creek Detention Basin, Fancher Creek Detention Basin, and Big Dry Creek Detention Basin.

Project Site

In accordance with the Storm Drain Master Plan and other planning documents, the FMFCD is developing improvements for the Specific Plan Area for storm drain facilities. The Specific Plan Area encompasses all or part of the following existing drainage areas: BG, BL, BM, BS, CS, DS and, DV. Proposed drainage areas for SEDA include DT, DU, DW, DX, DY, and DZ. Most of the existing drainage areas include existing storm drain collection facilities, while the proposed drainage areas generally have no existing storm drain facilities. Areas DS and DV are the exceptions in that they are existing drainage areas with basins but have not yet been built out to Master Plan conditions.

FMFCD improvements include storm drain inlets and piping, which are being analyzed and developed in conjunction with the proposed land uses within the Plan Area. Those portions of the Plan Area encompassed in existing drainage areas include master planned utilities designed by FMFCD.

There are seven existing basins contributing to stormwater collection for the Plan Area, and six proposed basins within the Plan Area. There are also two existing basins outside of the Plan Area that are not part of existing drainage areas, including the Redbank Basin and the Fancher Creek Basin, that may contribute to additional drainage capacity; however, these two basins were not considered in the analyses completed as part of the Storm Drain Technical Study (Appendix I). FMFCD basins are designed for a capacity of a 2-year storm and for at least 60 percent of average rainfall. Per the FMFCD, the proposed drainage areas for SEDA have not been adopted yet and the basin locations have not been finalized; those presented here have been placed by FMFCD staff.[47] The Specific Plan must be analyzed and evaluated for impacts on the aggregate area and each planned basin area.

An area's runoff rate and volume are heavily affected by the amount of impervious surfaces within the area. Imperviousness is directly related to the type of land use and can either positively or negatively affect an area's drainage capabilities with a change in impervious surfaces. A common characteristic that can define an area's imperviousness, i.e., its ability to handle drainage during

[47] Wade, Denise. FMFCD Master Plan Special Projects Manager, FMFCD. Personal communication: email. February 22, 2022.

storm events, is its Equivalent Area, also known as the CA value. An area's CA value is the product of a unique runoff coefficient (C) and its area (A). Runoff coefficients vary based on land use depending on a perceived level of imperviousness, i.e., areas with higher levels of impervious surfaces (e.g., shopping centers) will have higher runoff coefficients than those with less impervious surfaces (e.g., rural residential areas).

The analysis completed in the Storm Drain Technical Study compared the CA value of each existing and proposed drainage area within SEDA between the General Plan Land Uses and the SEDA Specific Plan Land Uses. For the General Plan land use analysis, the FMFCD's "Recommended Design C-Factors for the City of Fresno" was used, and a set of preliminary C-values developed for SEDA land uses by FMFCD were used in completing the SEDA Specific Plan analysis. See the Storm Drain Technical Study for a full explanation of the analysis process and subsequent results.

The total runoff volume was determined for each drainage area under the General Plan and Specific Plan. In general, all drainage areas experienced some amount of increase in runoff volume. The proposed Specific Plan resulted in a total increase in stormwater runoff of 248 AF (23 AF of additional runoff to existing drainage areas, and 225 AF of additional runoff to proposed drainage areas). None of the existing basins experienced an increase of more than 20 percent, and all existing basins have sufficient capacity to accommodate the increase in runoff.

With regards to the proposed basins, there are two basins of concern – Basin DW and Basin DX. Basin DW experiences a 16.2 percent increase in runoff volume, and while this does not exceed the 20 percent threshold, it does exceed the available volume of the proposed basin by 12.8 AF, meaning that FMFCD will need to reevaluate Basin DW's capacity. The total runoff volume for Basin DX increased by 25.4 percent, which exceeds the 20 percent threshold. FMFCD will need to reevaluate either the basin's size or location to accommodate this increase in runoff.

Solid Waste

Solid Waste Collection

The City diverts a majority of its solid waste away from landfills and into recycling and composting programs. Diversion conserves limited landfill space, keeps toxic chemicals and materials from contaminating landfills, and enhances the reuse of materials. A Council resolution commits the City to the goal of Zero Waste by the year 2025. The City's Construction and Demolition Ordinance requires that the recycling of construction and demolition is required for any City-issued building, relocation or demolition permitted project that generates at least 8 cubic yards of material by volume and all waste must be hauled to a City-approved facility.[48]

The City's Solid Waste Division provides the following services: collection of residential and commercial solid waste, recyclables, and green waste throughout the community at least once a week; disposal of solid waste at the designated locations; provision and maintenance of containers; response to customer complaints/concerns; and provision of roll-off and compactor services to

[48] City of Fresno, Department of Public Utilities. Trash Disposal and Recycling, Multi-Family and Commercial Services, Construction and Demolition Waste. Website: https://www.fresno.gov/publicutilities/trash-disposal-recycling/multi-family-commercial-services/#tab-3. Accessed June 17, 2022.

residential customers. They also collect residential bulky goods through operation cleanup, as well as waste oil and waste oil filters.

In 2011, the City granted franchises for non-exclusive roll-off services to 16 roll-off companies for bins which were 10 cubic yards or greater. The City has also granted exclusive franchise agreements for the collection of commercial solid waste, recyclables and green waste to two franchises: Republic Services (formerly Allied Waste Services) is responsible for all commercial services north of Ashlan Avenue, and Mid Valley has all commercial locations south of Ashlan.[49] Both haulers are responsible for Commercial, Multi-family, and Industrial up to 8 cubic yards, which fall into City jurisdiction. Both City and non-exclusive/exclusive franchise haulers provide and maintain containers, respond to customer complaints/concerns, and provide roll-off and compactor services to residential, multi-family, and commercial customers respective to their agreements. Garbage disposed of in the City of Fresno is taken to Cedar Avenue Recycling and Transfer Station (CARTS). Once trash has been off-loaded to the transfer station, it is sorted and non-recyclable solid waste is loaded onto large trucks and taken to the American Avenue Landfill.

The City and Fresno County co-sponsor two household hazardous waste (HHW) drop-off events each year, one in the spring and one in the fall. Additionally, the County provides a door-to-door program that provides HHW pickup for individuals who, because of special circumstances, cannot participate in the HHW drop-off events.

Project Site

Solid waste collection in the Specific Plan Area will continue as currently planned for City residents, and collection routes will be extended to the Plan Area. Solid waste generation will increase with the buildout of the Specific Plan Area, and thus solid waste collection systems will need to accommodate this increase in demand for service.

All new developments will need to abide by the City's Construction and Diversion Ordinance. New developments may also need to create a Waste Management Plan per CALGreen requirements for on-site sorting of construction debris to be submitted to the City for approval.

Landfills

The American Avenue Landfill (American Avenue Disposal Site, Site Solid Waste Information System [SWIS] Number 10-AA-0009) is located approximately six miles southwest of Kerman. American Avenue Landfill is owned and operated by Fresno County and began operations in 1992 for both public and commercial solid waste haulers. The American Avenue Landfill is a sanitary landfill, meaning that it is a disposal site for non-hazardous solid waste spread in layers, compacted to the smallest practical volume, and covered by material applied at the end of each operating day.[50]

[49] LSA. 2020. City of Fresno Program Environmental Impact Report. March.
[50] City of Fresno, Department of Public Utilities. Facilities & Infrastructure, American Avenue Landfill. Website: https://www.fresno.gov/publicutilities/facilities-infrastructure__trashed/american-avenue-landfill/. Accessed June 17, 2022.

The American Avenue Landfill has a maximum permitted capacity of 32,700,000 cubic yards and a remaining capacity of 29,358,535 cubic yards, with an estimated closure date of August 31, 2031. The maximum permitted throughput is 2,200 tons per day.[51]

One other active disposal site is located in Fresno County. The City of Clovis Landfill (SWIS Number 10-AA-0004) has a maximum permitted capacity of 7,800,000 cubic yards and a remaining capacity of 7,740,000 cubic yards, with an estimated closure date of April 30, 2047. The maximum throughput is 2,000 tons per day .[52]

Green waste hauled by the residential solid waste operations is delivered to one of two locations: Earthwise/Green Valley Recycling located at 2365 North Avenue or West Coast Waste at 30777 Golden State Frontage Road, both of which are located within 0.25 mile of one another in southwest Fresno.

Commercial green waste and organics are delivered to Elm Avenue Recycling by Mid Valley and are then transferred to the Kerman facility and composted with organic compost, which is then used by organic farms in the region. Commercial green waste and organics being delivered by Allied Waste are taken to the Rice Road Transfer Station and trans-loaded into trucks to be delivered to Kochergen Farms for composting and land application.

Recycling collected by residential service is delivered to both CARTS and Elm Avenue Recycling. Both facilities have Material Recovery Facilities (MRFs) which sort through the co-mingled recycling stream of materials. Commercial franchises deliver recycling to Elm Avenue Recycling only. The City and franchise haulers continue to work with the California Department of Resources Recycling and Recovery (CalRecycle) to educate customers and refine the various waste streams.

Project Site

Solid waste service will be extended to the Plan Area, and similar collection processes will be followed to collect refuse and deliver it to the proper locations, whether that be to a landfill or other sorting facility. Solid waste generation will increase with the buildout of the Specific Plan Area, and thus solid waste collection facilities will need to accommodate this increase in demand for service.

Electricity, Natural Gas, and Telecommunications

Electricity

The State of California generates approximately 206,336 gigawatt-hours (GWh) of electricity. Approximately 43.0 percent of the energy generation is sourced from natural gas, 32.1 percent from renewable sources (i.e., solar, wind, and geothermal), 16.5 percent from large hydroelectric sources, and the remaining 8.4 percent is sourced from coal, nuclear, oil, and other nonrenewable sources.[53]

[51] California Department of Resources Recycling and Recovery (CalRecycle). 2019. Solid Waste Information System. Website: https://www2.calrecycle.ca.gov/SolidWaste/Site/Search. Accessed July 8, 2022.

[52] Ibid.

[53] California Energy Commission (CEC). 2022. 2019 Total System Electric Generation. Website: https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2020-total-system-electric-generation/2019. Accessed June 30, 2022.

In 2022, California was the nation's top producer of electricity from solar and geothermal, and second in production of biomass energy. The State was fourth in the nation in conventional hydroelectric power generation, and was the second-largest state overall in total electricity generation from renewable sources. In 2022, California was the fourth-largest electricity producer in the nation, and the third-largest electricity consumer among the states, but its per capita energy consumption was less than in all other states except Hawaii, due in part to its mild climate and its energy efficiency programs.[54]

Electricity and natural gas are distributed through the various electric load-serving entities (LSEs) in California. These entities include investor-owned utilities (IOUs), publicly owned LSEs, rural electric cooperatives, community choice aggregators, and electric service providers.[55]

End-use electricity and gas customers in Fresno County are served solely by Pacific Gas and Electric Company (PG&E) to meet electrical power demands. As of 2022, PG&E's portfolio contains 48 percent electricity generated from renewable sources.[56]

The smallest scale at which electricity consumption information is readily available is the County level. Therefore, electricity consumption in Fresno County is used herein to generally characterize the City's existing electricity consumption. Fresno County includes several incorporated cities and a large unincorporated area. According to the California Energy Commission (CEC), Fresno County consumed approximately 8,378.0 GWh in 2021.[57]

Natural Gas

Natural gas is used for everything from generating electricity to cooking and space heating to an alternative transportation fuel. In 2021, total natural gas demand in California for residential, commercial, industrial, vehicle fuel, and electric power generation was 2,033 billion cubic feet per year (BCF/year), up from 2,055 BCF/year in 2017. Demand in all sectors has fluctuated over the last few years due to the COVID-19 pandemic.[58]

Natural gas-fired generation has become the dominant source of electricity in California, as it fuels about 45 percent of electricity consumption followed by hydroelectric power. Because natural gas is a resource that provides load when the availability of hydroelectric power generation and/or other sources decrease, use varies greatly from year to year. The availability of hydroelectric resources, the emergence of renewable resources for electricity generation, and overall consumer demand are the variables that shape natural gas use in electric generation.[59]

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[54] Energy Information Administration (EIA). 2022. California State Profile and Energy Estimates. Website: https://www.eia.gov/state/?sid=CA. Accessed June 26, 2023.

[55] California Energy Commission (CEC). 2019. Electric Load-Serving Entities (LSEs) in California. Website: https://www.energy.ca.gov/almanac/electricity_data/utilities.html. Accessed June 24, 2022.

[56] Pacific Gas and Electric Company (PG&E). 2020. Corporate Responsibility and Sustainability Report.

[57] California Energy Commission (CEC). 2020. "Electricity Consumption by County." Website: https://ecdms.energy.ca.gov/elecbycounty.aspx. Accessed June 23, 2023.

[58] United States Energy Information Administration (EIA). 2022. Natural Gas Consumption by End Use. Website: https://www.eia.gov/dnav/ng/NG_CONS_SUM_DCU_SCA_A.htm. Accessed June 26, 2023.

[59] California Energy Commission (CEC). 2022. Supply and Demand of Natural Gas in California. Website: https://www.energy.ca.gov/data-reports/energy-almanac/californias-natural-gas-market/supply-and-demand-natural-gas-california. Accessed June 26, 2023.

The City is served solely by PG&E to meet natural gas demands. PG&E has detailed information regarding a commitment to use renewable gas sources in the future but has not provided a current figure for renewable gas in their portfolio.

The smallest scale at which natural gas consumption information is readily available is at the County level; therefore, natural gas consumption in Fresno County is used herein to also characterize the City's existing natural gas consumption. According to the CEC, Fresno County consumed approximately 318.9 million U.S. therms of natural gas in 2021, or approximately 31,890 billion BTU.[60]

Telecommunications

Various telecommunications companies provide internet and cellular service in the City of Fresno, including Xfinity, AT&T, Earthlink, Unwired, and Frontier.[61]

Project Site

Electrical, natural gas, and telecommunications services will be extended to the Plan Area, and be served by the same suppliers. New utility facilities will be required to accommodate the increase in demand for service resulting from future development in accordance with the Specific Plan.

3.18.3 - Regulatory Framework

Federal

Water, Recycled Water, Wastewater, and Storm Drainage

Safe Drinking Water Act

The Safe Drinking Water Act authorizes the United States Environmental Protection Agency (EPA) to establish national standards for drinking water, called the National Primary Drinking Water Regulations, to protect against both naturally occurring and man-made contaminants (42 United States Code [USC] § 300f *et seq*). These standards set enforceable maximum contaminant levels in drinking water and require all water providers in the United States to treat water to remove contaminants, except for private wells serving fewer than 25 people. In California, the State Department of Health Services conducts most enforcement activities.

Clean Water Act (National Pollutant Discharge Elimination System)

The Water Pollution Control Act of 1972, more commonly known as the CWA, regulates the discharge of pollutants into watersheds throughout the nation (33 USC § 1251 *et seq*.). Under the CWA, the EPA implements pollution control programs and sets wastewater standards.

The National Pollutant Discharge Elimination System (NPDES) permit program was established within the CWA to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint-source stormwater runoff. NPDES permits generally identify effluent and receiving water limits on allowable concentrations and/or

[60] California Energy Commission (CEC). 2020. Gas Consumption by County. Website: https://ecdms.energy.ca.gov/gasbycounty.aspx. Accessed June 23, 2023.
[61] Top 5 Internet Service Providers Fresno. Website: Website: https://www.highspeedinternet.com/ca/fresno. Accessed June 30, 2022.

mass emissions of pollutants contained in the discharge; prohibitions on discharges not specifically allowed under the permit; and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities. Wastewater discharge is regulated under the NPDES permit program for direct discharges into receiving waters and by the National Pretreatment Program for indirect discharges to a sewage treatment plant.

Energy

Energy Independence and Security Act

The Energy Policy Act of 2005 created the Renewable Fuel Standard program (2 USC § 13201 *et seq*.) The Energy Independence and Security Act of 2007 (EISA) (Public Law 109-58. 42 USC §13201 *et seq*.) expanded this program by:

- Expanding the Renewable Fuel Standard program to include diesel in addition to gasoline;
- Increasing the volume of renewable fuel required to be blended into transportation fuel from 9 billion gallons in 2008 to 36 billion gallons by 2022;
- Establishing new categories of renewable fuel, and setting separate volume requirements for each one; and
- Requiring the EPA to apply lifecycle greenhouse gas (GHG) emissions performance threshold standards to ensure that each category of renewable fuel emits fewer GHGs than the petroleum fuel it replaces.

This expanded Renewable Fuel Standard program lays the foundation for achieving substantial reductions of GHG emissions from the use of renewable fuels, reducing the use of imported petroleum, and encouraging the development and expansion of the nation's renewable fuels sector.

Signed on December 19, 2007, the EISA aims to:

- Move the United States toward greater energy independence and security.
- Increase the production of clean renewable fuels.
- Protect consumers.
- Increase the efficiency of products, buildings, and vehicles.
- Promote research on and deploy GHG capture and storage options.
- Improve the energy performance of the federal government.
- Increase U.S. energy security, develop renewable fuel production, and improve vehicle fuel economy.

EISA reinforces the energy reduction goals for federal agencies put forth in Executive Order 13423, as well as introduces more aggressive requirements. The three key provisions enacted are the Corporate Average Fuel Economy Standards, the Renewable Fuel Standard, and appliance/lighting efficiency standards.

The EPA is committed to developing, implementing, and revising both regulations and voluntary programs under the following subtitles in EISA, among others:

- Increased Corporate Average Fuel Economy Standards
- Federal Vehicle Fleets
- Renewable Fuel Standard
- Biofuels Infrastructure
- Carbon Capture and Sequestration[62]

State

Water

California Water Code

The California Water Code, a section of the California Code of Regulations, is the governing law for all aspects of water management in California.

California Porter-Cologne Water Quality Control Act

Under the Porter-Cologne Water Quality Control Act (Porter-Cologne Act), which was passed in California in 1969, the California State Water Resources Control Board (State Water Board) has the ultimate authority over State water rights and water quality policy (California Water Code Div. 7 § 13000 *et seq*.). The Porter-Cologne Act also established nine RWQCBs to oversee water quality on a day-to-day basis at the local and regional level. The RWQCBs engage in a number of water quality functions in their respective regions and regulate all pollutant or nuisance discharges that may affect either surface water or groundwater.

California Urban Water Management Planning Act

The Urban Water Management Planning Act requires that all urban water suppliers with at least 3,000 customers prepare UWMPs and update them every 5 years (California Water Code §§ 10610–10656, 10608). The act requires that UWMPs include a description of water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions. Specifically, UWMPs must:

- Provide current and projected population, climate, and other demographic factors affecting the supplier's water management planning;
- Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier;
- Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage;
- Describe plans to supplement or replace that source with alternative sources or water demand management measures;
- Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis (associated with systems that use surface water);

[62] United States Environment Protection Agency (EPA). 2022. Summary of the Energy Independence and Security Act. Website: https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act. Accessed June 24, 2022.

- Quantify past and current water use;
- Provide a description of the supplier's water demand management measures, including schedule of implementation, program to measure effectiveness of measures, and anticipated water demand reductions associated with the measures; and
- Assess the water supply reliability.

California Health and Safety Code

Section 64562 of the California Health and Safety Code establishes water supply requirements for service connections to public water systems. Before additional service connections can be permitted, enough water must be available to the public water system from its water sources and distribution reservoirs to adequately, dependably, and safely meet the total requirements of all water users under maximum-demand conditions.

California Senate Bills 610 and 221

SB 610 and SB 221 (Water Code § 10910(c)(2)) amended State law, effective January 1, 2002, to improve the link between information on water supply availability and certain land use decisions made by cities and counties.[63] SB 610 and SB 221 seek to promote more collaborative planning between local water suppliers and cities and counties by requiring that detailed information regarding water availability be provided to decision-makers prior to approval of specified large development projects. SB 610 requires that detailed information be included in a WSA, which is then included in the administrative record that serves as the evidentiary basis for an approval action by a city or county. SB 221 requires that the detailed information be included in a verification of water supply. Under SB 610, WSAs must be furnished to local governments for inclusion in any environmental documentation for certain projects (as defined in Water Code Section 10912(a)) subject to the California Environmental Quality Act (CEQA).

California Water Conservation Act

The California Water Conservation Act (SB X7-7) was enacted in November 2009 and requires each urban water supplier to select one of four water conservation targets contained in California Water Code Section 10608.20 with the Statewide goal of achieving a 20 percent reduction in urban per capita water use by 2020.[64] Under SBX7-7, urban retail water suppliers were required to develop water use targets and submit a water management plan to the Department of Water Resources (DWR) by July 2011. The plan must include the baseline daily per capita water use, water use target, interim water use target, and compliance daily per capita water use.

California Model Water Efficient Landscape Ordinance

The California Model Water Efficient Landscape Ordinance (MWELO) was adopted by the California Office of Administrative Law in September 2009 and requires local agencies to implement water efficiency measures as part of its review of landscaping plans.[65] Local agencies can either adopt the MWELO or incorporate provisions of the ordinance into its own code requirements for landscaping.

[63] Senate Bill 610 Water Supply Planning, Chapter 643, Statutes of 2001, Costa; SB 221 Land Use: Water Supplies, Chapter 642, Statutes of 2001, Kuehl.
[64] Water Conservation Act of 2009, Senate Bill SB X7-7, Steinberg, 2009.
[65] Model Water Efficient Landscape Ordinance (MWELO), Title 23 CCR, Div. 2, Chap. 2.7 §490 et seq.

The County has not adopted a local ordinance, but the City has incorporated the requirements of the MWELO into their municipal code (Chapter 11, "Building Permits and Regulations," and Chapter 15, "Citywide Development Code;" see Local Regulations section below).

California Groundwater Management Act of 1992

The California Groundwater Management Act (GWMA) was signed into law in 1992 and made groundwater management part of the California Water Code (California Water Code Division 6, Part 2.75, Chapters 1-5, §§ 10750-10755.4). First introduced as Assembly Bill (AB) 3030, the GWMA established specific procedures on how Groundwater Management Plans (GWMPs) are to be developed and adopted by local agencies. The intent of the GWMA is to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdictions and to provide a methodology for developing a GWMP. The GWMA has since been modified by SB 1938 in 2002 and AB 359 in 2011.

- AB 3030 provided a systematic procedure for existing local agencies to develop GWMPs.
- SB 1938 modified the GWMA by requiring any public agency seeking State funds administered through the DWR for the construction of groundwater projects to prepare and implement a GWMP.
- AB359 further modified the GWMA by requiring public agencies to prepare and implement GWMPs with an additional required component that focused on identifying groundwater recharge areas. It also included several plan adoption procedural changes, requires GWMPs to be submitted to DWR, and requires DWR to provide public access to this information.

Sustainable Groundwater Management Act

SGMA includes a three-bill legislative package composed of AB 1739, SB 1168, and SB 1319 (Division. 6, Part 2.74 §§ 10720-10737.8). SGMA requires local agencies to form GSAs for high and medium priority basins and develop and implement Groundwater Sustainability Plans (GSPs) to avoid and mitigate overdraft of groundwater within 20 years. SGMA places the authority of groundwater management with local agencies; it establishes a definition of sustainable groundwater management, establishes a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources, prioritizes basins with the greatest problems, and sets a 20-year timeline for implementation.

CALGreen Building Code

The California Building Standards Commission (CBSC) adopted the nation's first green building standards in 2008 (Title 25 California Code of Regulations [CCR] Part 11). The standards code was adopted to apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure, unless otherwise indicated in the California Code of Regulations, throughout California. CALGreen established planning and design standards for sustainable site development including water conservation. CALGreen provisions became effective on January 1, 2011. The purpose of the CALGreen provisions is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of concepts

having reduced negative impact or positive environmental impact and encouraging sustainable construction practices.

California Plumbing Code

The California Plumbing Code serves to prevent disorder in the industry and to consolidate plumbing codes utilized by local jurisdictions to reduce confusion and conflicts among varying practices (Title 24 CCR Part 5). The California Plumbing Code covers water fixtures, potable and nonpotable water systems, and recycled water systems, among other topics. Recycled water supply and distribution shall comply with all applicable provisions of the current edition of the California Plumbing Code.

Recycled Water

State Water Resources Control Board Water Quality Control Policy for Recycled Water

The State Water Board adopted their Water Quality Control Policy for Recycled Water on December 11, 2018, and it became effective on April 8, 2019.[66] The policy was adopted to encourage the safe use of recycled water from wastewater sources that implement State and federal water quality laws and protects public health and the environment. It is designed to provide direction to the State and RWQCBs when issuing permits for recycled water projects; it describes the circumstances under which permittees may enroll under Statewide water reclamation requirements for recycled water use or choose an alternate permitting mechanism. The intent of the policy is to expedite the permitting of recycled water projects in a manner that implements State and federal water quality laws while allowing the RWQCBs to focus their resources on projects that require substantial regulatory review due to unique site-specific conditions.

Title 22, California Code of Regulations

Title 22 "Social Security," of the California Code of Regulations contains a number of requirements and regulations for the production, distribution, and use of recycled water. This section of the California Code of Regulations includes numerous requirements for the use of recycled water. Recycled water intended for nonpotable reuse can be used in many ways depending on the level of treatment. Such uses include irrigation (parks, schools, roadway medians, etc.), cooling, impoundments, toilets, industrial processes, decorative fountains, structural firefighting, commercial laundries, etc. Areas that utilize recycled water must meet certain use area requirements included in Title 22, including proper marking of recycled water improvements and appropriate cross-connection facilities. Title 22 also includes provisions for dual use sites and required reporting and monitoring for all use cases. Any sites utilizing recycled water are required to meet all regulations and requirements of Title 22 of the California Code of Regulations.

Wastewater

Sanitary District Act of 1923

The Sanitary District Act of 1923 (California Health and Safety Code § 6400, *et seq*.) authorized the formation of sanitation districts and enforces the districts to construct, operate, and maintain facilities for the collection, treatment, and disposal of wastewater. The Sanitary District Act was

[66] Water Quality Control Policy for Recycled Water, State Water Resources Control Board California Environmental Protection Agency. December 11, 2018.

amended in 1949 to allow the districts to also provide solid waste management and disposal services, including refuse transfer and resource recovery.

Storm Drainage

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is mandated to evaluate flood hazards as a result of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. FEMA provides Flood Insurance Rate Maps (FIRMs) for local and regional planners to promote efficient land and floodplain development and to identify potential flood areas based on current conditions. The National Flood Insurance Program provides flood insurance to homeowners, renters, and businesses, and works with communities to adopt and enforce floodplain management regulations that help mitigate flooding effects. FEMA completes Flood Insurance Studies to delineate a FIRMs.

Statewide General Construction Permit

The State Water Board issued the General Construction Permit (GCP), Order No. 2012-0006-DWQ, which requires construction projects of one (1) acre or larger to file specific Permit Registration Documents with the State Water Board prior to beginning construction.[67] The documents include a Notice of Intent (NOI), risk assessment, site map, Storm Water Pollution Prevention Plan (SWPPP), annual fee, and a signed certification statement. The SWPPP must include applicable Best Management Practices (BMP) to be enacted during construction to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources. The SWPPP must also include a visual monitoring plan, a chemical monitoring program for nonvisible pollutants, and a sediment monitoring plan. The GCP also includes post-construction runoff reduction requirements.

Solid Waste

California Integrated Waste Management Act

To minimize the amount of solid waste that must be disposed of by transformation and land disposal, the State Legislature passed AB 939, the California Integrated Waste Management Act of 1989, effective January 1990. The legislation required each local jurisdiction in the State to set diversion requirements of 25 percent in 1995 and 50 percent in 2000; established a comprehensive Statewide system of permitting, inspections, enforcement, and maintenance for solid waste facilities; and authorized local jurisdictions to impose fees based on the types or amounts of solid waste generated. In 2007, amendments to the California Integrated Waste Management Act introduced a new per capita disposal and goal measurement system that moves the emphasis from an estimated diversion measurement number to using an actual disposal measurement number as a per capita disposal rate factor. As such, the new disposal-based indicator (pounds per person per year) uses only two factors: a jurisdiction's population (or in some cases employment) and its disposal as reported by disposal facilities.

[67] California State Water Resources Control Board (State Water Board). Order No. 2012-0006-DWQ, National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities. 2012.

Assembly Bill 341

In 2011, AB 341 was passed that sets a State policy goal of not less than 75 percent of solid waste that is generated to be source reduced, recycled, or composted by the year 2020, and annually thereafter. The bill requires all businesses that generate four or more cubic yards of garbage per week and multi-family dwellings with five or more units to recycle/create a recycling program. CalRecycle was required to submit a report to the legislature by January 1, 2014, outlining the strategy that was to used to achieve this policy goal. This bill affects local governments in that each jurisdiction is required to implement a commercial solid waste recycling program that consists of education, outreach, and monitoring of businesses. An annual report of the progress of such efforts is required by law. CalRecycle is responsible for reviewing each jurisdiction's commercial recycling program.

California Solid Waste Reuse and Recycling Access Act of 1991

The California Solid Waste Reuse and Recycling Access Act requires areas in development projects to be set aside for collecting and loading recyclable materials (Public Resources Code [PRC] 30 Part 3, Chapter 18). The California Solid Waste Reuse and Recycling Access Act requires CalRecycle to develop a model ordinance for adoption by any local agency relating to adequate areas for collection and loading of recyclable materials as part of development projects. Local agencies are required to adopt the model, or an ordinance of their own, providing for adequate areas in development projects for the collection and locating of recyclable materials.

Global Warming Solutions Act of 2006, Scoping Plan

The California Global Warming Solutions Act of 2006 (also known as AB 32) Scoping Plan, which was adopted by the California Air Resources Board (ARB), included a Mandatory Commercial Recycling Measure. The Mandatory Commercial Recycling Measure focuses on diverting commercial waste as a means to reduce GHG emissions, with the goal of reducing GHG emissions by 5 million metric tons (MMT) of carbon dioxide equivalents (CO_2e), consistent with the 2020 targets set by AB 32. To achieve this objective, the commercial sector needed to recycle an additional 2 to 3 million tons of materials annually by the year 2020.

CalRecycle adopted this measure at its January 17, 2012, monthly public meeting. The regulation was approved by the Office of Administrative Law on May 7, 2012, and became effective immediately. On June 27, 2012, the Governor signed SB 1018, which included an amendment requiring both businesses that generate four cubic yards or more of commercial solid waste per week and multi-family residences with five or more units to arrange for recycling services. This requirement became effective on July 1, 2012.

CALGreen Building Code

The purpose of CALGreen is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of building concepts having a reduced negative impact or positive environmental impact and encouraging sustainable construction practices related to material conservation and resource efficiency (Title 24 CCR Part 11). The provisions of this code apply to the planning, design, operation, construction, use, and occupancy of every newly

constructed building or structure, unless otherwise indicated in this code, throughout the State of California.

Section 4.408, Construction Waste Reduction Disposal and Recycling, of the CALGreen Building Code mandates that, in the absence of a more stringent local ordinance, a minimum of 50 percent of non-hazardous construction and demolition debris must be recycled or salvaged. CALGreen requires the applicant to have a Waste Management Plan for on-site sorting of construction debris, which is submitted to the City for approval.

The Waste Management Plan does the following:

- Identifies the materials to be diverted from disposal by recycling, reuse on the project, or salvage for future use or sale.
- Specifies if materials will be sorted on-site or mixed for transportation to a diversion facility.
- Identifies the diversion facility where the material collected can be taken.
- Identifies construction methods employed to reduce the amount of waste generated.
- Specifies that the amount of materials diverted shall be calculated by weight or volume, but not by both.

Energy

California Senate Bill 1078: Renewable Electricity Standards

On September 12, 2002, former Governor Gray Davis signed SB 1078, requiring California to generate 20 percent of its electricity from renewable energy by 2017. SB 107 changed the due date to 2010 instead of 2017. On November 17, 2008, former Governor Arnold Schwarzenegger signed Executive Order S-14-08, which established a Renewable Portfolio Standard target for California requiring that all retail sellers of electricity serve 33 percent of their load with renewable energy by 2020. Governor Schwarzenegger also directed the ARB (Executive Order S-21-09) to adopt a regulation by July 31, 2010, requiring the State's LSEs to meet a 33 percent renewable energy target by 2020. The CARB Board approved the Renewable Electricity Standard on September 23, 2010, by Resolution 10-23.

California Code of Regulations Title 24

California Code of Regulations, Title 24, Part 6 (California's Energy Efficiency Standards for Residential and Nonresidential Buildings) of the California Code of Regulations was first adopted in 1978 in response to a legislative mandate to reduce California's energy consumption. The standards are updated periodically to allow consideration and possible incorporation of new energy efficient technologies and methods. Energy efficient buildings require less electricity; therefore, increased energy efficiency reduces fossil fuel consumption and decreases GHG emissions. The 2016 Building Energy Efficiency Standards went into effect on January 1, 2017.[68] The 2019 Building Energy Efficiency Standards went into effect on January 1, 2020.

[68] California Energy Commission (CEC). 2016. 2016 Building Energy Efficiency Standards Frequently Asked Questions.

California Public Utilities Code

The California Public Utilities Commission (CPUC) regulates privately owned telecommunication, electric, natural gas, water, railroad, rail transit, and passenger transportation companies. It is the responsibility of the CPUC to (1) assure California utility customers safe, reliable utility service at reasonable rates; (2) protect utility customers from fraud; and (3) promote a healthy California economy. The Public Utilities Code, adopted by the legislature, defines the jurisdiction of the CPUC.

Local

Water

Fresno General Plan[69]

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of water service and facilities:

Objective PU-3 Enhance the level of fire protection to meet the increasing demand for services from an increasing population.

Policy PU-3-f **Adequate Infrastructure.** Continue to pursue the provision of adequate water supplies, hydrants, and appropriate property access to allow for adequate fire suppression throughout the City.

Objective PU-8 Manage and Develop the City's water facilities on a strategic timeline basis that recognizes the long life cycle of the assets and the duration of the resources, to ensure a safe, economical, and reliable water supply for existing customers and planned urban development and economic diversification.

Policy PU-8-a **Forecast Need.** Use available and innovative tools, such as computerized flow modeling to determine system capacity, as necessary to forecast demand on water production and distribution systems by urban development, and to determine appropriate facility needs.

Policy PU-8-b **Potable Water Supply and Cost Recovery.** Prepare for provision of increased potable water capacity (including surface water treatment capacity) in a timely manner to facilitate planned urban development consistent with the General Plan. Accommodate increase in water demand from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law, and recognizing the differences in terms of quantity, quality and reliability of the various types of water in the City's portfolio.

Policy PU-8-c **Conditions of Approval.** Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.

[69] Dyett & Bhatia Urban and Regional Planners, Fresno General Plan. December 2014.

Policy PU-8-d **CIP Update.** Continue to evaluate Capital Improvement Programs and update them, as appropriate, to meet the demands of both existing and planned development consistent with the General Plan.

Policy PU-8-f **Water Quality.** Continue to evaluate and implement measures determined to be appropriate and consistent with water system policies, including prioritizing the use of groundwater, installing wellhead treatment facilities, and enhancing Transmission Grid Mains to promote adequate water quality and quantity.

Policy PU-8-g **Review Project Impact on Supply**. Mitigate the effects of development and capital improvement projects on the long-range water budget to ensure an adequate water supply for current and future users.

Objective RC-6 Ensure that Fresno has a reliable, long-range source of drinkable water.

Policy RC-6-a **Regional Efforts.** Support cooperative, multi-agency regional water resource planning efforts and activities on developing and implementing the Upper Kings Basin Integrated Regional Water Management Plan.

Policy RC-6-b **Water Plans.** Adopt and Implement ordinances, standards, and policies to achieve the intent of the City of Fresno Urban Water Management Plan, Fresno-Area Regional Groundwater management Plan, and City of Fresno Metropolitan Water Resources Management Plan to ensure a dependable supply of water.

Policy RC-6-c **Land Use and Development Compliance.** Ensure that land use and development projects adhere to the objective of the Fresno Metropolitan Water Resources Management Plan to provide sustainable and reliable water supplies to meet the demand of existing and future customers through 2025.

Objective RC-7 Promote water conservation through standards, incentives and capital investments.

County of Fresno Revised 2000 General Plan[70]

Goal PF-C To ensure the availability of an adequate and safe water supply for domestic and agricultural consumption.

Policy PF-C.1 **Retain Existing Water Supplies.** The County shall actively engage in efforts and support the efforts of others within Fresno County to retain existing water supplies and to restore the water supplies that have diminished to the extent possible.

Policy PF-C.3 **Surface Water Use**. To reduce demand on the County's groundwater resources, the County shall encourage the use of surface water to the maximum extent feasible.

[70] Fresno County, Fresno County General Plan Policy Document, General Plan Update. October 2000.

Policy PF-C.8 **Water Master Plans**. The County shall require preparation of water master plans for areas undergoing urban growth.

Policy PF-C.12 **Adequate Sustainable Water Supply**. The County shall approve new development only if an adequate sustainable water supply to serve such development is demonstrated.

Fresno Municipal Code–Model Water Efficient Landscape Ordinance

As mentioned, the MWELO requires local agencies to implement water efficiency measures as part of its review of landscaping plans. Local agencies can either adopt the MWELO or incorporate provisions of the ordinance into its own code requirements for landscaping. Section 11 of Chapter 11, "Building Permits and Regulations," and Section 23 of Chapter 15, "Citywide Development Code," of the City Municipal Code, include requirements for landscape design and incorporates the requirements of the California MWELO, among other State codes and regulations. For new landscaping projects of 2,500 square feet of more that require a discretionary or ministerial approval, the applicant is required to submit a detailed "Landscape Documentation Package" that discusses water efficiency, soil management, and landscape design elements.

City of Fresno Metropolitan Water Resources Management Plan

The City of Fresno's Metropolitan Water Resources Management Plan (Metro Plan) was prepared to document the existing conditions of the City's water system and facilitate future water resources decisions and facilities improvements. Phase 1[71] consists of a baseline system characterization, Phase 2[72] consists of the development and evaluation of future water supplies, Phase 3[73] consists of implementation of the management plan, and Phase 4[74] included the preparation of an EIR for the City. Chapters 4, 5, 6, and 8 of Phase 2 discuss objectives, goals, and policies related to potable water, including water conservation (Chapter 4), groundwater (Chapter 5), surface water (Chapter 6), and future water supplies (Chapter 8). It should be noted that this plan was prepared in 2011, and a number of the stated objectives/goals/policies have already been completed. The City is currently in the process of updating the Metro Plan.

Urban Water Management Plan

The City's UWMP was prepared as a requirement of the Urban Water Management Planning Act (UWMPA) (California Water Code, Division 6, Part 2.6, §§ 10610–10656). The UWMP outlines a water supplier's long-term water resource planning to ensure sufficient water supplies for existing and future demands; it essentially sets the roadmap for how the City will utilize water over the coming years. UWMPs are updated and submitted to the DWR every 5 years. The UWMPA applies to urban water suppliers with 3,000 or more connections being serve or supplying more than 3,000 AF of water annually.

[71] City of Fresno. Metropolitan Water Resources Management Plan, Phase 1 Baseline System Characterization. December 2007.
[72] City of Fresno. Metropolitan Water Resources Management Plan, Phase 2 Alternative Development and Evaluation of Future Water Supply Plan. January 2011.
[73] City of Fresno. Metropolitan Water Resources Management Plan, Phase 3 Implementation Plan. January 2011.
[74] City of Fresno. Metropolitan Water Resources Management Plan Update, Final Environmental Impact Report. May 2014.

Recycled Water

Fresno General Plan

Policy PU-7-d Wastewater Recycling. Pursue the development of a recycled water system and the expansion of beneficial wastewater recycling opportunities, including a timely technical, practicable, and institutional evaluation of treatment, facility siting, and water exchange elements.

Objective PU-8 Manage and develop the City's water facilities on a strategic timeline basis that recognizes the long life cycle of the assets and the duration of the resources, to ensure a safe, economical, and reliable water supply for existing customers and planned urban development and economic diversification.

Policy PU-8-a Forecast Need. Use available and innovative tools, such as computerized flow modeling to determine system capacity, as necessary to forecast demand on water production and distribution systems by urban development, and to determine appropriate facility needs.

Policy PU-8-c Conditions of Approval. Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.

Policy PU-8-g Review Project Impact on Supply. Mitigate the effects of development and capital improvement projects on the long-range water budget to ensure an adequate water supply for current and future uses.

Policy RC-6-d Recycled Water. Prepare, adopt, and implement a City of Fresno Recycled Water Master Plan.

City of Fresno Recycled Water Ordinance

The City adopted a Recycled Water Ordinance concurrently with its Recycled Water Master Plan to require the use of recycled water by existing and future potential users in areas where recycled water is available.[75] It regulates the use and distribution of recycled water in a manner that complies with any and all applicable federal, State, and local standards.

City of Fresno Rules and Regulations of Recycled Water Use

The City published the Rules and Regulations of Recycled Water Use to govern the design, construction, and use of recycled water within the City.[76] These Rules and Regulations aim to provide customers with the necessary information needed to comply with relevant codes, laws, statutes, and regulations concerning the use of recycled water. The Rules and Regulations are prepared and administered by the Department of Public Utilities (DPU) WMD and apply to all customers and distributors of recycled water.

[75] Bill No. B-18, Ordinance No. 2021-026. An Ordinance of the City of Fresno, California, Amending Chapter 6, Article 9, of the Fresno Municipal Code, the Recycled Water Ordinance. June 17, 2021.

[76] City of Fresno Department of Public Utilities. Rules and Regulations of Recycled Water Use.

City of Fresno Metropolitan Water Resources Management Plan–Phase 2 Development and Evaluation of Future Water Supply Plan

The City's Metro Plan was prepared to document the existing conditions of the City's water system and facilitate future water resources decisions and facilities improvements. Chapter 7 of Phase 2 discusses the City's anticipated future use of recycled water, and includes a list of proposed objectives, goals, and policies related to recycled water.[77]

Wastewater

Fresno General Plan

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of wastewater service and facilities:

Objective PU-4 Ensure provision of adequate trunk sewer and collector main capacities to serve existing and planned urban development, consistent with the Wastewater Master Plan.

Policy PU-4-b **New Trunk Facilities.** Pursue construction of new or replacement sewer trunk facilities or other alternatives consistent with the Wastewater Master Plan to accommodate the uses as envisions in this General Plan.

Policy NS-4-c **System Extension and Cost Recovery**. Pursue enlargement or extension of the sewage collection system where necessary to serve planned urban development, with the capital costs and benefits allocated equitably and fairly between the existing users and new users.

Objective PU-5 Preserve groundwater quality and ensure that the health and safety of the entire Fresno community is not impaired by use of private, on-site disposal systems.

Policy PU-5-b **Non-Regional Treatment**. Discourage, and when determined appropriate, oppose the use of private wastewater (septic) disposal systems, community wastewater disposal systems, or other non-regional sewage treatment and disposal systems within or adjacent to the Metropolitan Area if these types of wastewater treatment facilities would cause discharges that could result in groundwater degradation.

Policy PU-5-c **Satellite Facilities**. Work with the Regional Water Quality Control Board to ensure that approval if any satellite treatment and reclamation facility proposal is consistent with governing statutes and regulations.

Objective PU-6 Ensure the provision of adequate sewage treatment and disposal by utilizing the Fresno-Clovis Regional Wastewater Reclamation Facility as the primary facility, when economically feasible, for all existing and new development within the Metropolitan Area.

[77] City of Fresno. Metropolitan Water Resources Management Plan, Phase 2 Alternative Development and Evaluation of Future Water Supply Plan. January 2011.

Policy PU-6-a **Treatment Capacity and Cost Recovery**. Prepare for and consider the implementation of increased wastewater treatment and reclamation facility capacity in a timely manner to facilitate planned urban development within the Metropolitan Area consistent with this General Plan. Accommodate increase in flows and loadings from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law.

Policy PU-6-b **Consider Capacity in Plan Amendments**. Monitor wastewater treatment plant flows and loadings to the extent feasible. Consider the effects on wastewater treatment capacity and availability of potable water when evaluating proposed General Plan amendment proposals, community plans, Specific Plans, neighborhood plans, and Concept Plans.

Objective PU-7 Promote reduction in wastewater flows and develop facilities for beneficial reuse of reclaimed water and biosolids for management and distribution of treated wastewater.

Policy PU-7-a **Reduce Wastewater.** Identify and consider implementing water conservation standards and other programs and policies, to reduce wastewater flows.

Policy PU-7-b **Reduce Stormwater Leakage**. Reduce stormwater infiltration into the sewer collection system, where feasible, through a program of replacing old and deteriorated sewer collection pipeline; eliminating existing stormwater sewer cut-ins to the sanitary sewer system; and avoiding any new sewer cut-ins except when required to protect health and safety.

Policy PU-7-c **Biosolid Disposal.** Investigate and consider implementing economically effective and environmentally beneficial methods of biosolids handling and disposal.

Policy PU-7-d **Wastewater Recycling.** Pursue the development of a recycled water system and the expansion of beneficial wastewater recycling opportunities, including a timely technical, practicable, and institutional evaluation of treatment, facility siting, and water exchange elements.

Policy PU-7-e **Infiltration Basins**. Continue to rehabilitate existing infiltration basins, and if determined appropriate, pursue acquiring additional sites for infiltration basins, as needed.

Policy PU-7-f **Food and Drink Industry.** Ensure adequate provision of facilities for the appropriate management of wastewater from wineries and food processing and beverage facilities, including conformance with Waste Discharge Requirements issued by the Regional Water Quality Control Board.

County of Fresno Revised 2000 General Plan[78]

Goal PF-D To ensure adequate wastewater collection and treatment and the safe disposal of wastewater.

Policy PR-D.4 **Available Wastewater Treatment Capacity**. The County shall limit the expansion of unincorporated, urban density communities to areas where community wastewater treatment facilities can be provided.

Policy PR-D.7 **Sewer Master Plans.** The County shall require preparation of sewer master plans for wastewater treatment facilities for areas experiencing urban growth.

City of Fresno Municipal Code

Article 3, "Sewage and Water Disposal," of Chapter 6, "Municipal Services and Utilities," of the Municipal Code includes provisions regarding wastewater collection and discharge for the City. The purpose of the "Sewage and Water Disposal" Ordinance is to ensure the health, safety, and general welfare of citizens; protect the water quality of water courses, water bodies, and groundwater in accordance with the CWA and the NPDES permitting program; and provide requirements for wastewater collection, conveyance, treatment, and disposal/recycling.

Sewer System Management Plan

Under the Statewide General Wastewater Discharge Requirements for Sanitary Sewer Systems (see State Water Resources Control Board above), the City was required to develop and maintain a SSMP to provide a mechanism to properly manage, operate, and maintain all parts of the sanitary sewer system with the goal of reducing and preventing SSOs, which is a release of untreated or partially treated wastewater resulting in public exposure, regardless of whether the wastewater reaches waters of the United States or not, or wastewater backups into buildings and onto private property that are caused by blockages in the City's portion of the sanitary sewer system.[79] The City's first SSMP was approved in 2009 and several revisions have been issued since; the latest revision was approved in 2019.

Drainage and Flood Control

Fresno General Plan

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of drainage and flood control service and facilities:

Policy NS-2-b **Soil Analysis Requirement.** Identify areas with potential geologic and/or soils hazards and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.

[78] Fresno County, Fresno County General Plan Policy Document, General Plan Update. October 2000.
[79] City of Fresno. Sewer System Management Plan. 2019.

Objective NS-3 Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.

Policy NS-3-a **Stormwater Drainage and Flood Control Master Plan**. Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.

Policy NS-3-b **Curb and Gutter Installation.** Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.

Policy NS-3-c **Dual Use Facilities.** Support multiple uses of flood control and drainage facilities as follows:

- Use, wherever practical, FMFCD facilities for groundwater management and recharge; and
- Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.

Policy NS-3-e **Pollutants**. Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.

Policy NS-3-f **Flooding Emergency Response Plans**. Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin River bottom.

Policy NS-3-g **Essential Facilities Siting Outside of Floodplains.** Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.

Policy NS-3-h **Runoff Controls.** Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.

Policy NS-3-i **New Development Must Mitigate Impact**. Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project.

Policy NS-3-k **100-Year Floodplain Policy**. Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.

Policy NS-3-l **200-Year Floodplain Protection**. Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin River bottom.

Policy NS-3-m **Flood Risk Public Awareness**. Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.

Policy RC-6-f **Regulate Sewage Disposal Facilities**. Oppose development of new sewage disposal facilities either within the Planning Area or upgradient (north and east) of the Planning Area, unless the treatment facilities produce effluent that:

- Will not degrade the aquifer in the long term.
- Will not introduce contaminants into surface water that would negatively affect its potential economic use for drinking water.
- Will not deleteriously affect downstream agricultural and urban uses.
- Will not degrade sensitive riparian habitat.

County of Fresno Revised 2000 General Plan[80]

Goal PF-E To provide efficient, cost-effective, and environmentally sound storm drainage and flood control facilities that protect both life and property and to divert and retain stormwater runoff for groundwater replenishment.

Policy PF-E.1 **Flood Control Coordination.** The County shall coordinate with the agencies responsible for flood control or storm drainage to assure that construction and

[80] Fresno County. Fresno County General Plan Policy Document. General Plan Update. October 2000.

acquisition of flood control and drainage facilities are adequate for future urban growth authorized by the County General Plan and City General Plans.

Policy PF-E.4 **Storm Drainage System Capacity**. The County shall encourage the local agencies responsible for flood control or storm drainage to require that storm drainage systems be developed and expanded to meet the needs of existing and planned development.

Policy PF-E.10 **Drainage Facility Design**. In growth areas within the jurisdiction of a local agency responsible for flood control or storm drainage, the County shall encourage that agency to design drainage facilities as if the entire areas of service were developed to the pattern reflected in the adopted general plans to assure that the facilities will be adequate as the land use intensifies.

City of Fresno Municipal Code

Article 7, "Urban Storm Water Quality Management and Discharge Control," of Chapter 6, "Municipal Services and Utilities," of the Municipal Code includes provisions regarding stormwater discharge for the City. The purpose of the "Storm Water Quality Management and Discharge Control" Ordinance is to ensure the health, safety, and general welfare of citizens, and protect the water quality of water courses and water bodies in accordance with the CWA by reducing pollutants in urban stormwater discharges to the maximum practicable extent and by prohibiting non-stormwater discharges to the storm drain system.

FMFCD Post-Development Standards Technical Manual

The FMFCD published a Post-Development Standards Technical Manual in 2014 to provide development and redevelopment standards to address stormwater quality requirements for projects in areas that do not drain to the Regional Stormwater Management Basin System.[81] Per the manual, five drainage areas in the FMFCD service area do not drain into a stormwater management basin, and two areas outside the service area do not drain into a regional stormwater management basin. These post-development requirements were developed to comply with the Municipal Separate Storm Sewer System (MS4) Permit maintained for stormwater and non-stormwater discharges from MS4 to waters of the United States. The manual provides guidance and recommendations for implementing stormwater quality BMPs with the intention of improving water quality and mitigating potential water quality impacts from stormwater and non-stormwater discharges.

FMFCD Standard Plans and Specifications

The FMFCD maintains and publishes a set of standard specifications and plans intended to serve as requirements for FMFCD improvements and projects intended for use by designers and Contractors.

[81] Fresno Metropolitan Flood Control District. Post-Development Standards Technical Manual prepared by Larry Walker Associates, June 2014.

Solid Waste

Fresno General Plan

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of solid waste service and facilities:

Objective PU-9 Provide adequate solid waste facilities and services for the collection, transfer, recycling, and disposal of refuse.

Policy PU-9-a **New Techniques.** Continue to collaborate with affected stakeholders and partners to identify and support programs and new techniques of solid waste disposal, such as recycling, composting, waste to energy technology, and waste separation, to reduce the volume and toxicity of solid wastes that must be sent to landfill facilities.

Policy PU-9-b **Compliance with State Law.** Continue to pursue programs to maintain conformance with the Solid Waste Management Act of 1989 or as otherwise required by law and mandated diversion goals.

Policy PU-9-c **Cleanup and Nuisance Abatement**. Continue and enhance, where feasible, community sanitation programs that provide services to neighborhoods for cleanup, illegal dumping, and nuisance abatement services.

Policy PU-9-d **Facility Siting**. Locate private or public waste facilities and recycling facilities in conformance with City zoning and State and federal regulations, so that the transportation, processing, and disposal of these materials are not detrimental to the public health, safety, welfare, and aesthetic well-being of the surrounding community.

County of Fresno Revised 2000 General Plan

Goal PF-F To ensure the safe and efficient disposal or recycling of solid waste generated in the County in an effort to protect the public health and safety.

Policy PF-F.1 **Solid Waste Source Reduction.** The County shall continue to promote maximum use of solid waste source reduction, reuse, recycling, composting, and environmentally safe transformation of wastes.

Policy PF-F.5 **County Integrated Waste Management Plan.** The County shall ensure that all new development complies with applicable provisions of the County Integrated Waste Management Plan.

Electricity, Natural Gas, and Telecommunications

Fresno General Plan

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of electricity, natural gas, and telecommunications facilities:

Policy RC-1-f **Telecommunications Strategy**. Develop a process for communication carriers to use excess fiber optic conduit with the City in a manner that will allow for appropriate cost recovery and that is consistent with State and federal law.

Objective RC-8 Reduce the consumption of nonrenewable energy resources by requiring and encouraging conservation measures and the use of alternative energy sources.

Policy RC-8-a **Existing Standards and Programs.** Continue existing beneficial energy conservation programs, including adhering to the California Energy Code in new construction and major renovations.

Policy RC-8-b **Energy Reduction Targets.** Strive to reduce per capita residential electricity use to 1,800 kWh per year and nonresidential electricity use to 2,700 kWh per year per capita by developing and implementing incentives, design and operation standards, promoting alternative energy sources, and cost-effective savings.

Policy RC-8-c **Energy Conservation in New Development.** Consider providing an incentive program for new buildings that exceed California Energy Code requirements by 15 percent.

Policy RC-8-d **Incentives**. Establish an incentive program for residential developers who commit to building all of their homes to ENERGY STAR performance guidelines.

Policy RC-8-e **Energy Use Disclosure**. Promote compliance with State law mandating disclosure of a building's energy data and rating of the previous year to prospective buyers and lessees of the entire building or lenders financing the entire building.

Policy RC-8-f **City Heating and Cooling**. Reduce energy use at City facilities by updating heating and cooling equipment and installing "smart lighting" where feasible and economically viable.

Policy RC-8-g **Revolving Energy Fund.** Create a City Energy Fund which uses first year savings and rebates from completed City-owned energy efficiency projects to provide resources for additional energy projects. Dedicate this revolving fund to the sole use of energy efficiency projects that will pay back into the fund.

Policy RC-8-h **Solar Assistance**. Identify and publicize information about financial mechanisms for private solar installations and provide over-the-counter permitting for solar installations meeting specified standards, which may include maximum size (in kV) of units that can be so approved.

Policy RC-8-i **Renewable Target**. Adopt and implement a program to increase the use of renewable energy to meet a given percentage of the City's peak electrical load within a given time frame.

Policy RC-8-k **Energy Efficiency Education**. Provide long-term and ongoing education of homeowners and businesses as to the value of energy efficiency and the need to upgrade existing structures on the regular basis as technology improves and structures age.

County of Fresno Revised 2000 General Plan

Goal PF-J To provide efficient and cost-effective utilities that serve the existing and future needs of people in the unincorporated areas of the County.

Policy PF-J.1 The County shall encourage the provision of adequate gas and electric, communications, and telecommunications service and facilities to serve existing and future needs.

Policy PF-J.2 The County shall work with local gas and electric utility companies to design and locate appropriate expansion of gas and electric systems, while minimizing impacts to agriculture and minimizing noise, electromagnetic, visual, and other impacts on existing and future residents.

Policy PF-J.3 The County shall require all new residential development along with new urban commercial and industrial development to underground utility lines on-site.

Policy PF-J.4 The County shall require compliance with the Wireless Communications Guidelines.

Solar Valley Initiative

This initiative envisions Fresno as becoming a leader in renewable energy use by maximizing new renewable sources. With its abundant sunshine, the opportunity exists to improve air quality, reduce dependence on foreign energy, and provide attractive new jobs by harnessing solar power. Three initiatives work toward this vision:

- Increase use of renewable energy to meet 50 percent of annual electrical consumption for City operations.
- Reduce the City's peak electrical load by 10 percent through energy efficiency and conservation measures and shifting the timing of energy demands.
- Reduce citywide GHG emissions to meet requirements of AB 32.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to hydrology and water quality:

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.3 **Stormwater Management Features.** Maximize the use of green stormwater management infrastructure—such as ponds, basins, swales, and other low-impact systems—within the open space system.

- Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to incorporate green infrastructure within city parks and trails.

Objective OS-12 Provide solid waste services and facilities in accordance with the City of Fresno General Plan.

Policy OS-12.1 **Solid Waste Facilities and Services.** Provide solid waste facilities and services for the collection, transfer, recycling, and disposal of refuse in accordance with the policies of the City of Fresno General Plan.

Objective OS-13 Provide electricity, natural gas, and telecommunications infrastructure necessary to serve development in the SEDA.

Policy OS-13.1 **Provision of Electricity and Natural Gas Infrastructure.** The City of Fresno shall work with Pacific Gas and Electric Company (PG&E) to provide the necessary electricity and gas infrastructure to serve development in the SEDA.

Policy OS-13.3 **Provision of Telecommunications Infrastructure.** The City of Fresno shall work with service providers to establish the telecommunications infrastructure necessary to serve the residents and employers of the SEDA.

Objective OS-14 Provide water, stormwater, and wastewater infrastructure necessary to serve development in the SEDA.

Policy OS-14.1 **Provision of Water, Stormwater, and Wastewater Infrastructure.** Provide water, stormwater, and wastewater infrastructure in accordance with the policies of the Greenhouse Gas Reduction and Conservation Chapter.

Conservation Element

Objective RC-2 Integrate water supply, treatment and delivery, and flood control and stormwater planning in the Southeast Development Area.

Policy RC-2.2 **Shared Water Resources and Infrastructure.** Develop methods and systems to share water resources and infrastructure to capture the highest possible value for all planning, water delivery, and water-using agencies.

Objective RC-3 Promote water conservation and the long-term sustainability of water resources within the Southeast Development Area.

Policy RC-3.2 **Site and Building Efficiency Standards from Water Use.** Green building standards contain a spectrum of strategies to conserve water, including site measures to encourage the planting of species that require minimal water. All new construction in the SEDA is required to meet existing local and State laws with regard to water conservation and any additional measures needed locally to respond to drought conditions as determined by the City of Fresno Department of Public Utilities**.**

Policy RC-3.3 **Water Recycling.** Use treated wastewater for irrigation and other uses, consistent with applicable regulations, to minimize the required surface and groundwater needs of SEDA homes and businesses.

- **Public Facilities:** Require the use of tertiary treated wastewater to irrigate parks, golf courses, and public landscaping, as specified in the Open Space, Schools and Public Facilities Chapter.
  - **Municipal purple pipe**. Establish a site- or district-wide purple pipe system that conveys recycled water.
  - **Water treatment facilities.** Available to serve the SEDA, the Southeast Service Water Treatment Facility was constructed in 2018 and is designed with the latest energy conservation and renewable energy technology.
- **Commercial Landscaping:** Require the use of treated wastewater to irrigate commercial landscaping, adhering to the standards included in the California Code of Regulations, Title 22.
- **Residential Landscaping:** Where appropriate, encourage the use of tertiary treated wastewater to irrigate residential landscaping. Specific policy considerations should be addressed in the pending SEDA Infrastructure Financing Plan and EIR-related water infrastructure planning tasks.
- **Small Farms and Community Farming:** Use secondary- and tertiary treated wastewater for agricultural irrigation in the SEDA and within the immediate vicinity, consistent with applicable laws and regulations. Specific policy considerations should be addressed in the pending SEDA Infrastructure Financing Plan and EIR-related water infrastructure planning tasks.

Policy RC-3.4 **Implementation and Monitoring.** Support and monitor water conservation policies and programs. Developer shall abide by all state and local requirements for water use efficiency standards.

Objective RC-4 Ensure that there will be no adverse effects on regional groundwater levels by minimizing groundwater extraction and replenishing groundwater used to serve the Southeast Development Area. Maximize multiple uses of open space by encouraging new recharge facilities to be accessible to the public.

Policy RC-4.1 **Minimizing Groundwater Extraction.** Use available surface water supplies to meet as much of the SEDA's potable water demand as possible, limiting groundwater extraction to extreme periods. The pending SEDA Infrastructure Financing Plan shall address this issue in detail.

Policy RC-4.2 **Replacement of Extracted Groundwater.** The North Kings Groundwater Sustainability Plan (approved in 2019) illustrates the decrease in groundwater levels in the region as a result of pumping. All groundwater drawn to serve development in the SEDA shall be replaced with at least an equal volume via infiltration, pumping, or other means. Recharge need not necessarily occur the same year as withdrawals, however, over time, total recharge must at least match total withdrawals. Recharge and withdrawals need not occur within the same groundwater aquifer but must be within the same groundwater basin. The pending SEDA Infrastructure Financing Plan shall address this issue in detail.

Policy RC-4.3 **Maximizing Groundwater Recharge.** Establish integrated systems within the SEDA open space network to maximize recharge using stormwater, treated wastewater, and excess surface water supplies. Facilitate increased porosity and stormwater recharge through the use of porous conveyance methods such as bioswales, naturalized channels, and layered basins. Recharge and related systems shall be addressed in the SEDA Infrastructure Financing Plan.

Policy RC-4.4 **Utilization of Recreation and Open Spaces as Groundwater Recharge Areas.** Support recreation opportunities with a range of parks and multiuse trails by establishing joint-use agreements with Fresno Metropolitan Flood Control District to allow access to storm drainage/recharge basins for recreational use, when appropriate (see the Open Space, Schools and Public Facilities Chapter).

Objective RC-5 Protect surface and groundwater supplies from major sources of pollution.

Policy RC-5.1 **Stormwater Runoff.** Implement stormwater management practices that minimize stormwater runoff impacts on the Tulare Lake Watershed.

- **Compact Development:** Limit impervious cover by clustering new, higher density development within the SEDA, directing growth away from undeveloped portions of the watershed.
  - **Compact development.** Reduce the building footprint and overall impervious surface in order to minimize lot coverage on a per unit basis.
  - **Parking demand management.** Reduce the demand for parking stalls to lower the amount of impervious surface (and environmental impacts).
- **Low Impact Development Practices:** Implement development practices such as natural conveyance, bioswales, raingardens and xeriscape that minimize, slow, and filter street runoff and remove pollutants, lowering peak volume and reducing the size and cost of stormwater infrastructure.

Policy RC-5.2 **Hazardous Materials and Pesticide Reduction.** Prevent contamination of the groundwater table and surface water resources and discourage all pesticide use for agricultural and landscaping uses within the SEDA.

- **Signage:** Install appropriate signage to deter the discharge of hazardous materials into storm drains.
- Pollution Prevention: Provide information to SEDA residents on appropriate ways to dispose of hazardous materials and chemicals.
- Pesticide Reduction: Discourage all pesticide use for agricultural and landscaping uses within the SEDA.
- Remedia**tion:** Encourage rapid cleanup of contaminated groundwater consistent with applicable laws and regulations.

Policy RC-5.3 **Construction Erosion.**

- **Erosion and Sedimentation Control Plan:** Require all construction projects to create and implement a plan using State and local best management practices for erosion and sedimentation control.
- Runoff Control: Prevent loss of soil by stormwater runoff and sedimentation of storm sewers or receiving streams.

Objective RC-6 Develop sufficient wet utility infrastructure to meet the demand created by new development within the Southeast Development Area, applying cost-effective and low-impact strategies to the extent possible.

Policy RC-6.1 **Water Supply and Delivery.** Evaluate the potential surface water, groundwater resources and infrastructure needs necessary to meet the Southeast Development Area demand. Assessments shall be included in the pending SEDA Infrastructure Financing Plan and EIR-related water infrastructure planning tasks.

- **Site and Development-Level Water Supply:** Utilizing the pending SEDA Infrastructure Financing Plan as a basis, establish estimates for water supply and demand for all development proposals, reducing demand (as appropriate) through site design and efficiency measures.
- **Delivery Systems:** Proposed water supplies and delivery systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno. Systems must work within the schematic designs established in the pending EIR-related water infrastructure planning tasks, and the SEDA Infrastructure Financing Plan.
  - **Water demand reductions.** The City of Fresno and the developer or builder will identify specific demand reduction measures required for the development proposal to move forward. Technical assistance will be provided by the City as needed.

- **Detailed engineering.** Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.

Policy RC-6.2 **Wastewater Treatment and Delivery.** Evaluate the potential wastewater treatment and infrastructure needs necessary to meet Southeast Development Area demand and require treatment facilities to separate wastewater solids for energy generation and water for irrigation in the SEDA.

- **Site Water Treatment:** Establish site-wide estimates for water treatment demand, reducing demand (as appropriate) after incorporating site design and efficiency measures.
- Site Pl**an Delivery.** Proposed wastewater supplies and delivery systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno.
  - **Wastewater reductions.** The City of Fresno and the developer will identify specific wastewater reduction measures required for the development proposal to move forward. Technical assistance will be provided by the City as needed. Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.

Policy RC-6.3 **Flood Control and Stormwater Management.** Evaluate and provide infrastructure to minimize community flood risk, enhance water quality, and provide locations for active recreation.

- **Sub-Area or Development Proposal Delivery:** Proposed stormwater systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno. Systems must work within the requirements established in the pending EIR-related water infrastructure planning tasks and the SEDA Infrastructure Financing Plan.
  - **Stormwater runoff reductions.** The City of Fresno and the developer will identify specific reduction measures required for the development proposal to move forward.
  - **Detailed engineering.** Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.

Policy RC-6.4 **Shared Resources and Infrastructure.** Develop methods and systems to share resources, infrastructure, and to capture the highest possible value for all public agencies. Resource-sharing strategies and plans shall be included in the SEDA Infrastructure Financing Plan.

- **Energy Generation:** Evaluate the potential to generate energy and heat from wastewater treatment facilities.

  - **Biodigestion.** Study opportunities to treat wastewater sludge and organic waste to capture methane, alcohols, fertilizers, and other fuels to transform into renewable energies.

- **Wastewater Treatment Plants:** Require treatment facilities to separate wastewater solids for energy generation and water for irrigation in the SEDA.
- **Safety and Access Standards for Facilities:** Develop facilities design and management standards that address public safety and access issues.

Fresno General Plan PEIR Mitigation Measures

The Fresno General Plan Program Environmental Impact Report (General Plan PEIR) contains the following mitigation measures that are applicable to the proposed project.

MM UTL-4.1 The City shall evaluate additional landfill locations at the time discretionary projects are submitted, and shall not approve development that could contribute solid waste to a landfill that is at capacity until additional capacity is provided.

3.18.4 - Methodology

The potential project-related impacts related to utilities and service systems were evaluated on a qualitative basis due to the programmatic nature of this Draft PEIR. Qualitative impacts were assessed by evaluating the proposed project's potential for impacting utilities and service systems within the Planning Area based on information regarding the current service commitments and capacities of public service providers within the Planning Area.

Technical studies were developed to analyze the impacts of development under the proposed Specific Plan versus the approved General Plan. General Plan land use classifications and Specific Plan land use classifications were provided by the City's Planning and Development Department in the form of GIS (Geographic Information System) and Shape files. GIS and Shape files were also obtained from the City's Department of Public Utilities for the existing facilities in Fresno, including the Plan Area.

The Water Technical Study (Appendix F) focused on the analysis of water demand in the Plan Area, and how it may change based on Specific Plan development. For the General Plan land use case, the technical memorandum prepared by West Yost Associates for the City of Fresno General Plan Update MEIR[82] was used in obtaining projected water demand data for SEDA. For the Specific Plan analysis, the water demand factors used were prepared by Akel Engineering as part of the Metro Plan Update.[83] The GIS files for the General and Specific Plan land uses were used to determine the total areas of each land use classification. The water demand factors were then used with the area of the corresponding land use classification to determine a total water demand for the Plan Area based on the General Plan and the Specific Plan developments. The total water demand for the Plan Area

[82] West Yost Associates. Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report. January 21, 2013.
[83] Akel Engineering Group Inc. Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update. October 2020.

based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in water demand for the Plan Area.

The Recycled Water Technical Study (Appendix I) focused on the analysis of potential recycled water demand in the Plan Area, and how it may affect development in accordance with the Specific Plan. The Plan Area presents a unique opportunity to develop the recycled water distribution system along with the area-wide development, allowing recycled water use to be engrained into the Plan Area. However, recycled water is not yet utilized in the Plan Area, and the Recycled Water planning documents do not account for the development of a recycled water distribution system within the Plan Area until after the planned development of the City's growth areas. Improvements within the Plan Area will be required to facilitate the use of recycled water. Since the recycled water distribution system has not yet been planned for the area, it was assumed that all land uses that would be eligible for recycled water use will utilize potable water until the recycled water supply and distribution system are available. A baseline analysis of the Plan Area was completed to understand a preliminary recycled water demand based solely on estimated area of open space presented in the Specific Plan buildout plan, and only accounting for recycled water that may be used for irrigation of said open space. Preliminary irrigation calculations were completed to determine the Estimated Total Water Use (ETWU) of the park acres in the Plan Area. Assuming the landscaping would be warm-season turf, and irrigation would mainly be applied via overhead spray/rotors, an annual ETWU with rainfall included of approximately 283 AF (0.3 MGD) was found for the Plan Area.

The Wastewater Technical Study (Appendix I) focused on the analysis of wastewater production in the Plan Area, and how it may change based on Specific Plan development. The wastewater flow factors were taken from the Wastewater Master Plan[84] for each General Plan land use. The GIS files for the General and Specific Plan land uses were used to determine the total areas of each land use classification. The wastewater flow factors were then multiplied by the area of the corresponding land use classification to determine a total wastewater flow for the Plan Area based on the General Plan and the Specific Plan developments. The total wastewater produced by the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in wastewater generation for the Plan Area.

The Storm Drain Technical Study (Appendix I) focused on comparing the changes in the Equivalent Area for each drainage area of the General Plan to the Specific Plan to determine potential impacts to future storm drain collection systems. The methodology used to calculate the CA values for each case utilized land use data obtained from the City and design data from FMFCD. For the General Plan land use analysis, the FMFCD's "Recommended Design C-Factors for the City of Fresno" was used. Not all land uses described in the General Plan are listed in this table, so some C-Factors were estimated based on their description, while others were taken from FMFCD's hydraulic and hydrology spreadsheets when possible. The FMFCD is currently developing updated C-Factors for the SEDA Specific Plan land use classifications; a set of preliminary values have been developed, and these were used in completing the SEDA Specific Plan analysis. The Equivalent Area data was used to

[84] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

evaluate the required storage capacity for each drainage area and how this compared to the existing/proposed drainage basins in the Plan Area.

The results from the Technical Studies, along with various City, State, and federal planning documents, were used to analyze and assess the impacts of all utilities systems within the Specific Plan Area and to determine the thresholds of significance for each impact.

3.18.5 - Thresholds of Significance

The lead agency utilizes the criteria in the CEQA Guidelines Appendix G Environmental Checklist to determine whether impacts to utilities and service systems are significant environmental effects. Would the project:

a) Require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects?

b) Have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years?

c) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?

d) Generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals?

e) Comply with federal, State, and local statutes and regulations related to solid waste?

3.18.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Water and Wastewater Treatment Facilities

Impact UTIL-1:	**The proposed project could require or result in the relocation or construction of new or expanded water, wastewater treatment or stormwater drainage, electric power, natural gas, or telecommunications facilities, the construction or relocation of which could cause significant environmental effects.**

Impact Analysis

The potential long-term impacts to utility services and facilities are based on the potential increase in development as a result of the implementation of the proposed Specific Plan. The Specific Plan for SEDA provides implementation mechanisms for development in the Plan Area that accommodate for increased density and accelerate housing production. As part of the City's General Plan, SEDA was designated with land use classifications as defined in the General Plan. The Specific Plan presents alternative land use classifications for SEDA and seeks to propose how the Plan Area will develop

over time to complete buildout conditions with these newly defined land use categories. As such, utility infrastructure will need to accommodate the increased development and densities among the Specific Plan land use classifications when compared to the previously approved General Plan land uses and developments.

The proposed project would involve the relocation, construction, or expansion of numerous utility facilities in order to provide utilities services for the new land uses associated with the proposed project. The proposed utility expansions are a part of the Project Description, and the potential impacts that would result from construction of these facilities are evaluated throughout this Draft PEIR (e.g., Section 3.3, Air Quality; Section 3.10, Hydrology and Water Quality; and Section 3.13, Noise and Vibration, etc.). The purpose of the analysis in this Section 3.18, Utilities and Service Systems, is to evaluate whether the proposed facilities would have adequate capacity to serve the proposed project's demand for utilities and service systems during construction and operation, or whether further relocation or construction of new or expanded facilities would be required.

Construction

The construction of expanded and new water, wastewater treatment, stormwater drainage, and other utility facilities could result in short-term environmental effects. These temporary effects include traffic, air emissions, GHG emissions, and noise from construction equipment and vehicles as well as water quality effects during construction. The following is a discussion of each potential impact.

- Traffic–Construction of these facilities may require lane closures or other traffic control measures along the adjacent roadway and could result in lower levels of service on nearby roadways and intersections. These effects would be potentially significant.
- Air emissions–Construction activities would result in the generation of criteria pollutants, such as reactive organic gases (ROGs) and nitrogen oxides (NO_X) (ozone precursors) and particulate matter (PM_{10} and $PM_{2.5}$) pollutant emissions. The implementation of the proposed Specific Plan policies as well as existing San Joaquin Valley Air Pollution Control District (Valley Air District) regulations identified in Section 3.3, Air Quality, would reduce potential construction emissions. However, since the timing of the construction of the expanded and new facilities is not known, there could be more than one facility under construction at one time. Therefore, there is a possibility that emission standards for the criteria pollutants identified above could be exceeded and significant impacts could occur. In addition, the operation of treatment plants and construction of other utility infrastructure (pipes, basins, etc.) would contribute to emissions associated with the buildout of the proposed Specific Plan. These emissions could be criteria pollutants, toxic pollutants, and odors. These emissions would be potentially significant.
- GHG Emissions–Construction of utility facilities and treatment plants would result in the generation of GHG emissions. Construction emissions would occur only in the short-term; however, since the timing of the construction of the expanded and new facilities is not known, there could be more than one facility under construction at one time. Therefore, there is a possibility that a substantial amount of GHG emissions could occur. In addition, the operation of treatment plants and construction of other utility infrastructure (pipes, basins, etc.) could

contribute to emissions associated with the buildout of the proposed Specific Plan. These emissions would be potentially significant.

- Noise–Construction and operation of expanded and new treatment plants and other utility infrastructure (pipes, basins, etc.) would increase noise levels in the vicinity of each improvement and facility location. Various proposed Specific Plan policies (see Section 3.13, Noise), and existing General Plan policies would reduce potential noise levels to meet City noise standards. Therefore, potential increases in noise levels associated with the future construction and operation of expanded and new utility facilities and infrastructure would be less than significant.
- Water Quality–Construction activities associated with expanded and new utility facilities and infrastructure could result in potential water quality issues. However, projects that disturb more than one acre of soil must obtain coverage under the Construction General Permit and implement BMPs to protect surface water flows from sources of pollution at the construction site. With the implementation of the proposed Specific Plan policies, existing General Plan policies, and the required BMPs, short-term construction impacts on surface water quality would be less than significant. In addition, the operations of any treatment facilities would discharge treated water to approved locations. The approval of these locations would require consistency with the regulatory requirements identified in a waste discharge permit. Consistency with these discharge permits would result in a less than significant impact on long-term water quality.

There may also be construction impacts as a result of new or expanded utility infrastructure that could result in long-term effects related to aesthetics, agricultural resources, biological resources, and cultural resources. The following is a discussion of these potential impacts.

- Aesthetics–Impacts to aesthetics may be adverse on the Specific Plan Area. The construction of expanded or new utility facilities, infrastructure, or treatment facilities could alter the current visual characteristics of the area. However, the proposed Specific Plan includes various policies (see Section 3.2 Aesthetics) to reduce potential aesthetic impacts, and the expanded or new facilities would not substantially alter the visual characteristic of the area. These potential facilities may add lighting systems in the area; however, the increases in lighting are anticipated to be less than significant with the implementation of the proposed Specific Plan policies and mitigation measures identified in Section 3.2, Aesthetics.
- Agricultural Resources–The general locations of proposed expanded or new utility facilities or infrastructure could result in impacts to current Farmland Mapping and Monitoring Program (FMMP) designated areas. The removal of FMMP lands would result in significant impacts; therefore, the construction of expanded or new utility facilities and infrastructure could result in significant farmlands impacts.
- Biological Resources–The future construction of expanded or new utility facilities and infrastructure could result in impacts to biological resources. Proposed Specific Plan policies and mitigation measures identified in Section 3.4, Biological Resources, would reduce potential impacts to biological resources to less than significant.

- Cultural Resources–The future construction of expanded or new utility facilities and infrastructure could result in impacts to cultural resources. There is a potential for unknown cultural resources (i.e., archaeological, paleontological, and human remains) to be located at the future sites of the proposed utilities. Although there is a potential for unknown resources, the implementation of the proposed Specific Plan policies and mitigation measures identified in Section 3.5, Cultural Resources, would reduce the potential impacts to cultural resources to less than significant.

Water Supply

The potential long-term impacts related to water supply requirements of the baseline General Plan conditions for the Plan Area versus the proposed Specific Plan conditions for the Plan Area differ by 1.7 percent and are considered less than significant for full implementation of the proposed Specific Plan with mitigations incorporated. The results of the water demand analysis are shown in Table 3.18-1 and Table 3.18-2.

Per the Water Technical Study prepared for this Draft PEIR, projected water demand for the Plan Area under General Plan conditions was 19.50 mgd, and the projected water demand for the Plan Area under Specific Plan conditions was 19.83 mgd, resulting in an increase of 0.33 mgd (370 AFY), or 1.7 percent. Though this increase is not substantial, there may still be a need for expansion of water supply and treatment facilities, and construction of new distribution facilities to serve future land uses in the Plan Area is still required as there are no existing City water distribution facilities in the Plan Area. Thus, development of the Plan Area could result in significant impacts to the existing water supply and distribution system. See the Technical Study for a full explanation of the analysis process and subsequent results.

A summary of master planned proposed water supply, treatment, and distribution infrastructure that would accommodate future development associated with the Specific Plan include the following:

- New municipal groundwater wells.
  - Wellhead treatment as needed.
- Expansion of the NESWTF.
- New water storage tanks and booster pump stations.
- Extension of 48-inch diameter RTM.
- New Transmission Grid Mains of various sizes.
- New recharge inter-ties to FMFCD basins.

Table 3.18-1: Specific Plan Anticipated Water Demand per Land Use Classification

General Plan Land Classification	Specific Plan Equivalent Land Use Classification	Specific Plan Base Water Demand (mgd)
Residential–Low Density	Residential–Rural Residential	4.18
Residential–Medium Density	Residential–Neighborhood Residential	4.03

General Plan Land Classification	Specific Plan Equivalent Land Use Classification	Specific Plan Base Water Demand (mgd)
Residential–Urban Neighborhood	Residential–Mixed Residential	5.27
Employment–Office	Employment–Office Center	0.38
Employment–Business Park	Employment–Flexible Research and Development	0.04
Employment–Regional Business Park		2.17
Mixed Use -Corridor/Center Mixed Use	Mixed Used–Community Center	0.53
Mixed Use–Regional Mixed Use	Mixed Use–Regional Center	0.61
Open Space–Open Space	N/A	0.00
Open Space–Community Park	N/A	0.00
Open Space–Ponding Basin	Other–Flood Control Basin	0.00
Public Facilities–College	Employment–Institutional	0.19
Public Facilities–School with Park		0.43
Public Facilities–School with Park	Mixed Use–Neighborhood Center	0.91
Buffer–Buffer	Residential–Rural Cluster Residential	1.08
Other–Street/Rail/ Canal, etc.	Other	0.00
Totals	**–**	**19.83**

Notes:
mgd = million gallons per day
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Water Technical Study. June 9, 2022.

Table 3.18-2: Difference Between General Plan and Specific Plan Anticipated Water Demand

SEDA General Plan Total Base Water Demand (mgd)	SEDA Specific Plan Total Base Water Demand (mgd)	Usage Δ (mgd)	Usage Δ (%)
19.5	19.83	0.33	1.7%

Notes:
mgd = million gallons per day
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Water Technical Study. June 9, 2022.

Recycled Water Supply

Improvements within the Plan Area will be required to facilitate the use of recycled water. Since the recycled water distribution system has not yet been planned for the area, it has been assumed that all land uses that would be eligible for recycled water use will utilize potable water until the recycled water supply and distribution system are available. However, these potable water facilities should be installed in accordance with all recycled water regulations and requirements, allowing a seamless

transition to recycled water. This includes installing purple pipe, purple valve boxes, purple irrigation facilities, and maintaining required clearances with other adjacent utilities.

If the Plan Area is expected to be supplied with recycled water from the Fresno-Clovis RWRF, considerable infrastructure will be needed to convey the water from the facility to the Plan Area at a usable flow rate and pressure. Piping of various sizes and booster pump stations will be required, among other improvements. If a satellite RWRF is planned, then the infrastructure required would likely mainly consist of a distribution system of pipelines to convey the recycled water to the users. Consideration would need to be given to recycled water storage facilities when assessing the demand versus the supply of recycled water produced.

The following paragraphs provide a baseline analysis of the Plan Area to understand a preliminary recycled water demand based solely on estimated area of open space presented in the Specific Plan buildout plan, and only accounting for recycled water that may be used for irrigation of said open space. According to the Specific Plan, each land use classification will encompass some percentage of open space, or "Park Acres."

The total minimum park acres in the Plan Area equal 464 acres. Utilizing precipitation data obtained from the Western Regional Climate Center for Fresno,[85] preliminary irrigation calculations were completed to determine the ETWU of the park acres in the Plan Area. Assuming the landscaping would be warm-season turf, and irrigation would mainly be applied via overhead spray/rotors, an annual ETWU with rainfall included of approximately 283 AF (0.3 mgd) was found for the Plan Area (without rainfall yields an ETWU of 1,572 AF, or 1.4 mgd). This represents the minimum required recycled water demand for the park acres included in each of the land use classifications and does not account for any designated open spaces, agricultural areas, or other miscellaneous potential recycled water uses. This has also been completed without knowledge about the available supply of recycled water for the Plan Area and demands will need to be reassessed once a supply is available.

This demand is not a clear indicator of how much recycled water the Plan Area will actually use. Updates to the Recycled Water Master Plan will be required to fully develop the recycled water distribution system for the Plan Area. Determinations of potential recycled water users will need to be made to accurately estimate the anticipated recycled water demand.

Recycled water may be a considerable contributor to the Plan Area's water supply system. The principal impact of providing recycled water is the overall water supply rather than direct shortages for end users because the ability exists to trade off and supplement recycled water supply from other sources. The recycled water planning documents do not delve into detailed plans for improvements for the Plan Area. Recycled water is not currently utilized in the Plan Area, and there are no portions of the recycled water distribution system that have been constructed within the area. Thus, any proposed recycled water use would necessitate the expansion of the existing recycled water system and installation of new recycled water pipelines, and potentially new treatment and storage facilities to provide sufficient recycled water at buildout conditions.

[85] Western Regional Climate Center. Website: https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3257. Accessed April 12, 2022.

Because of the lack of planning document details, and the absence of recycled water supply currently in the Plan Area, it is difficult to assess the necessary mitigation measures to accommodate the impacts of new facilities. Continued evaluation of available capacity and construction of improvements is required. Construction and operation of potential improvements could result in project-specific impacts that are not currently known because recycled water facilities have not yet been designed or planned. Until further environmental evaluations have occurred, and further planning is completed, potential impacts would be considered significant without any mitigations. Therefore, impacts related to the construction of new recycled water treatment facilities or expansion of baseline facilities would be less than significant with mitigation incorporated. See the Recycled Water Technical Study for a full explanation of the analysis process and subsequent results.

Wastewater Treatment

The Specific Plan proposes a transfer of density from the General Plan conditions to the Specific Plan conditions, which will modify the distribution of wastewater generation in the Plan Area from that originally planned. Generally, wastewater generation is predicted to increase as growth occurs, both in the General Plan and this Specific Plan. For the purposes of this analysis, it was assumed that development of the Plan Area would proceed as described in the Wastewater Technical Study prepared for this Draft PEIR–from the General Plan to the Specific Plan land conditions, resulting in new or reoccupied dwelling units and new or repurposed commercial/mixed use space within the Plan Area. Per the proposed Specific Plan, the Plan Area has capacity for 45,000 dwelling units and 5,580 acres of residential space, 1,120 acres of commercial/mixed use space, and 1,820 acres of office/employment space.

As shown in Table 3.18-3, there would be an increase in baseline wastewater generation of 1.46 mgd, or 15 percent when compared to the buildout General Plan conditions. The Plan Area is projected to produce an estimated 11.32 mgd at buildout with Specific Plan land uses compared to 9.86 mgd under the General Plan land uses. Given that the Master Plan utilities were designed based on General Plan buildout conditions, a 15 percent increase would impact associated wastewater treatment requirements and WDRs, and the impacts would be significant without mitigation.

The City would be required to increase wastewater treatment capacity and obtain revised and/or new waste discharge permits. The policies included in the General Plan and the Wastewater Master Plan would reduce the potential impacts associated with increased wastewater generation and treatment requirements; however, these improvements will need to be reevaluated given the projected increase in wastewater generation in the Plan Area, and the City will need to update the Wastewater Master Plan. The implementation of the proposed Specific Plan will result in the need for expansion of the existing wastewater treatment facilities, and new wastewater collection and treatment facilities to serve future land uses in the Plan Area.

A summary of master planned proposed wastewater treatment facilities and collection infrastructure that should accommodate future development associated with the Specific Plan include:

- Wastewater Master Plan Update:[86]
  - Large-diameter trunk sewers, arterial lateral sewer mains, and a satellite wastewater reclamation/scalping plant.
- Expansion of Fresno-Clovis RWRF wastewater treatment capacity.
- Increased size of planned wastewater collection facilities.
- Various wastewater improvement/rehabilitation plans within the City to improve overall wastewater collection and treatment system conditions.

Table 3.18-3 Comparison of General and Specific Plan Anticipated Wastewater Generation per Land Use Classification

GP Land Use Classification	GP Base Wastewater (mgd)	SP Equivalent Land Use Classification	SP Base Wastewater (mgd)	Usage Δ (mgd)	Usage Δ (%)
Residential–Low Density	1.02	Residential–Rural Residential	1.22	0.20	19.8%
Residential–Medium Density	2.50	Residential–Neighborhood Residential	2.44	-0.07	-2.6%
Residential–Urban Neighborhood	3.12	Residential–Mixed Residential	3.59	0.47	15.1%
Employment–Office	0.14	Employment–Office Center	0.15	0.01	7.0%
Employment–Business Park	0.01	Employment–Flexible Research and Development	1.04	0.06	5.8%
Employment–Regional Business Park	0.98				
Mixed Use -Corridor/Center Mixed Use	0.88	Mixed Used–Community Center	0.77	-0.12	-13.2%
Mixed Use–Regional Mixed Use	0.69	Mixed Use–Regional Center	0.96	0.27	39.1%
Open Space–Open Space	0.00	N/A	0.00	0.00	0.0%
Open Space–Community Park	0.00	N/A	0.00	0.00	0.0%
Open Space–Ponding Basin	0.00	Other–Flood Control Basin	0.00	0.00	0.0%
Public Facilities–College	0.08	Employment–Institutional	0.19	0.00	0.00%
Public Facilities–School with Park	0.10				
Public Facilities–School with Park	0.29	Mixed Use–Neighborhood Center	0.49	0.20	69.8%
Buffer–Buffer	0.04	Residential–Rural Cluster Residential	0.46	0.42	1,186.3%
Other–Street/Rail/ Canal, etc.	0.00	Other	0.00	0.00	0.0%
Totals	**9.86**	**Totals**	**11.32**	**1.46**	**15%**
Notes:					

[86] Carollo Engineers, and Blair, Church & Flynn Consulting Engineers, Inc. 2015. City of Fresno Wastewater Collection System Master Plan Update. September.

GP Land Use Classification	GP Base Wastewater (mgd)	SP Equivalent Land Use Classification	SP Base Wastewater (mgd)	Usage Δ (mgd)	Usage Δ (%)
GP = General Plan; mgd = million gallons per day; SP = Specific Plan Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Wastewater Technical Study. May 13, 2022.					

Stormwater Drainage

As development of the Plan Area occurs under the Specific Plan, new and expanded storm drain facilities will be necessary to adequately accommodate the increase in stormwater flows due to an increase in impervious surfaces. Implementation of the Specific Plan would result in a significant impact on existing drainage facilities. The transition from General Plan to Specific Plan, though, proposes a modest transfer of density and land uses throughout the Plan Area, which will modify the distribution of stormwater generation. Under both the General Plan and Specific Plan, stormwater generation will continue to increase as growth continues.

The buildout of the Specific Plan when compared to the General Plan would result in a net increase of 248 AF in expected runoff; FMFCD allows a 20 percent change in required basin volumes before the basin must be modified. Table 3.18-4 shows that all existing basins that are encompassed in or serve SEDA do not exceed a 20 percent change in volume or exceed its capacity.

Table 3.18-5 shows that the buildout of the Specific Plan results in a change in required volume of more than 20 percent in one basin (Basin DX), and the exceedance of one basin's proposed capacity (Basin DW). These two basins will need to be revised by resizing or relocating.

The Plan Area does have master planned FMFCD utilities, including inlets, pipelines, basins, and drainage areas, which have been designed to accommodate the General Plan developments, and are being modified for the SEDA Specific Plan developments by FMFCD. The majority of the planned facilities will be sufficient to provide drainage for the Specific Plan improvements without significant environmental impacts, except for Basin DW and DX which will require reassessment and possibly resizing or relocation. FMFCD plans for drainage facilities but does not construct facilities until such time as development. Therefore, impacts related to the construction of new storm drain treatment facilities or expansion of baseline facilities would be less than significant with mitigation incorporated. See the Storm Drain Technical Study for a full explanation of the analysis process and subsequent results.

Mitigation measures related to storm drain systems are established and required in the Storm Drain Master Plan and the City General Plan PEIR. Stormwater collection and handling must adhere to these mitigation measures.

A summary of master planned proposed storm drain facilities and collection infrastructure that should accommodate future development associated with the Specific Plan include the design and construction of Basins DS, DT, DU, DV, DW, DX, DY, DZ, and their associated collection facilities, including but not limited to inlets, manholes, catch basins, pipelines, and pump stations.

Table 3.18-4 General Plan and Specific Plan Anticipated Runoff Volume for Existing Basins Encompassed within SEDA Specific Plan Area

Drainage Area	GP FMFCD Design Runoff Volume (acre-feet)	SP Runoff Volume Increase (acre-feet)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (acre-feet)	Remaining Basin Volume (acre-feet)
BG	213.2	8.50	4.0%	232.1	10.4
BL	274.0	4.00	1.5%	301.1	23.1
BM	379.3	0.46	0.1%	390.4	10.7
BS	332.2	5.34	1.6%	396.7	59.2
CS	310.4	4.75	1.5%	346.5	31.3

Notes:
FMFCD = Fresno Metropolitan Flood Control District
GP = General Plan
SP = Specific Plan
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Storm Drain Technical Study. June 10, 2022.

Table 3.18-5 General Plan and Specific Plan Anticipated Runoff Volume for Proposed Basins within SEDA Specific Plan Area

Drainage Area	GP FMFCD Design Runoff Volume (acre-feet)	SP Runoff Volume Increase (acre-feet)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (acre-feet)	Remaining Basin Volume (acre-feet)
DS	433.8	85.2	19.6%	1,383.3	864.3
DT	207.3	18.7	9.0%	232.4	6.4
DU	305.0	3.8	1.3%	323.8	15.0
DV	171.7	6.6	3.8%	230.0	51.7
DW	212.3	34.4	16.2%	233.9	-12.8
DX	215.7	54.8	25.4%	304.5	34.0
DY	279.9	10.4	3.7%	295.2	4.9
DZ	237.4	11.1	4.7%	263.6	15.1

Notes:
FMFCD = Fresno Metropolitan Flood Control District
GP = General Plan
SP = Specific Plan
Source: Blair, Church & Flynn Consulting Engineers. SEDA Specific Plan Storm Drain Technical Study. June 10, 2022.

Electricity, Natural Gas, and Telecommunications

Electricity, natural gas, and telecommunications utilities respond to increased demands in various ways. These may include temporary stoppages or rolling blackouts, extension of existing infrastructure, or construction of new facilities.

Each of these utility providers prepares long-range plans to accommodate projected growth in their service areas. For example, PG&E provides annual sustainability reports that outline strategies to accommodate future growth and ensure reliability of electrical and natural gas service. As indicated in the 2021 Corporate Sustainability Report, PG&E has requested approval for 387 megawatts of additional energy storage from six projects slated for completion by August 2023. These projects will provide "system reliability procurement that will help integrate increasing amounts of renewable energy and meet peak summer demand." Telecommunications companies continually expand infrastructure to serve the growing population. These planning efforts take into account growth projections, including the growth under the proposed project. Because the proposed project would not result in unplanned growth, the majority of growth would be infill, and because the utility providers take into consideration all future growth projections in their planning efforts, the proposed project would not be expected to require or result in new or expanded electricity, natural gas, or telecommunications facilities beyond those already planned. Impacts would be less than significant.

Level of Significance Before Mitigation

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

Implementation of all other mitigation measures in this Draft PEIR would be required for all construction activities. Therefore, construction of new utilities would cause less than significant impacts with mitigation incorporated, with regard to the other potential environmental impacts discussed in this Draft PEIR. See the Executive Summary for a summary of all mitigation measures. Mitigation measures for all resource topics in this Draft PEIR would be applicable to construction of new or expanded utility infrastructure.

Specific mitigation measures include the following:

MM UTIL-1a The City shall evaluate the water conveyance system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would demand additional water and exceed the capacity of a facility until additional capacity is provided. The City shall evaluate proposed water capacity and conveyance improvements provided in the City Metro Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.

MM UTIL-1b The City shall evaluate the water supply system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve

development that would demand additional water until additional sources are secured and provided for future development. The City shall evaluate proposed water supply improvements for potential environmental impacts, and shall construct such improvements prior to exceedance of demand to accommodate full buildout of the Specific Plan.

MM UTIL-1c The City shall evaluate the wastewater system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would contribute wastewater to the wastewater treatment system that would exceed capacity until additional capacity is provided. The City shall evaluate proposed wastewater treatment improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.

MM UTIL-1d Consistent with the Sewer System Management Plan, the City shall evaluate the wastewater collection system at the time that discretionary projects are submitted for approval by the City, the City shall not approve development that would generate additional wastewater and exceed the capacity of a facility until additional capacity is provided. The City shall evaluate proposed wastewater collection improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.

MM UTIL-1e The City shall support the Fresno Metropolitan Flood Control District (FMFCD) in evaluating the stormwater collection system and implementing the District Services Plan and Storm Drainage and Flood Control Master Plan, and in constructing such improvements to the storm drain system prior to exceedance of capacity to accommodate full buildout of the Specific Plan. The City shall complete these evaluations prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

MM UTIL-1f At the time discretionary projects are submitted, the City shall require project-specific environmental evaluations for the expansion or relocation of electric, natural gas, or telecommunication facilities be completed prior to project approval.

Level of Significance After Mitigation

Less than significant impact with mitigation incorporated.

Water Supplies

Impact UTIL-2: The proposed project could have sufficient water supplies available to serve the project and reasonably foreseeable future development during normal, dry and multiple dry years.

Impact Analysis

As shown by the 1.7 percent increase in water demand, existing City water supplies could be sufficient to supply the future development in SEDA in addition to the existing demands. Current City water supply sources are as follows:

- Groundwater–The City owns and operates 270 municipal water wells with 202 active wells; projected groundwater supply for the City of Fresno in 2035 is 149,100 AFY.
- Surface Water–The City owns and operates two (2) surface water treatment facilities–the NESWTF and the SESWTF. The NESWTF has a design capacity of 30 mgd expandable to 60 mgd, and the SESWTF has a design capacity of 54 mgd expandable to 80 mgd. The surface water is obtained from the Kings River via an agreement with FID, and from the Friant-Kern Canal through an agreement with the USBR. Treated surface water is used for potable uses and groundwater recharge. The projected surface water supply for the City of Fresno in 2035 is 191,600 AFY (60,000 via USBR, 131,600 via FID).
- Recycled Water–The City owns and operates the Fresno-Clovis RWRF and the NFWRF, which collects and treats wastewater from City users to various levels of treatment for nonpotable uses. The Fresno-Clovis RWRF produces undisinfected secondary effluent for use as restricted irrigation water for farmland and for groundwater recharge via discharge into adjacent percolation ponds, and disinfected tertiary effluent for distribution through the City's recycled water distribution system for nonpotable uses, including landscape irrigation and industrial processes. The NFWRF collects and treats wastewater to a disinfected tertiary level for use as landscape irrigation supply for the Copper River Ranch Golf Course. The projected supply of recycled water for the City of Fresno in 2035 is 5,910 AFY.

The UWMP presents actual data available for water supply and demand for the year 2020, as well as projected water usage. For 2020, the actual total potable water demand for the City was 121,993 AFY, and the projected potable water demand for the City in 2035 is 154,210 AFY. Additionally, the projected nonpotable water demand for the City for groundwater recharge is 68,100 AFY for 2035. The estimated groundwater yield for the City in 2035 was projected to be 149,100 AF, assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, indicating that groundwater alone will not be sufficient to meet future City demands, including those for SEDA.[87]

However, estimated surface water supplies for the City are projected to be 191,600 AF for 2035 (60,000 via USBR, 131,600 via FID) during normal water years, as well as 5,910 AF of recycled water. Total projected water supply for the City in 2035 is 346,610 AF during normal water years and assuming groundwater characteristics are not altered due to climatic events or regulatory influences

[87] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July

from SGMA, and total projected demand is 222,310 AF. The estimated increase in total water use for SEDA in accordance with the Specific Plan selected alternative is 0.33 mgd, or 370 AFY. This results in a modified projected potable demand for the City of 154,580 AFY, with a total water demand (potable and nonpotable) of 222,680 AFY.

In the event of a single dry year, the projected water supply for 2035 is 200,862 AF assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA and the projected demand is 184,174 AF; for multiple dry years, the projected water supplies and demands are shown in Table 3.18-6.

Table 3.18-6 Multiple Dry Years Supply and Demand Comparisons (DWR 7-4R) (2020 UWMP Table 7-3)

		2025	2030	2035	2040	2045
First Year	Supply Total (AFY)	273,725	279,265	284,735	290,125	295,455
	Demand Total (AFY)	199,204	212,756	222,310	231,876	241,447
	Difference (AFY)	74,521	66,509	62,425	58,249	54,008
Second Year	Supply Total (AFY)	274,626	280,166	285,636	291,026	296,356
	Demand Total (AFY)	199,204	212,756	222,310	231,876	241,447
	Difference (AFY)	75,422	67,410	63,326	59,150	54,909
Third Year	Supply Total (AFY)	217,568	223,108	228,578	233,968	239,298
	Demand Total (AFY)	190,267	193,637	197,736	201,753	205,708
	Difference (AFY)	27,301	29,471	30,842	32,215	33,589
Fourth Year	Supply Total (AFY)	189,852	195,392	200,862	206,252	211,582
	Demand Total (AFY)	162,551	165,920	170,020	174,036	177,992
	Difference (AFY)	27,301	29,471	30,842	32,215	33,589
Fifth Year	Supply Total (AFY)	314,840	320,380	325,850	331,240	336,570
	Demand Total (AFY)	199,204	212,756	222,310	231,876	241,447
	Difference (AFY)	115,636	107,624	103,540	99,364	95,123

Source: Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.

The City Metro Plan Update will include proposed infrastructure improvements necessary to sustain development in SEDA, including the construction of new groundwater wells, surface water treatment plant expansions, and expansion of the Regional Transmission water distribution system. Impacts would be less than significant with the incorporation of mitigation and compliance with all regulatory requirements and proposed policies for the proposed Specific Plan.

Implementation of the proposed plan would result in a total buildout of approximately 45,000 dwelling units and over 3,000 acres (130+ million square feet) of mixed use, commercial, office,

retail, public, and open spaces throughout the Plan Area. The General Plan anticipated that approximately 15,000 dwelling units would be built out in the Plan Area by 2035. The proposed increase in development would result in a long-term increase in water demand with each new land use. Additionally, construction activities associated with development will require the use of water for various purposes. Operations of construction equipment and tools, and construction operations such as excavation, grading, and demolition would increase impacts as well.

Future planned improvements to the water conveyance and treatment infrastructure in the Plan Area, include:

- New municipal groundwater wells.
  - Wellhead treatment as needed.
- Expansion of the NESWTF.
- New water storage tanks and booster pump stations.
- Extension of 48-inch diameter RTM in Olive Avenue.
- New Transmission Grid Mains.
- New recharge inter-ties to FMFCD basins.

Additionally, updates to the Recycled Water Master Plan would help ensure that adequate water is available to serve the development under the Specific Plan.

Since the increase in water demand for the Specific Plan Area is 1.7 percent from the General Plan condition, the impacts to water supply could be potentially significant; upon compliance with regulatory requirements, proposed policies for full implementation of the proposed Specific Plan, proposed mitigation measures, and construction of proposed water supply and distribution system infrastructure, the impact could be reduced. The normal water year supply projected for the City of Fresno in 2035 is 346,610 AF, and total projected demand is 222,310 AF. All water supply scenarios for dry years for 2035 are sufficient to accommodate the increase in water demand for the Specific Plan Area of 370 AFY assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA; see Table 3.18-6.

A WSA has been completed for the proposed project and is included in Appendix I. As shown in the WSA, the total projected water supplies for the proposed project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the proposed project in addition to existing and planned future uses. As shown in Table 7.1 of the WSA, demand within the City's service area is not expected to exceed the City's supplies in any normal, single dry, or multiple dry year between 2020 and 2045. The projected increase in water demand for the proposed project is 0.33 MGD, or approximately 370 AFY. As shown in the WSA, the increase in water demand due to the proposed project would not exceed the projected available water supplies for the normal, single dry, and multiple dry years. See the WSA for additional information and further analysis.

Level of Significance

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM HYD-2b, MM HYD-2c, MM UTIL-1a, MM UTIL-1b, and the following:

MM UTIL-2a The City shall develop and implement water conservation measures to reduce the per capita water use, and continue to refine and implement water saving and conservation standards for new developments approved under the Specific Plan. The City shall complete these measures and standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated the refined measures and standards prior to issuing approval.

MM UTIL-2b The City shall continue to implement the City of Fresno Water Conservation Program, as may be updated, and periodically update restrictions on water uses, and evaluate the feasibility of the conservation target identified as part of the Fresno General Plan PEIR. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

MM UTIL-2c The City shall refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance (MWELO) and other State regulations. The City shall complete these standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

Level of Significance After Mitigation

Less than significant impact with mitigation incorporated.

Wastewater Treatment Capacity

Impact UTIL-3:	**The proposed project would not result in a determination by the wastewater treatment provider which serves or may serve the proposed project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments.**

Impact Analysis

The potential long-term impacts related to wastewater collection, treatment, and disposal requirements of the General Plan versus the Specific Plan differ by 15 percent, or 1.46 mgd, and are considered significant for full implementation of the proposed Specific Plan. Development in accordance with the proposed Specific Plan would result in a significant impact on the existing wastewater treatment facilities and their capacities and require an increase of wastewater treatment capacities in the form of expansions to existing facilities or the construction of new facilities.

The following proposed Wastewater Master Plan improvements could help accommodate future development associated with the Specific Plan:

- Expansion of Fresno-Clovis RWRF wastewater treatment capacity.
- SEDA Reclamation Facility–A satellite treatment facility in the southeast portion of the City to serve the SEDA Plan Area.
- Increased size of planned wastewater collection facilities.
- Various wastewater improvement/rehabilitation plans within the City to improve overall wastewater collection and treatment system conditions.

Other additional proposed Wastewater Master Plan improvements would help with conveyance of wastewater to treatment facilities, including:

- New trunk sewers and arterial lateral sewer mains.

Additionally, the implementation of the Specific Plan policies and improvements would result in significant impacts associated with wastewater treatment requirements and WDRs.

The policies in the General Plan are designed to reduce potential effects associated with expansion of wastewater treatment capacity, including those associated with the proposed Specific Plan. The measures required by the General Plan and the Wastewater Master Plan (listed above) also include surface water treatment facilities, additional wastewater collection system infrastructure, water conveyance facilities, and additional pipeline and storage facilities.

Implementation of the proposed plan would result in a total buildout of approximately 45,000 dwelling units and over 3,000 acres (130+ million square feet) of mixed use, commercial, office, retail, public, and open spaces throughout the Specific Plan Area. The proposed increase in development would result in a long-term increase in wastewater generation with each new land use. Additionally, construction activities associated with development would generate wastewater.

The proposed Specific Plan would require new connections to and expansion of the existing wastewater infrastructure to serve future development. Construction of this expansion and new connections have been evaluated as part of this Draft PEIR, and the implementation of these capital improvements would ensure that the City's wastewater conveyance and treatment infrastructure would be sufficient to accommodate the needs of the Specific Plan development. Compliance with all regulatory requirements and policies in the General Plan and the Specific Plan would further ensure adequate wastewater treatment and conveyance capacity. The impact would be less than significant with mitigations incorporated.

Level of Significance

Potentially significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

MM UTIL-1c, MM UTIL-1d

Level of Significance After Mitigation

Less than significant impact with mitigation incorporated.

Attainment of Solid Waste Reduction Goals

Impact UTIL-4:	**The proposed project would not generate solid waste in excess of State or local standards, or in excess of the capacity of local infrastructure, or otherwise impair the attainment of solid waste reduction goals.**

Impact Analysis

New residential, commercial, mixed use, and public land uses in the Specific Plan Area would increase the amount of solid waste generated by residents and businesses. The increase in growth and development as a result of the implementation of the proposed Specific Plan would result in an increase of solid waste to transfer stations and landfills and contribute to an increased demand for solid waste services throughout the Plan Area.

Based on the estimated closure dates of the American Avenue Landfill in 2031 and the Clovis Landfill in 2047, there is a potential for additional landfill capacity needed to accommodate the additional development from this Specific Plan. Therefore, development under the proposed Specific Plan could result in a significant impact on landfill capacity.

Implementation of the proposed plan would result in a total buildout of approximately 45,000 dwelling units and over 3,000 acres (130+ million square feet) of mixed use, commercial, office, retail, public, and open spaces throughout the Specific Plan Area. The proposed increase in development would result in a long-term increase in solid waste generation with each new land use.

To reduce the significant impacts associated with the solid waste disposal, the City will need to increase disposal capacity. The policies in the General Plan are designed to reduce the potential effect associated with solid waste disposal including those associated with the proposed Specific Plan. Additionally, incorporation of the General Plan PEIR Mitigation Measure (MM) UTL-4.1 as a condition of approval, (which remains applicable to this proposed Specific Plan) would ensure adequate landfill capacity for future development. [88] All future development under the Specific Plan would be required to comply with State and local requirements for reduction of solid waste going to landfills.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM UTL-4.1

[88] LSA. 2020. City of Fresno Program Environmental Impact Report. March.

Project Specific Mitigation Measures

No mitigation required.

Solid Waste Regulations

Impact UTIL-5: The proposed project would comply with federal, State, and local statutes and regulations related to solid waste.

Impact Analysis

Construction and operational activities that generate solid waste are handled, transported, and disposed of in accordance with applicable federal, State, and local regulations pertaining to municipal waste. With development in accordance with the proposed Specific Plan, solid waste would continue to be handled, transported, and disposed of in accordance with all applicable federal, State, and local regulations. The City currently has a number of provisions that require or promote recycling and waste reduction. See Section 3.18.3 above for a discussion of regulations related to solid waste. Because all development projects within SEDA would be required to comply with regulations related to solid waste, the proposed project would not include any activities or components that would conflict with federal, State, or local statutes or regulations related to solid waste. Solid waste disposal service impacts would be less than significant upon compliance with regulatory requirements and proposed policies for full implementation of the proposed Specific Plan.

All construction and operational activities would be required to comply with regulations related to solid waste. The proposed project does not include any activities or components that would conflict with regulations related to solid waste. Therefore, construction impacts would be less than significant.

Level of Significance

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

No mitigation required.

Project Specific Mitigation Measures

No mitigation required.

3.18.7 - Cumulative Impacts

The geographic context for evaluation of cumulative impacts related to utilities varies for the different utility providers and is specified below for each utility.

Past and present development in the geographic context has resulted in an increase in demand for water, wastewater treatment and stormwater capacity, landfill capacity, and energy facilities to adequately serve the development. The respective service providers have responded to these increasing demands by constructing new infrastructure. In addition, each utility type has a management plan in place that addresses future projected demands for planned development.

These management plans are routinely updated to account for this development. Construction of individual infrastructure projects has likely resulted in discrete impacts in various issue areas, such as aesthetics, air quality, biological resources, etc. Therefore, there could be a cumulatively significant impact from construction of past and present infrastructure projects. Future development could contribute to this cumulative impact.

The purpose of the SEDA Specific Plan is to identify and develop utilities and service systems within the project area, and to generally eliminate cumulative impacts outside of it. The impacts of anticipated development and projects resulting from the Specific Plan have been analyzed in this Draft PEIR. Most impacts are localized and would occur at different times as the Specific Plan is built out. The proposed project would comply with all State and local regulations related to utilities. Therefore, the proposed project would generally not combine with other projects to result in a cumulatively considerable contribution to cumulative impacts. Where there are regional impacts, they would occur on a scale and of a difficulty that cannot be addressed within a Specific Plan and are being addressed with long-term planning by regional groups and State agencies. However, some potential cumulative impacts were identified and are discussed below.

Water

The geographic context for cumulative impacts regarding water supply and water distribution system infrastructure is the Specific Plan Area and the groundwater basins from which the Plan Area derives water. As discussed, the potential long-term impacts related to water supply requirements of the baseline General Plan conditions for the Plan Area versus the proposed Specific Plan conditions for the Plan Area differ by 1.7 percent. Water supply and water treatment impacts would be less than significant upon compliance with regulatory requirements and proposed policies for full implementation of the proposed Specific Plan, and incorporation of all mitigation measures.

Recycled Water

The geographic context for cumulative impacts regarding recycled water supply and recycled water distribution system infrastructure is the Specific Plan Area and the City of Fresno which will all be recipients of the recycled water supply. As discussed, the potential long-term impacts related to recycled water supply requirements of the Plan Area cannot be fully determined at this time because recycled water is not yet utilized in the Plan Area, and the Recycled Water planning documents do not account for the development of a recycled water distribution system within the Plan Area until after the planned development of the City's growth areas. Improvements within the Plan Area will be required to facilitate the use of recycled water. Preliminary irrigation calculations were completed to determine the ETWU of the park acres in the Plan Area. Assuming the landscaping would be warm-season turf, and irrigation would mainly be applied via overhead spray/rotors, an annual ETWU with rainfall included of approximately 283 AF (0.3 MGD) was found for the Plan Area. Recycled water supply and wastewater treatment impacts would be less than significant upon compliance with regulatory requirements and proposed policies for full implementation of the proposed Specific Plan, and incorporation of all mitigation measures.

Wastewater

The study area for cumulative impacts regarding wastewater is the Specific Plan Area, the City of Fresno, and the City of Clovis because the City of Fresno acts as the Regional Sewering Agency and is responsible for operating the Fresno-Clovis RWRF, and the RWRF serves Clovis. As discussed, there would be an increase in baseline wastewater generation for the Specific Plan of 1.46 mgd, or 15 percent when compared to the buildout General Plan conditions. Given that the Master Plan utilities were designed based on General Plan buildout conditions, a 15 percent increase would impact associated wastewater treatment requirements and WDRs, and the impacts would be significant without mitigation, as would the cumulative impacts.

There are also a number of public utility districts, water districts, and other municipalities near the Specific Plan Area, including the Pinedale Public Utility District, the Pinedale County Water District, the Malaga Water District, and the Bakman Water Company. These entities could have construction projects of new wastewater treatment facilities or other urban development that could cause similar significant environmental impacts as discussed above. Since the proposed Specific Plan would result in less than significant environmental effects from the construction of expanded and new wastewater treatment and conveyance facilities, the proposed project's contribution to cumulative environmental impacts would not be considerable, and the proposed project would result in a less than significant cumulative environmental impact with the incorporation of all mitigation measures.

Storm Drainage

The study area for cumulative impacts regarding stormwater drainage is the Fresno-Clovis Metropolitan Area because the FMFCD service area includes almost the entire portion of the Fresno-Clovis Metropolitan Area. Stormwater and flood control system impacts would be less than significant upon compliance with regulatory requirements and proposed policies for full implementation of the proposed Specific Plan.

The buildout of the Specific Plan when compared to the General Plan would result in a net increase of 248 AF in expected runoff; FMFCD allows a 20 percent change in required basin volumes before the basin must be modified. The buildout of the Specific Plan would result in a change in required volume of more than 20 percent in one proposed basin (Basin DX), and the exceedance of one proposed basin's capacity (Basin DW). These two basins will need to be revised by resizing or relocating.

Mitigation measures related to storm drain systems are established in the Storm Drain Master Plan and have become standard operating practices. Stormwater collection and handling must adhere to the mitigation measures identified in the 2014 City of Fresno Master Plan EIR as well as regulatory requirements that codify the same fundamental practices.

Construction projects that are located immediately adjacent to the FMFCD boundary could cause similar significant environmental impacts as discussed above. Since the proposed Specific Plan would result in less than significant environmental effects from the construction of new stormwater drainage facilities, the proposed project's contribution to cumulative environmental impacts would

not be cumulatively considerable, and the proposed project would result in a less than significant cumulative environmental impact with the incorporation of all mitigation measures.

Solid Waste

The study area for cumulative impacts regarding solid waste is the entire County of Fresno because waste from throughout the County could be accommodated at primarily three landfills within the County including the American Avenue Landfill in Kerman, the Clovis Landfill in Clovis, and the Coalinga Landfill in Coalinga.

Shortage of waste disposal capacity can have significant impacts on adjacent areas. If refuse is exported to adjacent areas with existing spare capacity, significant impacts due to increased travel distances can result in additional transportation related impacts. Implementation of the City's General Plan PEIR MM UTL-4.1 would reduce the proposed project's contribution to potential cumulative impacts to less than cumulatively considerable, and the cumulative impact would be less than significant with incorporation of all mitigation measures.[89]

Electricity, Natural Gas, and Telecommunications

The geographic context for an analysis of cumulative impacts to electricity and natural gas is the PG&E service area. The context for telecommunications is the City of Fresno and the Specific Plan Area.

Past and present development has resulted in increased demand for electricity, natural gas, and telecommunications services. Electricity, natural gas, and telecommunications utilities respond to increased demands in various ways. These may include temporary stoppages or rolling blackouts, extension of existing infrastructure, or construction of new facilities. Each of these utility providers prepares long-range plans to accommodate projected growth in their service areas. For example, PG&E provides annual sustainability reports that outline strategies to accommodate future growth and ensure reliability of electrical and natural gas service. As indicated in the 2021 Corporate Sustainability Report, PG&E has requested approval for 387 megawatts of additional energy storage from six projects slated for completion by August 2023. These projects will provide "system reliability procurement that will help integrate increasing amounts of renewable energy and meet peak summer demand." Telecommunications companies continually expand infrastructure to serve the growing population. These planning efforts take into account growth projections, including the growth under the proposed project. Past, present, and future development has been and will continue to be accounted for in the utility plans, which are updated regularly to ensure continuity of service.

Because the proposed project would not result in unplanned growth, the majority of growth would be infill, and because the utility providers take into consideration all future growth projections in their planning efforts, the proposed project would not be expected to require or result in new or expanded electricity, natural gas, or telecommunications facilities beyond those already planned.

[89] LSA. 2020. City of Fresno Program Environmental Impact Report. March.

Cumulative projects would be included in planned growth, and impacts would be less than significant.

Level of Cumulative Significance Before Mitigation

Water–Potentially significant impact without mitigation incorporated.

Wastewater–Potentially significant impact without mitigation incorporated.

Storm Drainage–Potentially significant impact without mitigation incorporated.

Solid Waste–Potentially significant impact without mitigation incorporated.

Electricity, Natural Gas, and Telecommunications–Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

Implementation of MM UTL-4.1 would reduce the potential impact to solid waste capacity to less than significant.

Project Specific Mitigation Measures

Mitigation measures identified for the various resource topics in this Draft PEIR would reduce the cumulative impacts of construction of utility infrastructure to less than significant.

Level of Cumulative Significance After Mitigation

Less than significant impact with mitigation incorporated.

3.19 - Wildfire

3.19.1 - Introduction

This section describes the existing wildfire conditions in the project area as well as the relevant regulatory framework. This section also evaluates the possible impacts related to wildfire that could result from implementation of the proposed project. Information in this section is based on information provided by the Fresno General Plan (General Plan), Fresno Southeast Development Area (SEDA) Specific Plan (Specific Plan), and the California Department of Fire and Forestry Protection (CAL FIRE). Four public comments were received during the Environmental Impact Report (EIR) scoping period related to wildfire:

- Request that the Draft Program Environmental Impact Report (Draft PEIR) identifies the locations within the Plan Area that are within Special Flood Hazard Areas, which would be subject to Fresno County Ordinance Code Title 15, Chapter 15.48 as well as Federal Emergency Management Agency (FEMA) flood elevation requirements as applicable.

3.19.2 - Environmental Setting

Wildfire Hazard Area Designations

According to the CAL FIRE Fire and Resource Assessment Program, the Plan Area does not contain any lands within the State Responsibility Area (SRA) or lands classified as Very High Fire Hazard Severity Zone (FHSZ) within the Local Responsibility Area (LRA). The nearest Very High FHSZ to the Plan Area is located approximately 25 miles northeast of the Plan Area near Pine Flat Lake.[1] There are no wildlands located within or adjacent to the Plan Area.[2]

Wildfire-conducive Conditions

The Plan Area is located within the Central Valley and is relatively flat. The majority of the Plan Area is located within agricultural lands. Similar uses surround the Plan Area with mostly agricultural properties and rural residential uses to the north, west, and south. The Sierra Nevada foothills to the north and east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the topography and the distance between the Plan Area and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

Emergency and Evacuation Routes/Access

Both the City and County of Fresno implement programs to facilitate emergency preparedness for other types of incidents within the Plan Area, such as fires. Specifically, the City has an Emergency Operations Plan (EOP) that describes what the City's actions will be during a response to an emergency. This plan also describes the role of the Emergency Operations Center (EOC) and the

[1] California Department of Forestry and Fire Protection (CAL FIRE). 2007. Fire Hazard Severity Zones in SRA. Website: https://osfm.fire.ca.gov/media/6671/fhszs_map10.pdf. Accessed June 9, 2022.
[2] City of Fresno. 2018. Fresno County Multi-Hazard Mitigation Plan. Figure 4.53 Fresno County's Wildfire Severity Zones. Website: https://www.co.fresno.ca.us/home/showdocument?id=24743. Accessed May 17, 2022.

coordination that occurs between the EOC, City departments, and other response agencies. The plan establishes a requirement for the emergency management organization to mitigate any significant emergencies affecting the City. The plan also identifies the policies, responsibilities, and procedures required to protect the health and safety of City communities, public and private property, and the environmental effects of natural or technological disasters. In addition, the plan establishes the operation concepts and procedures associated within initial response operations (field response) to emergencies, the extended response operations (City of Fresno EOC Activities), and the recovery process. Furthermore, the plan complies with the State of California EOP "Cross Walk" checklist for determining whether an emergency plan has addressed critical elements of California's Standardized Emergency Management System (SEMS) and the National Incident Management System (NIMS).

The Fresno County Sheriff-Coroner's Office determines the need for evacuations and notifies the public regarding evacuation warnings and orders. The Sheriff-Coroner's Office coordinates the evacuation of the public as well as animals and livestock from hazardous areas during an emergency or disaster.

The County of Fresno (County) has a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), which is a plan that aims to reduce or eliminate long-term risk to people or property from natural hazards. The MJHMP was developed in 2007-2008 and FEMA approved it in 2009. The MJHMP was comprehensively updated in 2017-2018 and was adopted by the City in May 2018. The MJHMP was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 so that the County and the jurisdictions within it would be eligible for FEMA Hazard Mitigation Assistance Grants. The MJHMP identifies goals and objectives for reducing the County's vulnerability to hazards and recommends actions to meet them. The MJHMP contains the following mitigation actions for the City of Fresno:

- Establish a post-disaster action plan for the City's continuity of its Operations Plan.
- Improve the City's capabilities for sheltering animals in a disaster.
- Train and certify City inspectors to conduct a post-disaster damage assessment.
- Implement a flood awareness program for the public.
- Develop a recycled water distribution system in the southwest portion of the City.
- Comply with the Sustainable Groundwater Management Act, including groundwater sustainability planning and implementation.

The MJHMP does not have any mitigation actions for the City related to wildlife. However, the County does contain a mitigation action for CAL FIRE to develop wildfire Defensible Fuel Modification Zones in area of tree mortality. The foothill and mountain areas of the County have been severely impacted by the drought and subsequent bark beetle outbreak since 2014. This has caused tree mortality across 216,000 acres and over 21 million trees have died, creating an additional fuel load. All the communities in these areas are at an increased risk of a damaging wildland fire due to the mortality and fuel loading. These areas need increased Defensible Fuel Modification Zones and hazard tree removal to reduce the damaging effects of a wildland fire.

3.19.3 - Regulatory Framework

Federal

United States Department of Interior

Review and Update of the 1995 Federal Wildland Fire Management Policy

1. **Safety—**Firefighter and public safety is the first priority. All Fire Management Plans and activities must reflect this commitment
2. **Fire Management and Ecosystem Sustainability—**The full range of fire management activities will be used to help achieve ecosystem sustainability, including its interrelated ecological, economic, and social components
3. **Response to Wildland Fire—**Fire, as a critical natural process, will be integrated into land and resource management plans and activities on a landscape scale and across agency boundaries. Response to wildland fire is based on ecological, social, and legal consequences of the fire. The circumstances under which a fire occurs, and the likely consequences on firefighter and public safety and welfare, natural and cultural resources, and values to be protected, dictate the appropriate management response to the fire.
4. **Use of Wildland Fire—**Wildland fire will be used to protect, maintain, and enhance resources and, as nearly as possible, be allowed to function in its natural ecological role. Use of fire will be based on approved Fire Management Plans and will follow specific prescriptions contained in operational plans.
5. **Rehabilitation and Restoration—**Rehabilitation and restoration efforts will be undertaken to protect and sustain ecosystems, public health, and safety and to help communities protect infrastructure.
6. **Protection Priorities—**The protection of human life is the single, overriding priority. Setting priorities among protecting human communities and community infrastructure, other property and improvements, and natural and cultural resources will be based on the values to be protected, human health and safety, and the costs of protection. Once people have been committed to an incident, these human resources become the highest value to be protected.
7. **Wildland Urban Interface—**The operational roles of federal agencies as partners in the Wildland Urban Interface are wildland firefighting, hazardous fuels reduction, cooperative prevention and education, and technical assistance. Structural fire suppression is the responsibility of tribal, State, or local governments. Federal agencies may assist with exterior structural protection activities under formal Fire Protection Agreements that specify the mutual responsibilities of the partners, including funding. (Some federal agencies have full structural protection authority for their facilities on lands they administer and may also enter into formal agreements to assist State and local governments with full structural protection.)
8. **Planning—**Every area with burnable vegetation must have an approved Fire Management Plan. Fire Management Plans are strategic plans that define a program to manage wildland and prescribed fires based on the area's approved land management plan. Fire Management

Plans must provide for firefighter and public safety; include fire management strategies, tactics, and alternatives; address values to be protected and public health issues; and be consistent with resource management objectives, activities of the area, and environmental laws and regulations.

9. **Science—**Fire Management Plans and programs will be based on a foundation of sound science. Research will support ongoing efforts to increase our scientific knowledge of biological, physical, and sociological factors. Information needed to support fire management will be developed through an integrated interagency fire science program. Scientific results must be made available to managers in a timely manner and must be used in the development of land management plans, Fire Management Plans, and implementation plans.
10. **Preparedness—**Agencies will ensure their capability to provide safe, cost-effective fire management programs in support of land and resource management plans through appropriate planning, staffing, training, equipment, and management oversight.
11. **Suppression—**Fires are suppressed at minimum cost, considering firefighter and public safety, benefits, and values to be protected, consistent with resource objectives.
12. **Prevention—**Agencies will work together and with their partners and other affected groups and individuals to prevent unauthorized ignition of wildland fires.
13. **Standardization—**Agencies will use compatible planning processes, funding mechanisms, training and qualification requirements, operational procedures, values to be protected methodologies, and public education programs for all fire management activities.
14. **Interagency Cooperation and Coordination—**Fire management planning, preparedness, prevention, suppression, fire use, restoration and rehabilitation, monitoring, research, and education will be conducted on an interagency basis with the involvement of cooperators and partners.
15. **Communication and Education—**Agencies will enhance knowledge and understanding of wildland fire management policies and practices through internal and external communication and education programs. These programs will be continuously improved through the timely and effective exchange of information among all affected agencies and organizations.
16. **Agency Administrator and Employee Roles—**Agency administrators will ensure that their employees are trained, certified, and made available to participate in the wildland fire program locally, regionally, and nationally as the situation demands. Employees with operational, administrative, or other skills will support the wildland fire program as necessary. Agency administrators are responsible and will be held accountable for making employees available.
17. **Evaluation—**Agencies will develop and implement a systematic method of evaluation to determine effectiveness of projects through implementation of the 2001 Federal Fire Policy. The evaluation will assure accountability, facilitate resolution of areas of conflict, and identify resource shortages and agency priorities.

State

California Emergency Response Plan

California has developed an emergency response plan to coordinate emergency services provided by federal, State, and local governments and private agencies. Responding to hazardous-materials incidents is one part of this plan. The plan is administered by the California Governor's Office of Emergency Services, which coordinates the responses of other agencies. When Contra Costa County experiences an emergency, an EOC may be opened. In the event an EOC is opened, emergency response team members coordinate efforts and work with local fire and police agencies, emergency medical providers, the California Highway Patrol (CHP), CAL FIRE, California Department of Fish and Wildlife (CDFW), and California Department of Transportation (Caltrans).

California Department of Forestry and Fire Protection Threat Potential Mapping

CAL FIRE has mapped fire threat potential throughout California. CAL FIRE maps fire threat based on the availability of fuel and the likelihood of an area burning (based on topography, fire history, and climate). The threat levels include no fire threat, moderate, high, and very high fire threat. Further, the maps designate the City as the LRA of the project site. Additionally, CAL FIRE produced a 2010 Strategic Fire Plan for California which contains goals, objectives, and policies to prepare for and mitigate the effects of fire on California's natural and built environments. The CAL FIRE Office of the State Fire Marshal provides oversight of enforcement of the California Fire Code as well as overseeing hazardous liquid pipeline safety.

California Building Code

The State of California provided a minimum standard for building design through the 2022 California Building Standards Code (CBC), which is located in Part 2 of Title 24 of the California Code of Regulations. The 2022 CBC is based on the International Building Code but has been modified for California conditions. It is generally adopted on a jurisdiction-by-jurisdiction basis, subject to further modification based on local conditions. Commercial and residential buildings are plan-checked by local City and County building officials for compliance with the CBC. Typical fire safety requirements of the CBC include the installation of sprinklers in all new high-rise buildings and residential buildings; the establishment of fire resistance standards for fire doors and building material; and particular types of construction.

California Public Resources Code

The California Public Resources Code includes fire safety regulations that restrict the use of equipment that may produce a spark, flame, or fire; require the use of spark arrestors[3] on construction equipment that use an internal combustion engine; specify requirements for the safe use of gasoline-powered tools in fire hazard areas; and specify fire suppression equipment that must be provided on-site for various types of work in fire-prone areas.

These regulations include the following:

[3] A spark arrestor is any device that prevents the emission of flammable debris from a combustion source (i.e., fireplaces, internal combustion engines, and wood burning stoves).

- Earthmoving and portable equipment with internal combustion engines would be equipped with a spark arrestor to reduce the potential for igniting a wildland fire (California Public Resources Code [PRC] § 4442);
- Appropriate fire suppression equipment would be maintained during the highest fire danger period—from April 1 to December 1 (PRC § 4428);
- On days when a burning permit is required, flammable materials would be removed to a distance of 10 feet from any equipment that could produce a spark, fire, or flame, and the construction contractor would maintain the appropriate fire suppression equipment (PRC § 4427); and
- On days when a burning permit is required, portable tools powered by gasoline-fueled internal combustion engines would not be used within 25 feet of any flammable materials (PRC § 4431).

Regional

County of Fresno Multi-Jurisdictional Local Hazard Mitigation Plan

The purpose of a Local Hazard Mitigation Plan is to reduce or eliminate long-term risk to human life and property resulting from hazards. A Local Hazard Mitigation Plan recognizes risks before they occur, as well as identifies resources, information, and strategies for emergency response. Fresno County, with participation from 17 jurisdictions, is the lead agency on the MJHMP. In 2018, the Fresno County Board of Supervisors adopted the MJHMP, which includes a portion listing information most relevant to the City in the areas of health, infrastructure, housing, government, environment, and land use.

Local

City of Fresno Emergency Operation Plan

The California Emergency Services Act requires cities to prepare and maintain an emergency plan for emergencies that are natural or caused by man. The City's adopted EOP plans for emergencies including natural hazards. The EOP does not designate any evacuation routes within the Planning Area.

City of Fresno General Plan

Noise and Safety Element

Objective NS-6 Foster an efficient and coordinated response to emergencies and natural disasters.

Policy NS-6-a **County Multi-Jurisdiction Hazard Mitigation Plan.** Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex.

Policy NS-6-b **Disaster Response Coordination.** Maintain coordination with other local, State, and federal agencies to provide coordinated disaster response.

Policy NS-6-c **Emergency Operations Plan.** Update the City's EOP periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.

Policy NS-6-d **Evacuation Planning.** Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies.

Policy NS-6-e **Critical Use Facilities.** Ensure critical use facilities (e.g., City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and other structures that are important to protecting health and safety in the community remain operational during an emergency.

- Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions.
- Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.

Policy NS-6-f **Emergency Vehicle Access.** Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

Policy NS-6-g **Emergency Preparedness Public Awareness Programs.** Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

Public Utilities and Services Element

Objective PU-2 Ensure that the Fire Department's staffing and equipment resources are sufficient to meet all fire and emergency service level objectives and are provided in an efficient and cost-effective manner.

Policy PU-2-a **Unify Fire Protection.** Pursue long-range transfer of fire protection service agreements with adjacent fire districts that, in concert with existing automatic aid agreements, will lead to the eventual unification of fire protection services in the greater Fresno area.

Policy PU-2-b **Maintain Ability.** Strive to continually maintain the Fire Department's ability to provide staffing and equipment resources to effectively prevent and mitigate emergencies in existing and new high-rise buildings and in other high-density residential and commercial development throughout the City.

Policy PU-2-c **Rescue Standards.** Develop appropriate standards, as necessary, for rescue operations, including, but not limited to, confined space, high angle, swift water rescues, and the unique challenges of a high speed train corridor.

Policy PU-2-d **Station Siting.** Use the General Plan, community plans, Specific Plans, neighborhood plans, and Concept Plans, the City's Geographic Information Systems (GIS) database, and a fire station location program to achieve optimum siting of future fire stations.

Policy PU-2-e **Service Standards.** Strive to achieve a community-wide risk management plan that include the following service level objectives 90 percent of the time:

- First Unit on Scene–First fire unit arriving with minimum of three firefighters within 5 minutes and 20 seconds from the time the unit was alerted to the emergency incident.
- Effective Response Force–Provide sufficient number of firefighters on the scene of an emergency within 9 minutes and 20 seconds from the time of unit alert to arrival. The effective response force is measured as 15 firefighters for low-risk fire incidents and 21 firefighters for high-risk fire incidents and is the number of personnel necessary to complete specific tasks required to contain and control fire minimizing loss of life and property.

Objective PU-3 Enhance the level of fire protection to meet the increasing demand for services from an increasing population.

Policy PU-3-a **Fire Prevention Inspections.** Develop strategies to enable the performance of annual fire and life safety inspection of all industrial, commercial, institutional, and multi-family residential buildings, in accordance with nationally recognized standards for the level of service necessary for a large Metropolitan Area, including a self-certification program.

Policy PU-3-b **Reduction Strategies.** Develop community risk reduction strategies that target high service demand areas, vulnerable populations (e.g., young children, older adults, non-English speaking residents, persons with disabilities, etc.), and high life hazard occupancies.

Policy PU-3-d **Review All Development Applications.** Continue Fire Department review of development applications, provide comments, and recommend conditions of approval that will ensure adequate on-site and off-site fire protection systems and features are provided.

Policy PU-3-e **Building Codes.** Adopt and enforce amendments to construction and fire codes, as determined appropriate, to systematically reduce the level of risk to life and property from fire, commensurate with the City's fire suppression capabilities.

Policy PU-3-f **Adequate Infrastructure.** Continue to pursue the provision of adequate water supplies, hydrants, and appropriate property access to allow for adequate fire suppression throughout the City.

Policy PU-3-g **Cost Recovery.** Continue to evaluate appropriate codes, policies, and methods to generate fees or other sources of revenue to offset the ongoing personnel and maintenance costs of providing fire prevention and response services.

Fresno Southeast Development Area Specific Plan

The Fresno SEDA Specific Plan is framed within three significant and interrelated goals: fiscal responsibility, social equity, and environmental sustainability. The proposed Plan and policies that form its implementation framework are formulated and coordinated to meet the criteria of these overlapping goals. The proposed Specific Plan contains the following policies and programs related to wildfire:

Open Space Element

Objective OS-2 Create and maintain an open space network that serves multiple purposes, including recreation, stormwater management, community farming, and environmental preservation.

Policy OS-2.3 **Stormwater Management Features.** Maximize the use of green stormwater management infrastructure—such as ponds, basins, swales, and other low-impact systems—within the open space system.

- Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to incorporate green infrastructure within City parks and trails.

Objective OS-11 Provide the necessary levels of police and fire services in accordance with the City of Fresno General Plan.

Policy OS-11.2 **Provision of Fire Services**. Provide fire services in the SEDA in accordance with the policies of the City of Fresno General Plan. If deemed necessary, the City of Fresno Planning and Development Department, through coordination with public safety agencies, can make adjustments to these policies.

Policy OS-11.3 **Coordination with Police and Fire Departments**. The City of Fresno Planning and Development Department shall work with the Police and Fire departments as appropriate to promote safe environments throughout the SEDA and ensure that services can be provided in a manner that is sensitive and responsive to the needs of the community. Coordination may address:

- Evaluation of design features for safety and crime prevention
- Siting of police and fire substations
- Facilitation of citizen involvement processes

Objective OS-13 Provide electricity, natural gas, and telecommunications infrastructure necessary to serve development in the SEDA.

Policy OS-13.1 **Provision of Electricity and Natural Gas Infrastructure**. The City of Fresno shall work with Pacific Gas and Electric Company (PG&E) to provide the necessary electricity and gas infrastructure to serve development in the SEDA.

Policy OS-13.3 **Provision of Telecommunications Infrastructure.** The City shall work with service providers to establish the telecommunications infrastructure necessary to serve the residents and employers of the SEDA.

Conservation Element

Objective RC-1 Meet Statewide targets set for greenhouse gas emissions reductions as set forth in the City's updated GHG Reduction Plan, adopted in 2021.

Policy RC-1.6 **Municipal Facilities**. SEDA will include a range of municipal facilities from streetlights to parks and open spaces to community centers and police and fire facilities will be constructed. It is important to include greenhouse gas reductions and energy conservation at City facilities, over which the City has direct control and can allocate resources for this purpose. In addition, implementing these measures at City facilities also establishes the City as a leader in GHG reduction and conservation, which is important as it implements these measures on a citywide basis. The following are potential citywide actions that can be initiated within the SEDA as opportunity allows:

A. Improve energy efficiency in City operations.
B. Exceed Title 24 energy efficiency standards for new City buildings.
C. Install renewable energy systems on City facilities.
D. Implement City operated transportation demand management for City employees.
E. Purchase green vehicles for City fleets.
F. Enhance reduction, reuse and recycling efforts at City facilities.
G. Implement water efficient landscaping in City parks and facilities.
H. Establish a green purchasing program.

Objective RC-6 Develop sufficient wet utility infrastructure to meet the demand created by new development within the Southeast Development Area, applying cost-effective and low-impact strategies to the extent possible.

Policy RC-6.3 **Flood Control and Stormwater Management.** Evaluate and provide infrastructure to minimize community flood risk, enhance water quality, and provide locations for active recreation.

- **Sub-Area or Development Proposal Delivery:** Proposed stormwater systems shall be identified at the time of development project approval to the satisfaction of

the City of Fresno. Systems must work within the requirements established in the pending EIR-related water infrastructure planning tasks and the SEDA Infrastructure Financing Plan.

- **Stormwater runoff reductions.** The City of Fresno and the developer will identify specific reduction measures required for the development proposal to move forward.
- **Detailed engineering.** Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.

3.19.4 - Methodology

This evaluation focuses on whether the proposed project would result in changes to the physical environment that would cause or exacerbate adverse effects related to wildfires or whether the proposed project would be placed in a location susceptible to wildfire or post-wildfire conditions. The evaluation also includes a determination of whether changes to the physical environment caused by the proposed project would impair or interfere with emergency response plans, expose people to pollutant concentrations from a wildfire or uncontrolled spread of a wildfire, expose people/structures to downslope flooding or landslides, or include installation or maintenance of infrastructure that may exacerbate fire risk. The following analysis is based, in part, on information provided by the General Plan, the SEDA Specific Plan, and the CAL FIRE website.

3.19.5 - Thresholds of Significance

The lead agency utilizes the criteria in the California Environmental Quality Act (CEQA) Guidelines Appendix G Environmental Checklist to determine whether wildfire impacts would be considered significant from implementation of the proposed project.

If located in or near State Responsibility Areas or lands classified as very high fire hazard severity zones, would the project:

a) Substantially impair an adopted emergency response plan or emergency evacuation plan?

b) Due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire?

c) Require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment?

d) Expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes?

3.19.6 - Project Impacts and Mitigation Measures

This section discusses potential impacts associated with the development of the proposed project and provides mitigation measures where appropriate.

Emergency Response/Evacuation Plan Consistency

Impact WILD-1: The proposed project would not substantially impair an adopted emergency response plan or emergency evacuation plan.

Impact Analysis

A significant impact would occur if future development under the Specific Plan would impair an adopted emergency response plan or emergency evacuation plan. The proposed project does not approve, propose, or authorize development in an SRA or FHSZ. The nearest Very High FHSZ to the Plan Area is located approximately 25 miles northeast of the Plan Area near Pine Flat Lake.[4]

The Sierra Nevada foothills to the north and east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the flat topography of the Plan Area and the distance between developed portions of the City and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

The City's Police and Fire Departments are the lead agencies for all local emergency response efforts. In addition, the City's full-time Emergency Preparedness Officer (EPO) is responsible for ensuring that Fresno's emergency response plans are up-to-date and implemented properly. The EPO also facilitates cooperation between City departments and other local, State, and federal agencies that would be involved in emergency response operations.[5]

Development of the Plan Area would increase the development of residential, mixed use, research and development, institutional, and office land uses, creating a higher intensity of development within the Plan Area. These types of land uses are not expected to impair implementation of or physically interfere with adopted emergency response plans or emergency evacuation plans in the City.

Furthermore, the Specific Plan includes various policies that would reduce impacts in case of an emergency. Policy UF-5.1 requires implementation of the Major Circulation Plan, which would improve traffic circulation within the Plan Area in case of an emergency. Policy UF-5.6 sets criteria for vehicle travel facilities. Policy UF-5.7 sets Level of Service (LOS) standards. Policy PF-5.1, and Policy PF-5.2, and Policy PF-5.2 require the provision of adequate police and fire services in the SEDA in accordance with the policies of the General Plan and require that the Planning Department work with police and fire departments during buildout of the SEDA Specific Pan to ensure services are responsive to community needs.

[4] California Department of Forestry and Fire Protection (CAL FIRE). 2007. Fire Hazard Severity Zones in SRA. Website: https://osfm.fire.ca.gov/media/6671/fhszs_map10.pdf. Accessed June 9, 2022.

[5] City of Fresno. Mayor's Office. Emergency Preparedness. Website: https://www.fresno.gov/mayor/emergency-preparedness/. Accessed May 19, 2022.

In the event of an evacuation, major freeways including State Route (SR) 180, SR-168, or SR-99 can be used. Major roadway access corridors such as Temperance, Clovis, and Jensen Avenues can also be used for emergency access. Each of these major roadway access corridors accommodates four lanes of traffic with a central turning lane.

At the programmatic level, impacts to the Plan Area would be reduced to a less than significant level. Consistent with the General Plan and Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts and would ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

Expose Project Occupants to Pollutant Concentrations from Wildfire

Impact WILD-2:	**The proposed project would not due to slope, prevailing winds, and other factors, exacerbate wildfire risks, and thereby expose project occupants to, pollutant concentrations from a wildfire or the uncontrolled spread of a wildfire.**

Impact Analysis

A significant impact would occur if future development under the Specific Plan would exacerbate wildfire risk, exposing project occupants to pollutants. The proposed project does not approve, propose, or authorize development in an SRA or FHSZ. The nearest Very High FHSZ to the Plan Area is located approximately 25 miles northeast of the Plan Area.[6] Additionally, SR-168 separates this area from the Plan Area, serving as a fire break.

The proposed project would primarily facilitate infill development, creating a higher intensity of development within the Plan Area. The Sierra Nevada foothills to the north and east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the flat topography of the Plan Area and the distance between developed portions of the City and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

According to the General Plan Noise and Safety Element, the City's high temperatures and sunlight during summer months combined with low rainfall could create an environment prone to wildfires by drying and pre-heating combustible material, which would encourage the spontaneous

[6] California Department of Forestry and Fire Protection (CAL FIRE). 2007. Fire Hazard Severity Zones in SRA. Website: https://osfm.fire.ca.gov/media/6671/fhszs_map10.pdf. Accessed June 9, 2022.

combustion of such material. The City's estimated maximum wind speed is 70 mph, which could exacerbate wildfire risks.[7] The Specific Plan would result in more urbanization and paved areas, which would reduce the threat of wildfires in the area.

Development under the proposed project would be consistent with the County and City plans and policies in place to reduce the risks associated with wildland fires. For example, General Plan Policy NS-6-f requires adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance. General Plan Policy PU-2-c requires the development of appropriate standards, as necessary, for rescue operations. General Plan Policy PU-2-d requires the use of Specific Plans and a fire station location program to achieve optimum siting of future fire stations. General Plan Policy PU-2-e requires that the community-wide risk management plan includes service level objectives for 90 percent of the time. General Plan Policy PU-3-3 requires that the Fire Department review all development applications, provide comments, and recommend conditions of approval that ensure adequate on-site and off-site fire protection systems and features are provided.

Specific Plan Policy OS-13.1 and OS-13.3 include the provision of electricity, natural gas, and telecommunications infrastructure, which may increase fire risks in the area. However, the General Plan policies listed above in additional to compliance with the CBC would reduce these potential impacts to a less than significant level.

Because the Plan Area is relatively flat and is not located adjacent to or a near a Very High FHSZ, the potential for wildland fire hazard would not substantially change with adoption of the proposed project, and current hazards would not be exacerbated or significantly increased. Additionally, consistent with the General Plan and Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project- specific measures to reduce any potential impacts and would ensure that impacts remain less than significant. Therefore, impacts under this topic would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

[7] City of Fresno. 2020. Fresno General Plan Environmental Impact Report.

Infrastructure That Exacerbates Fire Risk

Impact WILD-3: **The proposed project would not require the installation or maintenance of associated infrastructure (such as roads, fuel breaks, emergency water sources, power lines or other utilities) that may exacerbate fire risk or that may result in temporary or ongoing impacts to the environment.**

Impact Analysis

A significant impact would occur if future development under the Specific Plan would occur if the installation or maintenance of project infrastructure would exacerbate fire risk. The proposed project does not approve, propose, or authorize development in an SRA or FHSZ. The nearest Very High FHSZ to the Plan Area is located approximately 25 miles northeast of the Plan Area near Pine Flat Lake.[8] Additionally, SR-168 separates this area from the Plan Area, serving as a fire break.

As previously stated, the proposed project would primarily facilitate infill development, creating a higher intensity of development within the Plan Area. The Sierra Nevada foothills to the north and east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the flat topography and the distance between developed portions of the City and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

As described above, Specific Plan Policy OS-13.1 and OS-13.3 include the provision of electricity, natural gas, and telecommunications infrastructure, which may increase fire risks in the area. Additionally, as discussed in WILD-2, General Plan policies (such as General Plan Policy PU-3-3) as well as compliance with the CBC would ensure that fire risks are not exacerbated, and impacts would remain less than significant. Additionally, consistent with the General Plan and Specific Plan policies, individual development projects would be required to undergo project-specific environmental review, which may require additional site-specific or project-specific measures to reduce any potential impacts and would ensure that impacts remain less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

[8] California Department of Forestry and Fire Protection (CAL FIRE). 2007. Fire Hazard Severity Zones in SRA. Website: https://osfm.fire.ca.gov/media/6671/fhszs_map10.pdf. Accessed June 9, 2022.

Flooding and Landslide Hazards Due To Post-fire Slope Instability/Drainage Changes

Impact WILD-4: The proposed project would not expose people or structures to significant risks, including downslope or downstream flooding or landslides, as a result of runoff, post-fire slope instability, or drainage changes.

Impact Analysis

A significant impact would occur if future development under the Specific Plan would expose people or structures to significant risks related to flooding, landslides, instability, and drainage changes. The proposed project does not approve, propose, or authorize development in an SRA or FHSZ. The nearest Very High FHSZ to the Plan Area is located approximately 25 miles northeast of the Plan Area near Pine Flat Lake.[9] Additionally, SR-168 separates this area from the Plan Area, serving as a fire break.

According to the Flood Insurance Rate Maps (FIRMs) that include SEDA, a majority of the SEDA Specific Plan Area is outside the 100-year flood zones; most areas are located within Zone X (unshaded) (outside the 500-year floodplain with minimal risk of flooding) (see Exhibit 3.10-1 included in Chapter 3.10, Hydrology and Water Quality). However, several areas in the northern portion of SEDA (north of SR-180) are within zones of higher flood risk, including Zones X (shaded) (between the 100-year and 500-year floodplain with moderate risk of flooding), Zone A (Special Flood Hazard Area [SFHA] within the 100-year floodplain with high risk of flooding, but base flood elevations have not been determined), Zone AE (SFHA within the 100-year floodplain with high risk of flooding, and with determined base flood elevations), and Zone A/AE Regulatory Floodplains (SFHA with high risk of flooding, the channel of a waterway and adjacent area which must be reserved to discharge base flood without increasing surface water elevation); these areas are mainly adjacent to existing rivers, creeks, canals, or detention basins.

As discussed in Chapter 3.10, Hydrology and Water Quality, the City participates in the National Flood Insurance Program (NFIP) which adopts Floor Insurance Rate Maps (FIRMs), appoints a trained Floodplain Administrator, adopts a floodplain ordinance modeled after the Flood Insurance Program model ordinance, and enforces the ordinance and the requirements of Title 40 of the Code of Federal Regulations (40 Code of Federal Regulations [CFR] Protection of Environment), Subchapter D (Water Programs, Parts 100–149). The City enforces these requirements through Chapter 11, Article 6 of the Fresno Municipal Code (Fresno Flood Plain Ordinance), which outlines specific requirements for floodproofing of structures. The proposed Specific Plan includes developments that would be located within these SFHAs; development within these areas would require substantial floodproofing, and any required review and approval of the developments by the City, FMFCD, FEMA, and any other governing body. If developments follow the floodplain ordinance and General Plan objectives and policies are implemented, impacts associated with flooding of developments within the 100-year floodplain would be less than significant.

As previously stated, the proposed project would primarily facilitate infill development, creating a higher intensity of development within the Plan Area. The Sierra Nevada foothills to the north and

[9] California Department of Forestry and Fire Protection (CAL FIRE). 2007. Fire Hazard Severity Zones in SRA. Website: https://osfm.fire.ca.gov/media/6671/fhszs_map10.pdf. Accessed June 9, 2022.

east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the flat topography and the distance between the developed portions of the City and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

Additionally, as described above, Specific Plan Policy OS-13.1 and OS-13.3 include the provision of electricity, natural gas, and telecommunications infrastructure, which may increase fire risks in the area. However, as discussed in WILD-2, General Plan policies as well as compliance with the CBC would ensure that fire risks are not exacerbated, and impacts would remain less than significant.

The Plan Area is relatively flat and does not contain any FHSZs or contemplate any land use changes in areas adjacent to FHSZs and, therefore, the risk of the proposed project exacerbating post-fire slope instability and drainage changes resulting in landslides or flooding is low. However, any new development facilitated by the proposed project would be subject to General Plan Update policies and actions as well as other local regulations that reduce flood and landslide risks. As such, impacts would be less than significant.

Level of Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Mitigation Measures

None.

Project Specific Mitigation Measures

None.

3.19.7 - Cumulative Impacts

The geographic scope of the cumulative impact analysis for wildfire impacts is the Plan Area, the City of Fresno, and the portions of Fresno County located outside the Plan Area that could contribute to wildfire risks.

The proposed project would convert primarily agricultural land to residential and mixed-use land uses, creating a higher intensity of development within the Plan Area. The Sierra Nevada foothills to the north and east of the City provide the nearest areas where large expanses of undeveloped properties occur. Because of the topography and the distance between the developed portions of the City and undeveloped areas, the primary fire hazard concern within the City consists of the potential for structure fires in developed areas.

According to the General Plan Noise and Safety Element, the City's high temperatures and sunlight during summer months combined with low rainfall could create an environment prone to wildfires by drying and pre-heating combustible material, which would encourage the spontaneous combustion of such material. The City's estimated maximum wind speed is 70 miles per hour (mph), which could exacerbate wildfire risks. The SEDA Specific Plan would result in more urbanization and paved areas, which would reduce the threat of wildfires in the area.

Development of the Plan Area would increase the development of residential, mixed use, research and development, institutional, and office land uses. These types of land uses are not expected to impair implementation of or physically interfere with adopted emergency response plans or emergency evacuation plans in the City.

In the event of an evacuation, major freeways, including SR-180, SR-168, or SR-99 could be used. Major roadway access corridors such as Temperance, Clovis and Jensen, Avenues could also be used for emergency access. Each of these major roadway access corridors accommodates four lanes of traffic with a central turning lane.

According to CAL FIRE's Fire and Resource Assessment Program, the Plan Area does not contain any lands within the SRA or lands classified as Very High FHSZ within the LRA. The County of Fresno SRA lands closest to the Plan Area that are classified as Very High FHSZ are located approximately 25 miles to the northeast near Pine Flat Lake.

Since the Plan Area and surrounding areas do not contain any lands classified as Very High FHSZ, and because no potentially significant impacts related to wildfires have been identified, cumulative impacts would be less than significant. Further, as discussed in Impact Discussion WILD-1 through WILD-4, the continued implementation of the above objectives and policies from the approved General Plan would ensure potential impacts from wildfire remain less than significant. Accordingly, implementation of the proposed project would not have a cumulatively considerable contribution to the less than significant impact. No mitigation would be required.

Level of Cumulative Significance Before Mitigation

Less than significant impact.

Fresno General Plan PEIR Cumulative Mitigation Measures

None.

Project Specific Cumulative Mitigation Measures

None required.

CHAPTER 4: OTHER CEQA CONSIDERATIONS

California Environmental Quality Act (CEQA) Guidelines Section 15126 requires that all aspects of a project must be considered when evaluating its impact on the environment, including planning, acquisition, development, and operation. As part of this analysis, the Draft Program Environmental Impact Report (Draft PEIR) must also identify (1) significant environmental effects of the proposed project; (2) significant environmental effects which cannot be avoided if the proposed project is implemented; (3) significant irreversible environmental changes which would be involved in the proposed project should it be implemented; (4) growth-inducing impact of the proposed project; (5) mitigation measures proposed to minimize the significant effects; and (6) alternatives to the proposed project.

This chapter provides a discussion of other CEQA-mandated topics including significant unavoidable impacts, growth inducement, and significant irreversible environmental changes which would be involved in the proposed project should it be implemented. Chapter 5, Alternatives to the Proposed Project, discusses alternatives to the proposed project.

4.1 - Significant Unavoidable Impacts

CEQA Guidelines Section 15126.2(a)(c) requires an Environmental Impact Report (EIR) to identify and focus on the significant environmental effects of the proposed project, including effects that cannot be avoided if the proposed project were implemented.

This section describes significant impacts, including those that can be mitigated but not reduced to a level of less than significant. Where there are impacts that cannot be alleviated without imposing a project alternative, their implications, and the reason why the project is being proposed, notwithstanding their effect, is described. With implementation of the proposed project, several significant impacts that cannot be avoided would occur. Each significant unavoidable impact is discussed below.

- **Impact AES-3 (Project-level Visual Character):** The proposed project would, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings. (Public views are those that are experienced from publicly accessible vantage point). Buildout of the Southeast Development Area (SEDA) Specific Plan would alter the existing visual character by increasing the intensity of development in many areas that are primarily agriculture. No feasible mitigation measures are available to mitigate the impact to a less than significant level.

- **Impact AES-4 (Project-level Light and Glare):** The proposed project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Intensified development in the Plan Area could increase the amount of light from streetlights, exterior lighting from buildings, and vehicle headlights. The increase in lighting within the Plan Area could result in light spillover onto adjacent areas and could substantially illuminate the sky during nighttime. This increase in illumination is considered a significant impact.

Implementation of MM AES-4a through MM AES-4e would reduce potential glare impacts resulting from the proposed project by requiring shields, low-intensity fixtures, requirements for signs, and non-reflective materials. However, impacts would remain significant and unavoidable.

- **Cumulative Aesthetics, Lights, and Glare Impacts:** Implementation of the proposed project would increase intensify development of structures, which would create new sources of light and glare within the Plan Area and adjacent to the Plan Area. These new sources of glare could result from materials used on building façades, parking lots, signs, roadway surfaces, and motor vehicles. This increase in glare could result in cumulatively considerable significant glare impacts and illumination of the nighttime sky. Additionally, implementation of Mitigation Measures (MM) AES-4a through MM AES-4e would reduce potential glare impacts resulting from the proposed project. However, impacts would remain significant and unavoidable.

- **Impact AG-1 (Project-level Conversion of Farmland to Nonagricultural Uses):** There are approximately 2,475 acres of land designated as Prime Farmland, approximately 1,352 acres of Farmland of Statewide Importance, approximately 1,189 acres of land designated as Farmland of Local Importance, and approximately 1,725 acres of land designated as Unique Farmland scattered throughout the Plan Area. Through its open space framework and land use objectives and policies, the Specific Plan would allow flexibility in the location, form, and function of diverse agricultural types within communities and would establish a buffer between the urban area of the City of Fresno and the surrounding agricultural land. Consistent with Policy RC-9-c, incorporation of the General Plan MM AG-1.1, which requires future development to comply with the Farmland Preservation Program (FPP) once adopted for the SEDA would ensure that all future development would be required to mitigate the loss of farmland if Prime Farmland, Unique Farmland, or Farmland of Statewide Importance where such lands are proposed to be converted to urban uses within the Sphere of Influence (SOI) outside city limits. However, because the FPP has not yet been developed, the proposed project would implement project-specific MM AG-2, which requires all future development to mitigate the loss of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, on a project-by-project basis before the initiation of construction or ground-disturbing activities. However, while implementation of MM AG-2 would reduce some project specific impacts, loss of Prime Farmland would still occur with implementation of the proposed project. Therefore, this impact would be significant and unavoidable even with implementation of available mitigation.

- **Impact AG-2 (Project-level Conflict with Existing Zoning or Williamson Act Contract)**: According to the General Plan, the City and its SOI includes lands under Williamson Act Contract for prime and non-prime agricultural land. According to the Williamson Act property map, the majority of Williamson Act properties within the City and SOI are located within the Plan Area. Therefore, the continued implementation of the approved General Plan and the proposed Specific Plan could conflict with existing Williamson Act Contracts because non-agricultural uses are allowed on the land under a Williamson Act Contract. As a result, the continued implementation of the General Plan and proposed Specific Plan could result in a

significant impact on existing Williamson Act Contract land. While the policies included in the Specific Plan would directly limit farmland conversion and thereby help to preserve agriculture in the Plan Area and implementation of the FPP when established through General Plan MM AG-1.1 as a condition of approval, buildout of the proposed project would still result in the conversion of Williamson Act land to nonagricultural uses. Therefore, this impact would be significant and unavoidable without any available mitigation.

- **Cumulative Agricultural Resources and Forestry Resources Impacts:** Although the proposed project would promote small farms, community gardens, and farmer's markets, future development in areas outside of the Plan Area, in combination of the loss of prime farmland within the Plan Area, would result in the conversion of farmland to non-agriculture uses. Therefore, the implementation of the proposed project would result in a significant and unavoidable impact on agricultural zoning and Williamson Act Contracts. The proposed project includes land use changes that would result in the conversion of farmland to non-agriculture uses, and no feasible mitigation measures are available. Therefore, this impact would be significant and unavoidable.

- **Impact AIR-1 (Project-level Consistency with Air Quality Management Plan):** The proposed project has the potential to exceed the San Joaquin Valley Air Pollution Control District (Valley Air District) significance thresholds during construction and operation. Implementation of the proposed project would result in the generation of substantial long-term criteria air pollutant emissions that would exceed the Valley Air District regional significance thresholds and would therefore not be considered consistent with the existing Air Quality Plans (AQPs). No further measures are available beyond the applicable Valley Air District rules and regulations in addition to the proposed project's policies and design guidelines. The various goals and policies of the proposed project would contribute to reducing long-term criteria air pollutant emissions to the extent feasible. However, due to the magnitude and intensity of development accommodated by the proposed project, it would have a significant and unavoidable impact.

- **Impact AIR-2 (Project-level Cumulative Criteria Pollutant Emissions):** While adherence to Rule 9510 would contribute to reducing exhaust nitrogen oxide (NO_x) emissions, it would not be applicable to reducing volatile organic compound (VOC) emissions generated by operation of equipment and from off-gassing from asphalt and paints. Additionally, there is potential for multiple projects to be constructed at one time in the Plan Area, resulting in the generation of cumulatively significant amounts of NO_x emissions. Regional emissions generated by the proposed project would exceed applicable thresholds for cumulative criteria pollutant emissions after compliance with all rules, regulations, and mitigation measures during operation. While compliance with the Valley Air District rules and the policies of the proposed Specific Plan may contribute to reducing operation-related regional air quality impacts of individual projects envisioned under the proposed Specific Plan to less than significant levels, the projected cumulative emissions associated with future development projects would be in exceedance of the Valley Air District thresholds. Therefore, implementation of the proposed project would result in a significant impact because it would significantly contribute to the

nonattainment designations of the San Joaquin Valley Air Basin (SJVAD). This impact would be significant and unavoidable**.**

- **AIR-3 (Project-level Sensitive Receptors Exposure to Pollutant Concentrations):** Compliance with existing regulatory programs, General Plan policies and mitigation measures, and MM AIR-1a through MM AIR-1f will serve to reduce the impacts of the proposed project to the extent feasible. However, the proposed project would result in the future development of numerous projects, each contributing incrementally to air emissions affecting sensitive receptors. Thus, it is possible that the proposed project would result in cumulatively significant impacts to sensitive receptors, even if individual projects were each less than significant. This is particularly likely since none of the measures herein would prevent multiple development projects from being constructed concurrently within close proximity to sensitive receptors in such a manner as to cause substantial concentrations within the area. Further, neither the amount of construction occurring nor the exact location within the Plan Area is foreseeable and, as such, it cannot be determined whether the resultant construction emissions could be adequately controlled or reduced to below regulatory thresholds. Without such information, it is not possible to conclude that air pollutant emissions resulting from construction activities would be adequately reduced to the point that sensitive receptors are not exposed to substantial concentrations of air pollutants, and thus a significant and unavoidable impact may result.

- **Cumulative Air Quality Impacts:** While implementation of MM AIR-1a though MM AIR-1f, as well as General Plan PEIR Mitigation Measures, would serve to reduce criteria air pollutant and toxic air contaminants (TAC) emissions generated by the proposed project, there is currently not enough information to quantify emissions of specific project development that may occur under the proposed project. Without quantification to guarantee a less than significant finding, future development projects may still exceed the Valley Air District regional significance thresholds. Additionally, due to the size of the proposed project, there is not sufficient mitigation available to reduce the potential criteria pollutant emissions associated with the proposed project to levels that would not exceed the Valley Air District thresholds of significance. Therefore, cumulative impacts to air quality would be considered to remain significant and unavoidable.

- **Impact GHG-1 (Project-level Greenhouse Gas Emissions):** Implementation of the proposed project would contribute to global climate change through direct emissions of greenhouse gases (GHG) from on-site area sources and vehicle trips generated by the proposed project, and indirectly through off-site energy production required for on-site activities, water use, and waste disposal. The operation of the proposed project would generate an increase in population and employment, and would contribute to an increase in wastewater generation, water demand, and vehicle trips. New buildings would be more energy efficient, but there would be an overall increase in energy usage due to the magnitude of new building space that would be constructed. Per the GHG Plan Update guidance, the environmental impact of the proposed project related to GHG emissions is significant, because the Plan Area is currently outside of the City boundaries, and the emissions included in the planning area were not

included or considered by the City in the preparation of the GHG Plan Update, which demonstrates that the city would be in compliance with State mandated GHG emission reduction goals. As a result, the proposed project is not consistent with the GHG Plan Update, and the proposed project's contribution to environmental impacts related to GHG emissions are significant. The guiding principles, design guidelines, and proposed land use designations for the Plan Area would contribute to minimizing emissions to the extent feasible, however there is no mitigation feasible to reduce the GHG emissions of the proposed project to less than significant levels. The GHG impacts of the proposed project are significant and unavoidable.

- **Cumulative Greenhouse Gas Emissions Impacts:** The proposed project would result in an expansion of the City of Fresno boundaries and would contribute to population growth in the region that was not included in the GHG Plan Update emissions projections, which demonstrate conformity with State GHG reduction goals. The proposed project would generate a significant net increase in GHG emissions and would have a "significant" GHG impact per the City of Fresno GHG Reduction Plan Update. As the proposed project would have a significant impact per the guidance included in the GHG Plan Update, the project has a potentially significant level of cumulative significance. There are no feasible mitigation measures available. As such, cumulative impacts with regard to GHG emissions are significant and unavoidable.

- **Impact NOI-1 (Project-level Construction Noise):** Short-term construction noise impacts associated with the project are an increase in traffic flow on local streets associated with the transport of workers, equipment, and materials to and from the project site and noise generated during site-preparation, grading, and construction activities. With implementation of MM NOI-1a and MM NOI-1b, construction noise impacts due to construction activities would be reduced to the extent feasible. However, given that details of individual development projects in the vicinity of the Plan Area are currently unknown, it is not possible to quantify the construction noise impacts at specific off-site or on-site sensitive receptors. Because these construction activities may occur near noise-sensitive receptors and because noise disturbances may occur for prolonged periods of time, construction noise impacts would remain significant and unavoidable.

- **Cumulative Construction Noise:** Given that details of individual development projects adjacent to the Plan Area are currently unknown, it is not possible to quantify future cumulative construction noise impacts that could occur if multiple developments were to construct simultaneously, which could constitute a cumulative noise impact. Because construction activities associated with implementation of the Specific Plan could then also occur simultaneously and because noise disturbances could occur for prolonged periods of time, there is the possibility for a cumulative construction noise impacts that would remain significant and unavoidable.

4.2 - Growth-inducing Impacts

There are two types of growth-inducing impacts that a project may have: direct and indirect. To assess the potential for growth-inducing impacts, the project's characteristics that may encourage and facilitate activities that individually or cumulatively may affect the environment must be evaluated (CEQA Guidelines § 15126.2(e)). CEQA Guidelines, as interpreted by the City, state that a significant growth-inducing impact may result if the project would:

- Induce substantial population growth in an area (for example, by proposing new homes and commercial or industrial businesses beyond the land use density/intensity envisioned in the general plan);
- Substantially alter the planned location, distribution, density, or growth rate of the population of an area; or
- Include extensions of roads or other infrastructure not assumed in the general plan or adopted capital improvements project list, when such infrastructure exceeds the needs of the project and could accommodate future developments.

Direct growth-inducing impacts occur when the development of a project imposes new burdens on a community by directly inducing unplanned population growth, or by leading to the construction of additional developments in the same area. Also included in this category are projects that remove physical obstacles to population growth (such as a new road into an undeveloped area or a wastewater treatment plant with excess capacity that could allow additional development in the service area). Construction of these types of infrastructure projects cannot be considered isolated from the development they facilitate and serve. Projects that physically remove obstacles to growth, or projects that indirectly induce growth may provide a catalyst for future unrelated development in an area such as a new residential community that requires additional commercial uses to support residents.

As discussed in Chapter 2, Project Description, buildout of the proposed project could generate up to approximately 45,000 homes and 37,000 jobs as well as 1,820 acres of employment-generating land uses such as office, research and development, and institutional uses by the year 2050. Based on the average household size in the City of 2.99 persons per household, this anticipated future development could accommodate up to 134,550 residents. The population potential for the Plan Area is within the population growth anticipated by the General Plan, which anticipates growth of up to 226,000 additional residents by 2035, consistent with the proposed project. Accordingly, implementation of the proposed project would not exceed the City's anticipated population growth.

According to the General Plan, the City projects that the total additional residential development capacity by the General Plan's horizon in 2035 would be approximately 76,000 additional dwelling units and by the General Plan's buildout in 2050 would be approximately 145,000 additional dwelling

units between both the infill and growth areas.[1] These values constitute the planned growth anticipated by the City for residential units within its SOI. As the proposed project would generate approximately 45,000 new dwelling units by 2050, approximately 31 percent of the total planned capacity for the City, full buildout of the proposed project would be considered planned growth providing housing to meet the demand for new residential units, and would not be considered growth inducing.

4.3 - Mandatory Findings of Significance

Public Resources Code Section 21083 requires lead agencies to make a finding of a "significant effect on the environment" if one or more of the following conditions exist:

1) A proposed project has the potential to degrade the quality of environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife species to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare, or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory.
2) The possible effects of a project are individually limited but cumulatively considerable.
3) The environmental effects of a project will cause substantial adverse effects on human beings, either directly or indirectly.

Finding No. 1: Less than significant with mitigation incorporated.

Based on the analysis provided in Section 3.4, Biological Resources, the proposed project's impacts related to special-status species and special-status natural communities and habitat would be less than significant with mitigation incorporated. Additionally, the proposed project's impacts on riparian habitat, a special-status species associated with riparian or wetlands habitats, as well as federally protected wetlands, and wildlife corridors would be less than significant with mitigation incorporated. Therefore, implementation of General Plan PEIR MM BIO-1.1 through MM BIO-1.4 would reduce impacts on special-status species. General Plan PEIR MM BIO-2.1 through MM BIO-2.3 would reduce impacts to sensitive natural communities or riparian habitats. Implementation of General Plan PEIR MM BIO-3.1 and MM BIO-3.2 would reduce impacts to wetlands and jurisdictional features.

With implementation of General Plan PEIR MM BIO-1.1, MM BIO-1.2, MM BIO-1.3, MM BIO-1.4, MM BIO-2.1, MM BIO-2.2, MM BIO-2.3, MM BIO-3.1, and MM BIO-3.2, the proposed project would not substantially degrade the quality of the environment, reduce fish or wildlife habitat, reduce fish or wildlife populations below self-sustaining levels, eliminate a plant or animal community, or reduce the number or range of a rare or endangered plant or animal.

[1] City of Fresno. 2014. General Plan, Table 1-2, Residential Development Capacity Under Horizon and Buildout, and Table 1-3, Residential Development Capacity Under General Plan Horizon. Website: https://cityoffresno.wpenginepowered.com/darm/wp-content/uploads/sites/10/2022/12/upload_temp_Consolidated-GP-10-13-2022.pdf. Accessed January 20, 2023.

Based on the analysis provided in Section 3.5, Cultural Resources and Tribal Cultural Resources, the proposed project's impacts related to California history or prehistory would be less than significant with mitigation incorporated. Implementation of General Plan PEIR MM CUL-1.1 and MM CUL-1.2 would reduce impacts to historical, cultural resources, or tribal cultural resources encountered during ground-breaking activities. General Plan PEIR MM CUL-2 would reduce impacts to prehistoric resources encountered during excavation and/or construction activities. Implementation of General Plan PEIR MM CUL-3 would reduce impacts to human remains that could be unearthed during excavation or grading activities.

With implementation of General Plan PEIR MM CUL-1.1, MM CUL-1.2, MM CUL-2, and MM CUL-3, the proposed project would not substantially degrade the quality of the environment or eliminate important examples of the major periods of California history or prehistory.

Based on the discussion provided above, compliance with required guidelines and statutes and implementation of the mitigation measures, the project would not substantially degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, substantially reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory. Therefore, impacts would be less than significant with incorporation of General Plan PEIR MM BIO-1.1, MM BIO-1.2, MM BIO-1.3, MM BIO-1.4, MM BIO-2.1, MM BIO-2.2, MM BIO-2.3, MM BIO-3.1, MM BIO-3.2, MM CUL-1.1, MM CUL-1.2, MM CUL-2, and MM CUL-3.

Finding No. 2: Significant and unavoidable.

The analysis presented in this Draft PEIR includes a review of proposed project's potential impacts related to air quality, biological resources, cultural resources, noise, and transportation, among other environmental issue areas. As presented throughout this PEIR, the proposed project's cumulative impacts would either be significant and unavoidable, less than significant with mitigation incorporated, less than significant, or there would be no impacts.

The proposed project is a document that provides a vision for growth and development in the SEDA over the next 20 to 30 years. This long-range planning document addresses a wide range of topics including affordable housing, jobs and economic development, transportation, parks and open space, and a healthy environment. As the proposed project is a policy-level document, it does not include any specific development proposals. The Specific Plan proposes changing land use designations for some of the Plan Area's parcels, which would require an amendment to the General Plan Land Use map.

There would be less than significant cumulative impacts with regard to biological resources, cultural and tribal-cultural resources, energy, hazards and hazardous materials, land use and planning, mineral resources, population and housing, and public services. Mitigation measures to further reduce impacts related to these environmental impacts are MM HAZ-2a, MM HAZ-2b, MM HAZ-2c, MM HAZ-2e, MM HAZ-2f, MM HAZ-2g, and MM HAZ-2h.

Potentially significant impacts related to geology and soils, hydrology and water quality, recreation, transportation, and utilities would be mitigated to less than significant levels with the implementation of MM GEO-6.1, MM GEO-1, MM HYD-2a, MM HYD-2b, MM HYD-2c, MM HYD-2d, MM HYD-3a, MM HYD-3b, MM HYD-3c, MM REC-1, MM TRANS-1a, MM TRANS-1b, MM TRANS-1c, MM TRANS-1d, MM TRANS-1e, MM TRANS-4, MM UTIL-1a, MM UTIL-1b, MM UTIL-1c, MM UTIL-1d, MM UTIL-1e, MM UTIL-1f, MM UTIL-2a, MM UTIL-2b, MM UTIL-2c, and MM UTIL-4.1.

Significant and unavoidable impacts would occur related to aesthetics, agricultural resources, air quality, GHG emissions, noise, and geology. While implementation of MM AES-1, MM AES-2, MM AES-3, MM AES-4, MM AES-5, MM AG-1.1, MM AG-2, MM AIR-1a, MM AIR-1b, MM AIR-1c, MM AIR-1d, MM AIR-1e, MM AIR-1f, MM NOI-1a, MM NOI-1b, MM NOI-2, MM NOI-3, and MM NOI-4 would reduce impacts to these topical sections, there is no feasible mitigation available that would fully bring these impacts to less than significant levels.

Overall, with implementation of the applicable General Plan PEIR and Project Specific mitigation measures, impacts associated with the proposed project would remain significant and unavoidable for aesthetics, agricultural resources, air quality, GHG emissions, noise, and geology and soils. The implementation of other projects in the City would be required to demonstrate regulatory compliance and implement similar mitigation measures, as applicable. Therefore, the proposed project would have some impacts that are individually limited, but cumulatively considerable.

Finding No. 3: Less than significant.

Compliance with and implementation of General Plan PEIR Mitigation Measures, project specific mitigation measures, existing regulations, and the City's standard permit conditions would ensure that the proposed project, and future development consistent with the proposed project, would not result in substantial adverse effects on human beings, including effects related to air pollution, seismic and geologic hazards, hazardous materials, flooding and natural disasters, or noise and vibration. Therefore, impacts associated with the proposed project would be less than significant.

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CHAPTER 5: ALTERNATIVES TO THE PROPOSED PROJECT

5.1 - Introduction

In accordance with California Environmental Quality Act (CEQA) Guidelines Section 15126.6, this Draft Program Environmental Impact Report (Draft PEIR) contains a comparative impact assessment of alternatives to the proposed project. The primary purpose of this section is to provide decision makers and the general public with a reasonable number of feasible project alternatives that could attain most of the basic project objectives, while avoiding or reducing any of the project's significant adverse environmental effects. Important considerations for these alternatives analyses are noted below (as stated in CEQA Guidelines § 15126.6).

- An EIR need not consider every conceivable alternative to a project;
- An EIR should identify alternatives that were considered by the lead agency, but rejected as infeasible during the scoping process;
- Reasons for rejecting an alternative include:
  - Failure to meet most of the basic project objectives;
  - Infeasibility; or
  - Inability to avoid significant environmental effects.

5.1.1 - Significant Unavoidable Impacts

The proposed project would result in the following significant unavoidable impacts:

Impact AES-3 **Project-level Visual Character:** The proposed project would, in non-urbanized areas, substantially degrade the existing visual character or quality of public views of the site and its surroundings. (Public views are those that are experienced from publicly accessible vantage point). Buildout of the Fresno Southeast Development Area (SEDA) Specific Plan (Specific Plan) would alter the existing visual character by increasing the intensity of development in many areas that are primarily agriculture. No feasible mitigation measures are available to mitigate the impact to a less than significant level.

Impact AES-4 **Project-level Light and Glare:** The proposed project would create a new source of substantial light or glare which would adversely affect day or nighttime views in the area. Intensified development in the SEDA Specific Plan Area (Plan Area) could increase the amount of light from streetlights, exterior lighting from buildings, and vehicle headlights. The increase in lighting within the Plan Area could result in light spillover onto adjacent areas and could substantially illuminate the sky during nighttime. This increase in illumination is considered a significant impact. Implementation of Mitigation Measures (MM) AES-4a through MM AES-4e would reduce potential glare impacts resulting from the proposed project by requiring

shields, low-intensity fixtures, requirements for signs, and non-reflective materials. However, impacts would remain significant and unavoidable.

Cumulative Aesthetics, Lights, and Glare Impacts: Implementation of the proposed project would increase intensify development of structures, which would create new sources of light and glare within the Plan Area and adjacent to the Plan Area. These new sources of glare could result from materials used on building façades, parking lots, signs, roadway surfaces, and motor vehicles. This increase in glare could result in cumulatively considerable significant glare impacts and illumination of the nighttime sky. Additionally, implementation of MM AES-4a through MM AES-4e would reduce potential glare impacts resulting from the proposed project. However, impacts would remain significant and unavoidable.

Impact AG-1 **Project-level Conversion of Farmland to Nonagricultural Uses:** There are approximately 2,475 acres of land designated as Prime Farmland, approximately 1,352 acres of Farmland of Statewide Importance, approximately 1,189 acres of land designated as Farmland of Local Importance, and approximately 1,725 acres of land designated as Unique Farmland scattered throughout the Plan Area. Through its open space framework and land use objectives and policies, the Specific Plan would allow flexibility in the location, form, and function of diverse agricultural types within communities and would establish a buffer between the urban area of the City of Fresno (City) and the surrounding agricultural land. Consistent with Policy RC-9-c, the Fresno General Plan (General Plan) Program Environmental Impact Report (PEIR) includes MM AG-1.1, which requires the development of a Farmland Preservation Program (FPP). The intent of the FPP would be that, when Prime Farmland, Unique Farmland, or Farmland of Statewide Importance would be proposed for development and converted to urban uses within the Sphere of Influence (SOI) outside City limits, this program would require that the developer mitigate the loss of farmland. However, because the FPP has not yet been developed, the proposed project would implement project-specific MM AG-2, which requires all future development to mitigate the loss of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance, on a project-by-project basis before the initiation of construction or ground-disturbing activities. However, while implementation of MM AG-2 would reduce some project specific impacts, loss of Prime Farmland would still occur with implementation of the proposed project. Therefore, this impact would be significant and unavoidable even with implementation of available mitigation.

Impact AG-2 **Project-level Conflict with Existing Zoning or Williamson Act Contract**: According to the General Plan, the City and its SOI includes lands under a Williamson Act Contract for prime and non-prime agricultural land. According to the Williamson Act property map, the majority of Williamson Act properties within the City and SOI are located within the Plan Area. Therefore, the continued implementation of the approved General Plan and the proposed Specific Plan could conflict with existing Williamson Act Contracts because nonagricultural uses are allowed on the land under a Williamson Act Contract. As a result, the continued implementation of the General

Plan and proposed Specific Plan could result in a significant impact on existing Williamson Act Contract land. While Objective CF-1 and Policy CF-1.3 included in the Specific Plan would strongly discourage the conversion of strategic farmland, and thereby help to preserve agriculture in the Plan Area and implementation of the FPP when established through General Plan PEIR MM AG-1.1 as a condition of approval, buildout of the proposed project would still result in the conversion of Williamson Act land to nonagricultural uses. Therefore, this impact would be significant and unavoidable without any available mitigation.

Cumulative Agricultural Resources and Forestry Resources Impacts: Although the proposed project would promote small farms, community gardens, and farmer's markets, as well as include a farmland buffer that helps transition new development to agricultural land outside of the SOI, future development in areas outside of the Plan Area, in combination of the loss of prime farmland within the Plan Area, would result in the conversion of farmland to non-agriculture uses. Therefore, the implementation of the proposed project would result in a significant and unavoidable impact on agricultural zoning and Williamson Act Contracts. The proposed project includes land use changes that would result in the conversion of farmland to non-agriculture uses, and no feasible mitigation measures are available. Therefore, this impact would be significant and unavoidable.

Impact AIR-1 **Project-Level Consistency with Air Quality Management Plan:** The proposed project has the potential to exceed the San Joaquin Valley Air Pollution Control District (Valley Air District) significance thresholds during construction and operation. Implementation of the proposed project would result in the generation of substantial long-term criteria air pollutant emissions that would exceed the Valley Air District regional significance thresholds and would therefore not be considered consistent with the existing Air Quality Plans (AQPs). No further measures are available beyond the applicable Valley Air District rules and regulations in addition to the proposed project's policies and design guidelines. The various goals and policies of the proposed project would contribute to reducing long-term criteria air pollutant emissions to the extent feasible. However, due to the magnitude and intensity of development accommodated by the proposed project, it would have a significant and unavoidable impact.

Impact AIR-2 **Project-level Cumulative Criteria Pollutant Emissions:** While adherence to Rule 9510 would contribute to reducing exhaust nitrogen oxide (NO_X) emissions, it would not be applicable to reducing volatile organic compound (VOC) emissions generated by operation of equipment and from off-gassing from asphalt and paints. Additionally, there is potential for multiple projects to be constructed at one time in the Plan Area, resulting in the generation of cumulatively significant amounts of NO_X emissions. Regional emissions generated by the proposed project would exceed applicable thresholds for cumulative criteria pollutant emissions after compliance with all rules, regulations, and mitigation measures during operation. While compliance with the Valley Air District rules and the policies of the proposed Specific

Plan may contribute to reducing operation-related regional air quality impacts of individual projects envisioned under the proposed Specific Plan to less than significant levels, the projected cumulative emissions associated with future development projects would be in exceedance of the Valley Air District thresholds. Therefore, implementation of the proposed project would result in a significant impact because it would significantly contribute to the nonattainment designations of the San Joaquin Valley Air Basin (SJVAB). As such, impacts would be significant and unavoidable**.**

Impact AIR-3 **Project-level Sensitive Receptors Exposure to Pollutant Concentrations:** Compliance with existing regulatory programs, General Plan policies and mitigation measures, and MM AIR-1a through MM AIR-1f would serve to reduce the impacts of the proposed project to the extent feasible. However, the proposed project would result in the future development of numerous projects, each contributing incrementally to air emissions affecting sensitive receptors. Thus, it is possible that the proposed project would result in cumulatively significant impacts to sensitive receptors, even if individual projects were each less than significant. This is particularly likely since none of the measures herein would prevent multiple development projects from being constructed concurrently within close proximity to sensitive receptors in such a manner as to cause substantial concentrations within the area. Further, neither the amount of construction occurring nor the exact location within the Plan Area is foreseeable and, as such, it cannot be determined whether the resultant construction emissions could be adequately controlled or reduced to below regulatory thresholds. Without such information, it is not possible to conclude that air pollutant emissions resulting from construction activities would be adequately reduced to the point that sensitive receptors are not exposed to substantial concentrations of air pollutants and result in a significant and unavoidable impact.

Cumulative Air Quality Impacts: While implementation of MM AIR-1a though MM AIR-1f, as well as the applicable General Plan PEIR Mitigation Measures, would serve to reduce criteria air pollutant and TAC emissions generated by the proposed project, there is currently not enough information to quantify emissions of specific project development that may occur under the proposed project. Without quantification to guarantee a less than significant finding, future development projects may still exceed the Valley Air District regional significance thresholds. Additionally, due to the size of the proposed project, there is not sufficient mitigation available to reduce the potential criteria pollutant emissions associated with the proposed project to levels that would not exceed the Valley Air District thresholds of significance. Therefore, cumulative impacts to air quality would be considered to remain significant and unavoidable.

Impact GHG-1 **Project-level Greenhouse Gas Emissions:** Implementation of the proposed project would contribute to global climate change through direct greenhouse gas (GHG) emissions from on-site area sources and vehicle trips generated by the proposed

project, and indirectly through off-site energy production required for on-site activities, water use, and waste disposal. The operation of the proposed project would generate an increase in population and employment, and would contribute to an increase in wastewater generation, water demand, and vehicle trips. New buildings would be more energy efficient, but there would be an overall increase in energy usage due to the magnitude of new building space that would be constructed. Per the GHG Plan Update guidance, the environmental impact of the proposed project related to GHG emissions is significant, because the Plan Area is currently outside of the City boundaries, and the emissions included in the planning area were not included or considered by the City in the preparation of the GHG Plan Update, which demonstrates that the city would be in compliance with State mandated GHG emission reduction goals. As a result, the proposed project is not consistent with the GHG Plan Update, and the proposed project's contribution to environmental impacts related to GHG emissions are significant. The guiding principles, design guidelines, and proposed land use designations for the Plan Area would contribute to minimizing emissions to the extent feasible, however there is no mitigation feasible to reduce the GHG emissions of the proposed project to less than significant levels. Thus, the GHG impacts of the proposed project would be significant and unavoidable.

Cumulative Greenhouse Gas Emissions Impacts: The proposed project would result in an expansion of the City's boundaries and would contribute to population growth in the region that was not included in the City's GHG Reduction Plan Update emissions projections, which demonstrate conformity with State GHG reduction goals. The proposed project would generate a significant net increase in GHG emissions and would have a significant GHG impact per the City's GHG Reduction Plan Update. As the proposed project would have a significant impact per the guidance included in the City's GHG Reduction Plan Update, the proposed project has a potentially significant level of cumulative significance. There are no feasible mitigation measures available. As such, cumulative impacts with regard to GHG emissions would be significant and unavoidable.

Impact NOI-1 **Project-level Construction Noise:** Short-term construction noise impacts associated with the proposed project are an increase in traffic flow on local streets associated with the transport of workers, equipment, and materials to and from the project site and noise generated during site preparation, grading, and construction activities. With implementation of MM NOI-1a and MM NOI-1b, construction noise impacts due to construction activities would be reduced to the extent feasible. However, given that details of individual development projects in the vicinity of the Plan Area are currently unknown, it is not possible to quantify the construction noise impacts at specific off-site or on-site sensitive receptors. Because these construction activities may occur near noise-sensitive receptors and because noise disturbances may occur for prolonged periods of time, construction noise impacts would remain significant and unavoidable.

Cumulative Construction Noise: Given that details of individual development projects adjacent to the Plan Area are currently unknown, it is not possible to quantify future cumulative construction noise impacts that could occur if multiple developments were to construct simultaneously, which could constitute a cumulative noise impact. Because construction activities associated with implementation of the Specific Plan could then also occur simultaneously and because noise disturbances could occur for prolonged periods of time, there is the possibility for a cumulative construction noise impacts that would remain significant and unavoidable.

5.1.2 - Alternatives to the Proposed Project

The three alternatives to the proposed project analyzed in this section are as follows:

Alternative 1–No Project Alternative

Under this alternative, the Specific Plan would not be approved, and thus, the proposed Specific Plan policies would not be implemented, and no zoning or land use designation changes would occur in the Plan Area. Additionally, the areas within the Plan Area that are outside of the City's SOI would not be annexed to the City. Future development in the Plan Area would be developed in accordance with the current land use and zoning maps identified in the General Plan. The buildout of the General Plan includes approximately 17,900 homes and approximately 29,600 jobs in the Plan Area. Comparatively, the proposed Specific Plan would include approximately 45,000 homes and approximately 37,000 jobs. The existing Plan Area contains the following General Plan designations that would not change under Alternative 1: Residential-Low Density, Residential-Medium Density, Residential-Urban Neighborhood, Employment-Mixed Use, Employment-Office, Public Facilities, Open Space, and Buffer.

Alternative 2–Consolidated Business Park Alternative

Under the Consolidated Business Park Alternative, the Specific Plan would be developed as described in this Draft PEIR, except that this alternative would maintain the existing Research and Development land designations from the General Plan for the area south of Jensen Avenue. It would accommodate approximately 42,900 homes and approximately 36,000 jobs within the 9,000-acre planning area. The area identified in the Specific Plan as Flexible Research and Development to the east of Temperance Avenue and north of Jensen Avenue would be developed as Neighborhood Residential and Mixed Residential with two community centers and five neighborhood centers. Additionally, this alternative would change the land use designations for the planned Mixed Residential and Neighborhood Residential, along with the Community and Neighborhood Centers south of Jensen Avenue. Under the Consolidated Business Park Alternative, that area would be designated as Flexible Research and Development and Offices. Please refer to Exhibit 5-1 for a visual representation of this alternative.

Alternative 3–Farmland Conservation Alternative

Under the Farmland Conservation Alternative, buildout of the Specific Plan would occur as proposed in this Draft PEIR; however, under this alternative, specific parcels of farmland located within the

Plan Area would be desingated for conservation. No future development would be permitted on farmland designated for conservation. Under the proposed project, buildout of the Specific Plan would include a farmland buffer along the east side of the Plan Area. Under the proposed project this area is designated as Rural Cluster Residential which allows specific residential development to be developed on the important farmlands. However, under this alternative, farmland located within the portions of the Plan Area designated as Rural Cluster Residential would be conserved, disallowing development on identified Prime, Unique, and Statewide Importance Farmland within this portion of Plan Area. It would be compatible with the uses of the surrounding land since the farmland preserved will also be rural in nature. Please refer to Exhibit 5-2 for a visual representation of this alternative.

The three alternatives to the proposed project are analyzed below. These analyses compare the proposed project and each individual project alternative. In several cases, the description of the impact may be the same under each alternative when compared with the CEQA Thresholds of Significance (i.e., both the project and the alternative would result in a less than significant impact). The actual degree of impact may be slightly different between the proposed project and each alternative, and this relative difference is the basis for a conclusion of greater or lesser impacts.

5.2 - Project Objectives

As stated in Chapter 2, Project Description, the objectives of the proposed project are to:

Quantified Objectives

- Accommodate between 40,000 and 45,000 dwelling units of varying types, sizes, densities, and affordability levels.
- Accommodate between 30,000 and 37,000 jobs.

Fiscal Responsibility

- Provide self-financing for the development and ongoing maintenance of the SEDA that does not reduce City of Fresno resources dedicated to other areas of the City or burden Fresno residents outside of the SEDA.
- Holistically coordinate infrastructure to integrate efficiencies that piecemeal planning cannot.
- Invest in resource conserving techniques for stormwater systems, water supply, and trail and open space networks to save on infrastructure and mitigation costs.

Social Equity

- Promote health by reducing harmful emissions from cars and industry.
- Foster healthy physical activity and community interaction by providing easy, safe walking and bicycle access to parks, schools, and retail centers.
- Sustain the diversity of Fresno's population by providing a wide variety of housing choices and business opportunities.

- Respect the major economic and cultural role of agriculture in the Central Valley by accommodating growth within the confines of a smaller urban footprint and directly integrating community-scale agriculture into the design of community centers, neighborhoods, and open spaces.

Environmental Sustainability

- Emphasize the efficient use of energy, water, and other resources in SEDA design and policies. Strive to produce a self-mitigating plan that deeply reduces the environmental impacts of growth and can sustain and even serve to improve or repair natural systems.
- Reduce energy and water consumption through more efficient land use patterns, smarter building standards, and environmentally sensitive infrastructure to help Fresno meet standards for greenhouse gas emissions, and well as air pollution and water quality.

Housing Choice

- Offer a variety of housing choices to a mix of incomes, age groups, and lifestyles.
- Ensure new housing units are affordable to households with varying levels of income through covenants and deed-restrictions or other affordability mechanisms.

High Quality Transit Service

- Provide convenient and frequent transit service to connect SEDA's town centers to jobs and housing inside the Plan Area and across the region.

Walkable Neighborhoods

- Provide for nearly all homes to be located within walking distance of a Neighborhood Town Center with an elementary school, recreation areas, community gardens, and small shops.

Parks, Open Space, and Trails

- Create a variety of natural open spaces and parks for recreation in all areas of the SEDA.
- Create trail systems and bicycle paths that make traveling without a car safe and convenient.
- Ensure that schools and major town centers can be reached safely with or without a car.

Mixed Use Town Centers

- Mix shopping, housing, and jobs in vibrant Regional Town Centers and Community Town Centers that are easily accessible to most residents via a short walk, bike ride, drive, or transit trip.

Innovative Employment Areas

- Attract opportunities in green technology and energy systems, ag-related industries, modular housing, and other emerging fields to provide jobs for Fresno residents.

Community Farming and Agriculture

- Integrate small farms, community gardens, and farmers' markets into neighborhoods, schools, and town centers.
- Create a buffer that includes rural homes, organic farming, and open spaces to serve as a transition between the SEDA and commercial agriculture to the east.

Implementation

- Develop the SEDA in an organized and phased manner based on housing needs, infrastructure availability, and minimization of impacts.
- Ensure amenities and infrastructure provision for each new phase prior to commencement of construction.

5.3 - Alternative 1—No Project Alternative

CEQA Guidelines Section 15126.6(e) requires an EIR to evaluate a 'No Project Alternative,' which is defined as what would be reasonably expected to occur in the foreseeable future, if the project were not approved. Under this alternative, the Specific Plan would not be approved with new policies and no zoning or land use designation changes would occur. Additionally, the General Plan would not be amended and the portions of the Plan Area that are not included within the City boundaries would not be annexed into the City. All future development in the Plan Area would be developed in accordance with the current land use and zoning maps identified in the General Plan.

The General Plan includes the development of approximately 17,900 homes and approximately 29,600 jobs in the Plan Area, while the proposed project includes approximately 45,000 homes and 37,000 jobs. The existing Plan Area contains the following General Plan designations: Residential-Low Density, Residential-Medium Density, Residential-Urban Neighborhood, Employment-Mixed Use, Employment-Office, Public Facilities, Open Space, and Buffer.

Overall, buildout under the No Project Alternative (Alternative 1) would be consistent with the General Plan, and thus, less dense and intense than under the proposed project.

5.3.1 - Impact Analysis

Aesthetics, Light, and Glare

As noted in Section 3.1, Aesthetics, Light and Glare, the proposed project's impacts to aesthetics, light, and glare would be significant and unavoidable even with implementation of mitigation because the proposed project would add sources of light and glare and would increase urbanization, changing the rural character of the community. Under Alternative 1, the proposed project would not be approved and buildout of the Plan Area would be consistent with the General Plan. As stated in the General Plan PEIR, buildout under the General Plan includes approximately 17,900 homes and approximately 29,600 jobs in the Plan Area. Comparatively, the proposed Specific Plan would include approximately 45,000 homes and approximately 37,000 jobs. Because the Specific Plan proposes a greater intensity of development, it would have greater impacts than Alternative 1. The General Plan PEIR determined that there would be a significant and unavoidable impact related to visual character

as well as light and glare. Therefore, a significant and unavoidable impact on aesthetics, light, and glare would also occur under Alternative 1. However, because more existing open space would be retained under the General Plan, Alternative 1 would have the same, but reduced impacts as compared to the proposed project.

Agricultural Resources and Forestry Resources

As noted in Section 3.2, Agricultural Resources and Forestry Resources, the proposed project's impacts to agricultural resources and forestry resources would be significant and unavoidable even with the implementation of mitigation. The proposed project includes the conversion of farmland to residential uses, community centers, flexible research and development, and neighborhood centers. Under Alternative 1, the proposed project would not be approved and buildout of the Plan Area would be consistent with the General Plan. As stated in the General Plan PEIR, buildout under the General Plan includes approximately 17,900 homes and approximately 29,600 jobs in the Plan Area. Comparatively, the proposed Specific Plan would include approximately 45,000 homes and approximately 37,000 jobs. Because the Specific Plan proposes a greater intensity of development, it would have greater impacts than Alternative 1. The General Plan PEIR determined that there would be a significant and unavoidable impact related to the conversion of farmland to non-agricultural use as well as conflicts with existing zoning for agricultural use or a Williamson Act Contract. Therefore, while Alternative 1 would have a lesser effect on farmland, it would still be significant and unavoidable.

Air Quality

As noted in Section 3.3, Air Quality, the proposed project's impacts to air quality would be significant and unavoidable even with the implementation of mitigation. As described above, Alternative 1 would result in less intense development compared to the proposed project. The General Plan PIER concluded that with buildout envisioned by the General Plan there would be significant and unavoidable air quality impacts related to cumulatively considerable increases in criteria pollutants as well as exposure of sensitive receptors to substantial pollutant concentrations. Therefore, while it would result in less air quality effects than the proposed project, impacts resulting from Alternative 1 would remain significant and unavoidable.

Biological Resources

As noted in Section 3.4, Biological Resources, the proposed project's impacts related to biological resources would be less than significant with the incorporation of the Fresno General Plan PEIR Mitigation Measures, along with applicable regulations. As described above, buildout of the General Plan under Alternative 1 would be less intense than under the proposed project. The General Plan PEIR concluded that there would be less than significant impacts related to biological resources. The same conclusion was made for the proposed project. Potential disturbance to biological resources would be similar, but less impactful, because of the decreased intensity in Alternative 1. The development under Alternative 1 would comply with mitigation measures specified in the Fresno General Plan PEIR that would reduce impacts to biological resources but would not have the benefit of enhancements identified in the proposed project. Impacts would be expected to be less than significant, similar to the proposed project.

Cultural Resources and Tribal Cultural Resources

As noted in Section 3.5, Cultural Resources and Tribal Cultural Resources, the proposed project's impacts related to cultural resources and tribal cultural resources would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary. Buildout under Alternative 1 would be less intense than under the proposed project and therefore is likely to have a smaller effect on cultural resources. However, similar to the proposed project, impacts would be less than significant.

Energy

As noted in Section 3.6, Energy, the proposed project's impacts related to energy would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary. Buildout under Alternative 1 would have less intensity than the proposed project. Therefore, Alternative 1would require a lower energy consumption than the proposed project. Additionally, since all past, present, and future development projects would be required to comply with the Municipal Code, City ordinances, and County policies that address energy conservation and efficiency during construction, impacts would be less than significant, similar to the proposed project. Impacts would remain less than significant, similar to the proposed project, although slightly less intense due to the reduction in development intensity.

Geology, Soils, and Seismicity

As noted in Section 3.7, Geology, Soils, and Seismicity, the proposed project's impacts related to geology, soils, and seismicity would be less than significant with the incorporation of the Fresno General Plan PEIR Mitigation Measures and project specific mitigation measures, along with applicable regulations. Buildout of the General Plan under Alternative 1 would be less intense than under the proposed project. Therefore, less soil would be disturbed. Development under Alternative 1 would comply with mitigation measures specified in the Fresno General Plan PEIR that would reduce impacts to geology, soils, and seismicity. Impacts would be expected to be less than significant, similar to the proposed project.

Greenhouse Gas Emissions

As noted in Section 3.8, Greenhouse Gas Emissions, the proposed project's impacts related to greenhouse gas (GHG) emissions would be significant and unavoidable even with the implementation of the Fresno General Plan PEIR Mitigation Measures and applicable policies and regulations. Alternative 1 would result in less intense development than the proposed project. The General Plan PEIR concluded that GHG impacts would be less than significant with mitigation incorporated. Therefore, Alternative 1 would have a reduced impact compared to the proposed project with regard to GHG emissions.

Hazards and Hazardous Materials

As noted in Section 3.9, Hazards and Hazardous Materials, the proposed project's impacts related to hazards and hazardous materials would be less than significant with all mitigation incorporated, along with the implementation of applicable regulations. Buildout of the existing General Plan under Alternative 1 would be less intense than under the proposed project. Notably, because they are

policy level documents and do not approve any specific development activities, neither Alternative 1 nor the proposed project would result in physical changes, resulting in a significant environmental effect. Additionally, construction of future individual development projects consistent with the existing General Plan must comply with the California Code of Regulations and implement a Stormwater Pollution Prevention Plan to prevent hazardous material spills and protect public safety. Therefore, while Alternative 1 would have a smaller effect on hazards and hazardous materials due to the smaller intensity of development, impacts would be less than significant, similar to the proposed project.

Hydrology and Water Quality

As noted in Section 3.10, Hydrology and Water Quality, the proposed project's impacts related to hydrology and water quality would be less than significant with the incorporation of all applicable mitigation measures and regulations. As described above, Buildout of the General Plan under Alternative 1 would be less intense than under the proposed project. Accordingly, potential disturbance to hydrology would be similar, but slightly less, because more open space would be retained. Therefore, the number of impervious surfaces created would be reduced. Impacts would be less than significant, but further reduced compared to the proposed project.

Land Use and Planning

As noted in Section 3.11, Land Use and Planning, the proposed project's impacts related to land use and planning would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary. The General Plan PEIR determined that buildout of the General Plan would have a less than significant impact with respect to land use. Therefore, impacts resulting from Alternative 1 would be less than significant, similar to the proposed project.

Mineral Resources

As noted in Section 3.12, Mineral Resources, the proposed project's impacts related to mineral resources would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

The General Plan PEIR found that there are mineral resources within the City, but only in the San Joaquin River Corridor, which is not part of the Plan Area. Therefore, Alternative 1 would have the same impact as the proposed project. A less than significant impact would occur.

Noise

As noted in Section 3.13, Noise, the proposed project's impacts related to noise would be significant and unavoidable for construction noise and less than significant for all other noise and vibration impacts.

The General Plan PEIR determined that impacts with respect to noise would be significant and unavoidable. Buildout of the General Plan under Alternative 1 would be less intense than under the proposed project. As such, noise effects resulting from Alternative 1 would be less than those resulting from the proposed project, but would still be significant and unavoidable.

Population and Housing

As noted in Section 3.14, Population and Housing, the proposed project's impacts related to population and housing would be less than significant with the implementation of applicable policies and regulations. Buildout of the General Plan under Alternative 1 would be less dense than under the proposed project. The General Plan provides for only 17,900 homes, whereas the proposed project would provide for approximately 45,000 homes. This alternative would result in a less than significant impact, similar to the proposed project.

Public Services

As noted in Section 3.15, Public Services, the proposed project's impacts related to public services would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary. Alternative 1 would result in fewer residential units, less nonresidential square footage, and fewer jobs compared to the proposed project. This would result in less demand for public services and recreation than would occur under the proposed project. Since all projects for both this alternative and the proposed project would be required to comply with City ordinances and other policies that address public services, Alternative 1 would have a less than significant impact with respect to public services, similar to the proposed project.

Recreation

As noted in Section 3.16, Recreation, the proposed project's impacts related to recreation would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations. Buildout of the General Plan under Alternative 1 would result in fewer residences, which would require fewer Pocket, Neighborhood, and Community parks to serve the residents of the proposed project. Therefore, Alternative 1 would have a less than significant impact with respect to public services, similar to the proposed project.

Transportation and Traffic

As noted in Section 3.17, Transportation and Traffic, the proposed project's impacts related to transportation and traffic would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations. Buildout of the General Plan under Alternative 1 would be less intense and dense than under the proposed project. This alternative would not conflict with any applicable plans, and individual future developments would be reviewed for consistency with applicable regulations found within the General Plan. Alternative 1 would result in a similarly less than significant impact on transportation.

Utilities and Service Systems

As noted in Section 3.18, Utilities and Service Systems, the proposed project's impacts related to utilities and service systems would be less than significant with the implementation of all applicable mitigation measures, policies and regulations.

The General Plan PEIR found that utilities and service systems impacts would be significant and unavoidable with respect to water, surface water treatment, wastewater treatment, wastewater collection, electric, natural gas, and telecommunications facilities because no project-specific design

details of the proposed infrastructure and utilities were available at the time the General Plan PEIR was published. Instead, the availability of utilities and service systems would be evaluated and determined on a project-by-project basis under the General Plan. Development under Alternative 1 would result in development at less intensity than the proposed project. The proposed project would have a less than significant impact with mitigation incorporated. As such, it can be assumed that Alternative 1 would be less than significant with mitigation incorporated.

Wildfire

As noted in Section 3.19, Wildfire, the proposed project's impacts related to wildfire would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout of the General Plan under Alternative 1 would be less intense and dense than under the proposed project. However, the buildout under the General Plan would still convert primarily agricultural land to residential and mixed-use land uses, creating a higher intensity of development within the Plan Area. The reduced density of this alternative would expose less individuals to the potential threat of wildfires. This increased urbanization and increase in paved areas would reduce the threat of wildfires in the area. The Plan Area does not contain any lands classified as Very High Fire Hazard Severity Zone. Therefore, similar to the proposed project, impacts to wildfires would be similarly less than significant for Alternative 1.

5.3.2 - Conclusion

Alternative 1 would have similar, but slightly less, impacts than the proposed project for the following impact areas: biological resources; cultural and tribal cultural resources; energy; geology, soils, and seismicity; hazards and hazardous materials; hydrology and water quality; land use; public services; transportation; utilities and service systems; and wildfire, all of which would have a less than significant or no impact conclusion for the proposed project. Impacts resulting from the proposed project that would be significant and unavoidable, including those related to aesthetics, light, and glare; agricultural resources and forestry resources; air quality; GHG emissions; and noise, would also be significant and unavoidable under Alternative 1, but slightly less impactful.

5.4 - Alternative 2—Consolidated Business Park Alternative

Under the Consolidated Business Park Alternative (Alternative 2), the SEDA Specific Plan would occur as planned, but this alternative maintains the Flexible Research and Development land designations from the General Plan for the area south of Jensen Avenue. It would accommodate approximately 42,900 homes and 36,000 jobs within the 9,000-acre planning area. This is approximately 2,100 fewer homes and 1,000 fewer jobs, when compared with the proposed project. Alternative 2 would have slightly less density of development than the proposed project. The area identified in the SEDA Specific Plan as Flexible Research and Development to the east of Temperance Avenue and north of Jensen Avenue would be developed as Neighborhood Residential and Mixed Residential with two community centers and five neighborhood centers. Additionally, this alternative would change the land use designations for the planned Mixed Residential and Neighborhood Residential, along with the Community and Neighborhood Centers south of Jensen Avenue. Under Alternative 2, that area

would be designated as Flexible Research and Development and Offices. Please refer to Exhibit 5-1 for a visual representation of this alternative.

5.4.1 - Impact Analysis

Aesthetics, Light, and Glare

As noted in Section 3.1, Aesthetics, Light and Glare, the proposed project's impacts to aesthetics, light, and glare would be significant and unavoidable even with implementation of mitigation because the proposed project would add sources of light and glare and would increase urbanization, changing the rural character of the community.

Alternative 2 would consolidate the proposed Office Center and Flexible Research and Development land uses in the area south of Jensen Avenue and west of Temperance Avenue. As such, more undeveloped space would be preserved compared to the proposed project. Additionally, Alternative 2 is slightly less dense than the proposed project. However, Alternative 2 would still significantly change the visual character of the currently rural Plan Area. Therefore, impacts to visual character would be slightly less than the proposed project, but still significant and unavoidable.

Additionally, new sources of light and glare would still be created under this alternative, and the development would increase urbanization, changing the rural character of the community. Buildout under Alternative 2 would result in increased urbanization compared to the existing land uses. Therefore, a significant and unavoidable impact on aesthetics, light, and glare would still be expected to occur, similar to, but slightly less than the proposed project.

Agricultural Resources and Forestry Resources

As noted in Section 3.2, Agricultural Resources and Forestry Resources, the proposed project's impacts to agricultural resources and forestry resources would be significant and unavoidable even with the implementation of mitigation. The proposed project includes the conversion of farmland to residential uses, community centers, flexible research and development, and neighborhood centers.

Buildout consistent with Alternative 2 would be similar to the proposed project. Although the Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue, Alternative 2 would have a similar amount of development, although slightly less intense. Therefore, impacts to agricultural resources and forestry resources would be expected to be significant and unavoidable, similar to, but slightly less than the proposed project.

Air Quality

As noted in Section 3.3, Air Quality, the proposed project's impacts to air quality would be significant and unavoidable even with the implementation of mitigation.

Buildout consistent with Alternative 2 would be similar to the proposed project. Although the Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. Alternative 2 would result in a similar amount of

development as the proposed project, although at a slightly lower intensity. Therefore, impacts to air quality would be expected to be significant and unavoidable, similar to, but slightly less than, the proposed project.

Biological Resources

As noted in Section 3.4, Biological Resources, the proposed project's impacts related to biological resources would be less than significant with the incorporation of the Fresno General Plan PEIR Mitigation Measures, along with applicable regulations.

Buildout under Alternative 2 would be similar to the proposed project. Under this alternative, the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue. Both Alternative 2 and the proposed project have the same footprint of approximately 9,000 square acres, although Alternative 2 would be slightly less dense. Additionally, this alternative would comply with the General Plan policies and implement the existing mitigation measures included in the General Plan PEIR. Therefore, impacts to biological resources would be expected to be less than significant, similar to, but slightly less than the proposed project.

Cultural Resources and Tribal Cultural Resources

As noted in Section 3.5, Cultural Resources and Tribal Cultural Resources, the proposed project's impacts related to cultural resources and tribal cultural resources would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout consistent with Alternative 2 would be similar to the proposed project. Under this alternative, the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue. Both Alternative 2 and the proposed project have the same footprint of approximately 9,000 acres, although Alternative 2 would be slightly less dense. Additionally, future development within the Plan Area could have significant impacts on known or previously unidentified cultural resources or Tribal Cultural Resources (TCRs). Development would be required to comply with federal, State, and local law and policies that protect cultural and TCRs. Therefore, impacts to cultural and TCRs would be expected to be less than less than significant, similar to, but slightly less than the proposed project.

Energy

As noted in Section 3.6, Energy, the proposed project's impacts related to energy would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout consistent with Alternative 2 would be similar to the proposed project. Under this alternative, the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue. Both this alternative and the proposed project have the same footprint of approximately 9,000 acres, although Alternative 2 would be slightly less dense. Additionally, since all past, present, and future development projects would be required to comply with the Municipal Code, City ordinances, and

County policies that address energy conservation and efficiency during construction and operation, impacts would be less than significant, similar to, but slightly less than the proposed project.

Geology, Soils, and Seismicity

As noted in Section 3.7, Geology, Soils, and Seismicity, the proposed project's impacts related to geology, soils, and seismicity would be less than significant with the incorporation of the Fresno General Plan PEIR Mitigation Measures and project specific mitigation measures, along with applicable regulations.

Buildout under Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project. Alternative 2 would result in the same amount of development as the proposed project. Therefore, impacts to geology, soils, and seismicity would be expected to be less than significant, similar to, but slightly less than the proposed project.

Greenhouse Gas Emissions

As noted in Section 3.8, Greenhouse Gas Emissions, the proposed project's impacts related to greenhouse gas (GHG) emissions would be significant and unavoidable even with the implementation of the Fresno General Plan PEIR Mitigation Measures and applicable policies and regulations.

Buildout consistent with Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project. This alternative would still generate a significant net increase in GHG emissions and would have a significant GHG impact per the City of Fresno GHG Reduction Plan Update. Therefore, impacts to GHG emissions would be expected to be significant, similar to, but slightly less than the proposed project.

Hazards and Hazardous Materials

As noted in Section 3.9, Hazards and Hazardous Materials, the proposed project's impacts related to hazards and hazardous materials would be less than significant with all mitigation incorporated, along with the implementation of applicable regulations.

Buildout consistent with Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project. Additionally, all projects under this alternative would be subject to the requirements and regulations set forth by the United States Environmental Protection Agency (EPA), Occupational Safety and Health

Administration (OSHA), United States Department of Transportation (USDOT), California Department of Toxic Substances Control (DTSC), California Department of Transportation (Caltrans), California Highway Patrol (CHP), and the Valley Air District related to transport, use, and disposal of hazardous materials. Therefore, impacts to hazards and hazardous materials would be expected to be less than significant, similar to, but slightly less than the proposed project.

Hydrology and Water Quality

As noted in Section 3.10, Hydrology and Water Quality, the proposed project's impacts related to hydrology and water quality would be less than significant with the incorporation of all applicable mitigation measures and regulations.

Buildout consistent with Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project. Additionally, buildout of this alternative would increase the amount of paved impervious surfaces within the Plan Area and increase demands for groundwater pumping beyond existing conditions. All projects would be required to comply with the proposed Specific Plan policies, mitigation measures, and the MS4 Permit, which would reduce impacts to less than significant, similar to, but slightly less than the proposed project.

Land Use and Planning

As noted in Section 3.11, Land Use and Planning, the proposed project's impacts related to land use and planning would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout consistent with Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project. Alternative 2 would not physically divide an established community. This alternative would allow for planned development and growth and would increase connectivity and support, strengthen, and connect new communities. However, this alternative might reduce impacts to land use by consolidating Office Center and Flexible Research and Development land uses to the area south of Jensen Avenue. Therefore, impacts to land use would be expected to be less than significant, similar to but slightly less than the proposed project.

Mineral Resources

As noted in Section 3.12, Mineral Resources, the proposed project's impacts related to mineral resources would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout under Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project.

However, the remaining unincorporated lands adjacent to the Plan Area are subject to the land use plans, policies, and regulations of Fresno County. Development within adjacent planning areas and unincorporated Fresno County is unlikely to create significant loss of availability of a known mineral resources or loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan, or other land use plan.

Additionally, no mining operations occur in the Plan Area, and thus, further development under either the proposed project or the Alternative 2 would not result in a loss of mineral resources. Therefore, impacts to mineral resources would be expected to be less than significant, similar to the proposed project.

Noise

As noted in Section 3.13, Noise, the proposed project's impacts related to noise would be significant and unavoidable for construction noise and less than significant for all other noise and vibration impacts.

Buildout under Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 would have slightly less density than the proposed project.

Alternative 2would result in similar noise and vibration impacts. However, since it is not possible to quantity future cumulative construction noise impacts that could occur if multiple developments were to construct simultaneously, this alternative would result in significant and unavoidable impacts with regard to construction noise. Other noise and vibration impacts under Alternative 2 would result in a less than significant impact, similar to, but slightly less than the proposed project.

Population and Housing

As noted in Section 3.14, Population and Housing, the proposed project's impacts related to population and housing would be less than significant with the implementation of applicable policies and regulations.

Buildout under Alternative 2 would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project would provide for a similar number of homes and jobs. This alternative would provide for approximately 42,900 homes and 36,000 jobs within the Plan Area, while the proposed

project would provide for approximately 45,000 homes and 37,000 jobs within the Plan Area. The Alternative 2would result in a less than significant impact, similar to, but slightly less than the proposed project.

Public Services

As noted in Section 3.15, Public Services, the proposed project's impacts related to public services would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout consistent with Alternative 2 would be similar to the proposed project. Since the proposed project had a less than significant impact on public services, with regard to fire protection, police protection, school facilities, parks and recreational facilities, and other public facilities, this alternative would have a less than significant impact, since it would result in slightly less amount of land being developed. Since all projects for both this alternative and the proposed project would be required to comply with City ordinances and other policies that address public services, Alternative 2 would be similarly less than significant to the proposed project.

Recreation

As noted in Section 3.16, Recreation, the proposed project's impacts related to recreation would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations.

Buildout under Alternative 2 would be similar to the proposed project. Future development under both the proposed project and this alternative would include recreational facilities or require the construction or expansion of recreational facilities, which might have an adverse physical effect on the environment. Additionally, individual development projects would be required to comply with the Park Facilities Impact Fee, which would allow new parks to be constructed and adequately maintained at appropriate sites within the Plan Area. Both the proposed project and this alternative would result in the need for additional parkland, although slightly less parkland would be needed under Alternative 2MM REC-1 would ensure potential impacts would be addressed and mitigated to meet the parkland requirements. Alternative 2 would result in less than significant impacts to recreation, similar to, but slightly less than the proposed project.

Transportation and Traffic

As noted in Section 3.17, Transportation and Traffic, the proposed project's impacts related to transportation and traffic would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations.

Buildout under Alternative 2 would be similar to the proposed project. This alternative would not conflict with any applicable plans, and individual future developments would be reviewed for consistency with applicable regulations found within the General Plan. Alternative 2 would result in a similarly less than significant impact on transportation.

Utilities and Service Systems

As noted in Section 3.18, Utilities and Service Systems, the proposed project's impacts related to utilities and service systems would be less than significant with the implementation of all applicable mitigation measures, policies and regulations.

Buildout under Alternative 2 would be similar to the proposed project. Since both this alternative and the proposed project would provide for a similar number of residential facilities, community centers, offices, and jobs, the requirements for water, wastewater, storm drainage, solid waste, and electricity, natural gas, and telecommunications would remain the same, although slightly less under Alternative 2. Mitigation measures for various resource topics in this Draft PEIR would reduce the cumulative impacts of construction of utility infrastructure to less than significant for both this alternative.

Wildfire

As noted in Section 3.19, Wildfire, the proposed project's impacts related to wildfire would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Buildout under Alternative 2would be similar to the proposed project. Although the proposed Office Center and Flexible Research and Development land uses would be consolidated to the area south of Jensen Avenue and west of Temperance Avenue under Alternative 2, both this alternative and the proposed project have the same footprint of approximately 9,000 acres. However, Alternative 2 has slightly less density than the proposed project.

The buildout under this alternative would still convert primarily agricultural land to residential and mixed-use land uses, creating a higher intensity of development within the Plan Area. This increased urbanization and paved areas would reduce the threat of wildfires in the area. Additionally, the Plan Area does not contain any lands classified as Very High Fire Hazard Severity Zone. Therefore, impacts to wildfires would be similarly less than significant for Alternative 2.

5.4.2 - Conclusion

Alternative 2, the Consolidated Business Park Alternative, would have similar, but slightly less impacts to the proposed project's less than significant or no impacts associated with biological resources; cultural and tribal cultural resources; energy; geology, soils, and seismicity; hazards and hazardous materials; hydrology and water quality; land use; mineral resources; public services; recreation; transportation; utilities and service systems; and wildfire. The significant and unavoidable impacts related to aesthetics, light, and glare; agricultural resources and forestry resources; air quality; GHG emissions; and noise would remain significant and unavoidable. The significant and unavoidable impacts related to a conflict with the Valley Air District regional significant thresholds and a cumulatively considerable net increase in criteria pollutants would remain significant and unavoidable under Alternative 2.

Additionally, Alternative 2 would not meet some of the project objectives. For example, Alternative 2 proposes 2,100 fewer homes and 1,000 fewer jobs than the proposed project.

5.5 - Alternative 3—Farmland Conservation Alternative

Under the Farmland Conservation Alternative (Alternative 3), buildout of the SEDA Specific Plan would occur as proposed in this Draft PEIR; however, under this alternative, specific parcels of farmland located south of Kings Canyon Road/California State Route (SR) 180 and north of Jensen Avenue would be conserved. No future development or ground disturbing activities would be permitted on farmland designated for conservation. This would conserve a total of 648.61 acres of farmland that would not be conserved under the proposed project (Exhibit 5-1). The Plan Area currently has 5,552 acres of farmland.

Under the proposed project, buildout of the Specific Plan would include a farmland buffer along the east side of the Plan Area, designated as Rural Cluster Residential which allows specific residential development to be developed on the important farmlands. This Alternative would include the Rural Cluster Residential Buffer; however, it would not permit developments on identified farmland within this portion of Plan Area. It would be compatible with the uses of the surrounding land since the farmland preserved will also be rural in nature. It is important to note that although development would not be allowed in identified farmland, ground disturbing activity consistent with agricultural uses would still be permited. Please refer to Exhibit 5-2 for a visual representation of this alternative.

5.5.1 - Impact Analysis

Aesthetics, Light, and Glare

As noted in Section 3.1, Aesthetics, Light and Glare, the proposed project's impacts to aesthetics, light, and glare would be significant and unavoidable even with implementation of mitigation because the proposed project would add sources of light and glare and would increase urbanization, changing the rural character of the community.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would slightly reduce effects on visual character and light and glare in the Plan Area, the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be significant and unavoidable.

Agricultural Resources and Forestry Resources

As noted in Section 3.2, Agricultural Resources and Forestry Resources, the proposed project's impacts to agricultural resources and forestry resources would be significant and unavoidable even with the implementation of mitigation. The proposed project includes the conversion of farmland to residential uses, community centers, flexible research and development, and neighborhood centers.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would slightly reduce the loss of farmland in the Plan Area, the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be significant and unavoidable.

Air Quality

As noted in Section 3.3, Air Quality, the proposed project's impacts to air quality would be significant and unavoidable even with the implementation of mitigation.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would slightly reduce the total development in the Plan Area, the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be significant and unavoidable.

Biological Resources

As noted in Section 3.4, Biological Resources, the proposed project's impacts related to biological resources would be less than significant with the incorporation of the Fresno General Plan PEIR Mitigation Measures, along with applicable regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would disturb slightly fewer biological resources in the Plan Area due to development, the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant.

Cultural Resources and Tribal Cultural Resources

As noted in Section 3.5, Cultural Resources and Tribal Cultural Resources, the proposed project's impacts related to cultural resources and tribal cultural resources would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would result in slightly less ground disturbance due to development in the Plan Area, but agricultural ground disturbance could continue and the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant.

Energy

As noted in Section 3.6, Energy, the proposed project's impacts related to energy would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would result in slightly less development and therefore, slightly less energy usage in the Plan Area, although the majority of the Plan Area would be developed as proposed. Impacts under Alternative 3 would still be less than significant.

Geology, Soils, and Seismicity

As noted in Section 3.7, Geology, Soils, and Seismicity, the proposed project's impacts related to geology, soils, and seismicity would be less than significant with the incorporation of the Fresno General Plan PEIR Mitigation Measures and project specific mitigation measures, along with applicable regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would result in slightly less ground disturbance due to development in the Plan Area, although the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant with mitigation incorporated.

Greenhouse Gas Emissions

As noted in Section 3.8, Greenhouse Gas Emissions, the proposed project's impacts related to greenhouse gas (GHG) emissions would be significant and unavoidable even with the implementation of the Fresno General Plan PEIR Mitigation Measures and applicable policies and regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would slightly reduce development, and therefore emissions, in the Plan Area, the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be significant and unavoidable.

Hazards and Hazardous Materials

As noted in Section 3.9, Hazards and Hazardous Materials, the proposed project's impacts related to hazards and hazardous materials would be less than significant with all mitigation incorporated, along with the implementation of applicable regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would slightly reduce the risk of releasing hazardous materials into the environment because less land would be disturbed for construction purposes, although the farmland could continue to be developed with agricultural uses and the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant with mitigation incorporated.

Hydrology and Water Quality

As noted in Section 3.10, Hydrology and Water Quality, the proposed project's impacts related to hydrology and water quality would be less than significant with the incorporation of all applicable mitigation measures and regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would result in slightly less development and therefore, slightly less disturbance of current hydrology patterns, the majority

of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant with mitigation incorporated.

Land Use and Planning

As noted in Section 3.11, Land Use and Planning, the proposed project's impacts related to land use and planning would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

As previously discussed, the proposed project would designate land on the eastern boundary of the Plan Area as Rural Cluster Residential, creating a buffer between the more intense development within the majority of the Plan Area and the agricultural land east of the Plan Area outside of the SOI. Alternative 3 would preserve farmland within land designated as Rural Cluster Residential under the proposed project, thereby reducing the transitional buffer. Thus, more intense uses to the west of this area could be located much closer to active agricultural land, reducing compatibility between the land uses. Thus, Alternative 3 would likely be in conflict with Specific Plan Policy UF-1.6, which requires buffers between new residential development and existing farmlands, and Policy HC-1.6, which requires urban edge transitions that protect existing rural residential and agricultural uses from new development. Therefore, the adoption of Alternative 3 into the proposed project would cause a significant environmental impact due to conflict with the Specific Plan policies, which would be adopted as part of the proposed project's approval. As such land use effects would be significant and unavoidable, with less continuity of land uses, greater than the proposed project.

Mineral Resources

As noted in Section 3.12, Mineral Resources, the proposed project's impacts related to mineral resources would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. There are no known resources within the Plan Area. As such, impacts under Alternative 3 would remain less than significant.

Noise

As noted in Section 3.13, Noise, the proposed project's impacts related to noise would be significant and unavoidable for construction noise and less than significant for all other noise and vibration impacts. There is no mitigation available to reduce cumulative construction noise impacts to less than significant.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. While this would slightly reduce construction and construction noise in the Plan Area, the area could still be used for agricultural purposes and the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be significant and unavoidable.

Population and Housing

As noted in Section 3.14, Population and Housing, the proposed project's impacts related to population and housing would be less than significant with the implementation of applicable policies and regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would slightly reduce the number of residences and, therefore, population increase in the Plan Area, although the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant.

Public Services

As noted in Section 3.15, Public Services, the proposed project's impacts related to public services would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would slightly reduce population growth and development in the Plan Area, slightly reducing the demand for public services, although the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant.

Recreation

As noted in Section 3.16, Recreation, the proposed project's impacts related to recreation would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would slightly reduce population growth and development in the Plan Area, slightly reducing the demand for recreational facilities, although the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant with mitigation incorporated.

Transportation and Traffic

As noted in Section 3.17, Transportation and Traffic, the proposed project's impacts related to transportation and traffic would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would slightly reduce development in the Plan Area, which would reduce traffic and its impacts, although the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant with mitigation incorporated.

Utilities and Service Systems

As noted in Section 3.18, Utilities and Service Systems, the proposed project's impacts related to utilities and service systems would be less than significant with the implementation of all applicable mitigation measures, policies, and regulations.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. This would slightly reduce population growth and development in the Plan Area, slightly reducing the demand for utilities services, although the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant with mitigation incorporated.

Wildfire

As noted in Section 3.19, Wildfire, the proposed project's impacts related to wildfire would be less than significant with the implementation of applicable policies and regulations. No mitigation is necessary.

Alternative 3 would result in less dense development in the area designated as Rural Cluster Residential because all farmland in this area would be preserved. The Plan Area does not contain any lands classified as Very High Fire Hazard Severity Zone.

Generally, development of rural land results in a reduced risk for wildfire spread because vegetation is removed. Alternative 3 would result in slightly less development than what was originally proposed. However, the majority of the Plan Area would be developed as proposed. As such, impacts under Alternative 3 would still be less than significant.

5.5.2 - Conclusion

Alternative 3, the Farmland Conservation Alternative, would have similar, but slightly less impacts to the proposed project's less than significant or no impacts associated with biological resources; cultural and tribal cultural resources; energy; geology, soils, and seismicity; hazards and hazardous materials; hydrology and water quality; land use; mineral resources; public services; recreation; transportation; utilities and service systems; and wildfire. The significant and unavoidable impacts related to aesthetics, light, and glare; agricultural resources and forestry resources; air quality; GHG emissions; and noise would remain significant and unavoidable. The significant and unavoidable impacts related to a conflict with the Valley Air District regional significant thresholds and a cumulatively considerable net increase in criteria pollutants would remain significant and unavoidable under Alternative 3.

For example, Alternative 3 would result in fewer homes than the proposed project, because land designated for residential uses would be conserved as farmland. However, although Alternative 3 would not fully reduce impacts to agriculture to below a level of significance, it would promote objectives related to Community Farming and Agriculture by preserving additional farmland to a greater degree than the proposed project.

5.6 - Environmentally Superior Alternative

CEQA Guidelines Section 15126(e)(2) requires identification of an environmentally superior alternative. If the No Project Alternative is environmentally superior, CEQA requires selection of the "environmentally superior alternative other than the No Project Alternative" among the project and the alternatives evaluated. The qualitative environmental effects of each alternative in relation to the proposed project are summarized in Table 5-1.

Table 5-1: Summary of Alternatives

Environmental Topic Area	Alternative 1: No Build Alternative	Alternative 2: Consolidated Business Park Alternative	Alternative 3: Farmland Conservation Alternative
Aesthetics, Light, and Glare	<=	<=	<=
Agricultural Resources and Forestry Resources	<=	<=	<=
Air Quality	<=	<=	<=
Biological Resources	<=	<=	<=
Cultural Resources and Tribal Cultural Resources	<=	<=	<=
Geology, Soils, and Seismicity	<=	<=	<=
Greenhouse Gas Emissions	<=	<=	<=
Hazards and Hazardous Materials	<=	<=	<=
Hydrology and Water Quality	<=	<=	<=
Land Use and Planning	<=	<=	>
Mineral Resources	<=	<=	<=
Noise	<=	<=	<=
Population and Housing	<=	<=	<=
Public Services	<=	<=	<=
Transportation and Traffic	<=	<=	<=
Utilities and Service Systems	<=	<=	<=
Wildfire	<=	<=	<=

Key:
Impact finding is the same as the proposed project: =
Impact finding is the same as the proposed project but slightly less impactful: <=
Impact finding is the same as the proposed project but slightly more impactful: >=
Impact finding is less than the proposed project: <
Impact finding is greater than the proposed project: >
Source: FirstCarbon Solutions (FCS) 2022.

CEQA Guidelines Section 15126(e)(2) requires an EIR to identify an environmentally superior alternative. If the No Project Alternative is the environmentally superior alternative, the EIR must also identify an environmentally superior alternative from among the other alternatives.

None of the alternatives analyzed would reduce the significant and unavoidable impacts related to Aesthetics, Light, and Glare; Agricultural Resources and Forestry Resources; Greenhouse Gas Emissions, and Noise, to below a level of significance although they would be incrementally less than the proposed project. Most of the less than significant impacts in other resources areas would be substantially similar; although incrementally less than the proposed project (with the exception of land use impacts under Alternative 3, which would be incrementally greater than the proposed project).

Alternative 1, the No Project Alternative, would not meet the project objectives. Alternatives 2 and 3 would meet many of the project objectives. The Consolidated Business Park Alternative is the environmentally superior alternative because it has similar, but slightly less, impacts as compared to the proposed project and meets the project objectives.

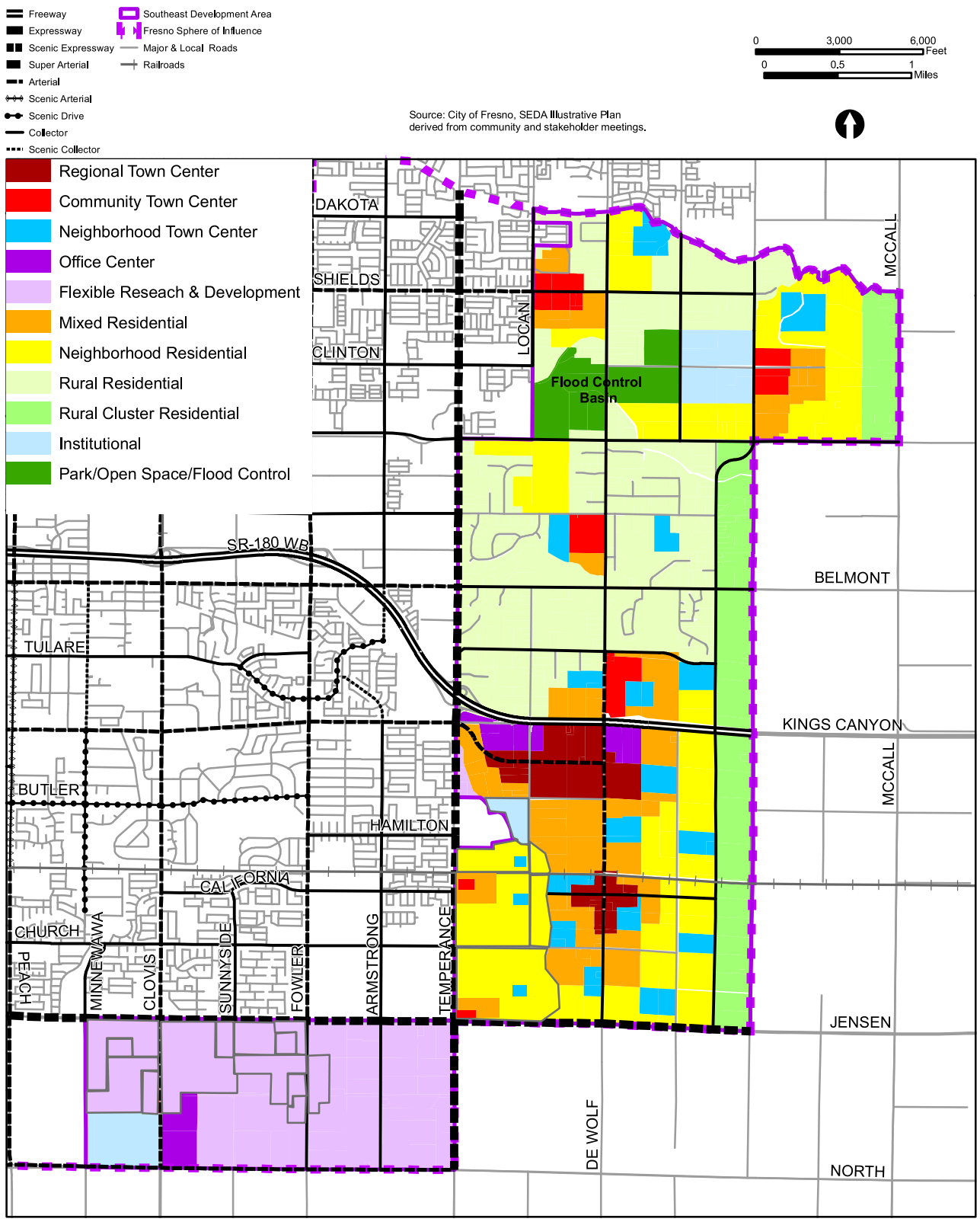
5.7 - Alternatives Rejected From Further Consideration

Section 15126.6(c) of the CEQA Guidelines requires EIRs to identify any alternatives that were considered by the lead agency but were rejected as infeasible for detailed study, and briefly explain the reasons underlying the lead agency's determination. Furthermore, Section 15126(f)(1) states that "among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries. . . and whether the proponent can reasonably acquire or control or otherwise have access to the alternative site. No one of these factors established a fixed limit on the scope of reasonable alternatives."

An increased residential density alternative that increased residential uses by 45,000 units in a different project location than the proposed SEDA was considered and rejected because it would not lessen any of the proposed project's impacts. There are no locations in the City where 45,000 homes could be constructed while avoiding environmetnal impacts to agricultural land. Agricultural land would be impacted regardless of where a large new residential development is located in the City. Therefore, no Location Alternative in the City is capable of avoiding the project's significant and unavoidable agriculture impact. For this reason, a location alternative is not considered further. Additionally, in this case, an alternative location does not constitute a feasible alternative because the project in question consists of a comprehensive specific plan for a 9,000-acre planning area. An alternative location would not meet the City's fundamental purpose of establishing a planning document that serves as the comprehensive land use planning document for the jurisdiction; as such, the geographical area encompassed by the plan is an immutable, fundamental characteristic. Thus, it is not possible to evaluate an alternative location.

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CONSOLIDATED BUSINESS PARK ALTERNATIVE

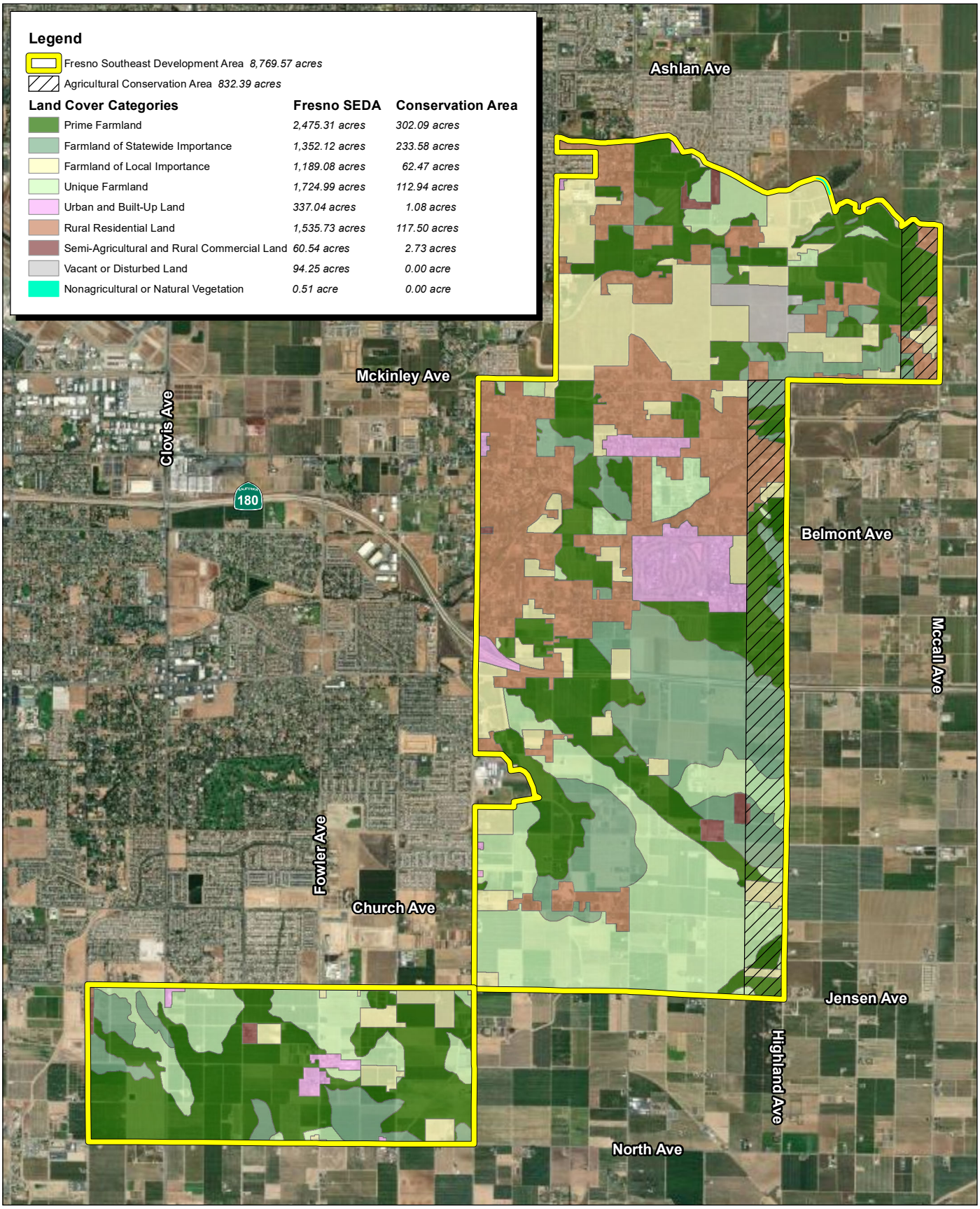


Source: City of Fresno

FIRSTCARBON SOLUTIONS™

Exhibit 5-1
Consolidated Business Park Alternative

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Source: ESRI Aerial Imagery. CA Department of Conservation Fresno County 2018

FIRSTCARBON SOLUTIONS™

4,600 2,300 0 4,600 Feet

Exhibit 5-2
Farmland Conservation Alternative

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CHAPTER 6: PERSONS AND ORGANIZATIONS CONSULTED/LIST OF PREPARERS

6.1 - Lead Agency

6.1.1 - City of Fresno

Planning and Development Department

Director ..... Jennifer Clark
Long Range Planning Supervisor ..... Sophia Pagoulatos
Planning Supervisor ..... Drew Wilson
Specific Plan Project Manager ..... Shawn Monk
GIS Specialist ..... Lachea Deamicis

Fire Department

Fire Chief ..... Kerri L. Dorris

Police Department

Police Chief ..... Paco Balderrama

Public Works Department

Director ..... Scott Mozier, PE

6.2 - List of Preparers

6.2.1 - Lead Agency

City of Fresno

Director ..... Jennifer Clark
Long Range Planning Supervisor ..... Sophia Pagoulatos
Planning Supervisor ..... Drew Wilson
Specific Plan Project Manager ..... Shawn Monk

6.2.2 - Lead Consultant

FirstCarbon Solutions

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Project Manager ..... Phil Ault
Assistant Project Manager ..... Rachel Krusenoski
Legal Counsel ..... Megan Starr, JD
Director of Cultural Resources ..... Dana DePietro, PhD, RPA
Historian/Cultural Resources Specialist ..... Ti Ngo
Field Manager (Cultural) ..... Natalie Adame
Director of Noise and Air Quality ..... Phil Ault

Senior Air Quality Scientist..... Jessica Coria
Air Quality Associate ..... Spencer Pignotti
Senior Biologist/Biology Lead ..... Bernhard Warzecha
Biologist..... Robert Carroll
Environmental Analyst ..... Stephanie Shepard
Environmental Analyst ..... Madelyn Dolan
Environmental Analyst ..... Kelly Evans
Environmental Analyst ..... Isobel Cooper
Environmental Analyst ..... Laura Campion
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Project Manager..... Louis Gonzalez, PE
Project Engineer ..... Zach Smith, PE

Economic & Planning Systems, Inc.

Principal ..... Amy Lapin
Senior Technical Associate ..... Allison Shaffer

Rose Strategic Communications

Founder/CEO. ..... Darren Rose
Chief Operations Officer and Project Manager..... Nick Kennedy

TJKM

Vice President ..... Chris Kinzel, PE
Transportation Planner ..... Arthur Chen

Appendix A:
EIR Noticing and Public Involvement

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A.1 - Notice of Preparation

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NOTICE OF PREPARATION

Date: February 22, 2022

To: State Clearinghouse and Interested Public Agencies, Parties, and Organizations

Subject: Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California

Lead Agency: City of Fresno

Contact: Jennifer Clark, Director, Planning and Development Department
c/o Shawn Monk, Planner, Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721
559.621.8166
Jennifer.Clark@fresno.gov
Shawn.Monk@fresno.gov

Comment Period: February 22, 2022, to March 25, 2022

PURPOSE OF NOTICE

The City of Fresno (Lead Agency and/or City) will prepare a Program Environmental Impact Report (Program EIR) for the proposed Southeast Development Area (SEDA) Specific Plan (proposed project), located in the City of Fresno. The Program EIR will address potential environmental and physical effects of the proposed project for each environmental topic listed in the California Environmental Quality Act (CEQA). The City of Fresno will use the Program EIR when considering approval of the proposed project. Pursuant to CEQA Guidelines Section 15082, the project history, description, location, and potential environmental effects of the project plan are described in the attached materials.

PUBLIC REVIEW PERIOD

The City is soliciting comments from public agencies, organizations, and members of the public regarding the scope and content of the Program EIR. In accordance with CEQA time regulations, the Notice of Preparation (NOP) 30-day period of public review will begin February 22, 2022, and will end on March 25, 2022. The City will hold a public scoping meeting to inform the public and interested agencies about the proposed project and solicit comments on the scope of the environmental factors addressed in the Program EIR, along with alternatives that are being considered. The meeting will be held on March 3, 2022, and will only be conducted electronically due to COVID-19 restrictions. Meeting details are as follows:

Web link: https://zoom.us/j/ 92678285600 Call-in Information: [(669) 900-9128

Webinar ID: 926 7828 5600

Meeting Date: March 3, 2022

Meeting Time: 6:00 p.m. to 8:00 p.m.

Because of COVID-19 restrictions, copies of the NOP may be reviewed at the following locations:

- Online at: https://www.fresno.gov/cityclerk/notices-publications/ or
- www.fresno.gov/SEDA

For information on additional viewing methods, contact Project Manager, Planning and Development Department, Summer Rooks, at Summer.Rooks@fresno.gov.

Your views and comments on how the project may affect the environment are welcomed and encouraged.

PROJECT LOCATION

The regional location of the nearly 9,000-acre SEDA Specific Plan Area (Plan Area) is in the southeast portion of the City, in Fresno County (County), California as shown in Exhibit 1. The Plan Area with the proposed land use designations in the proposed project, are shown in Exhibit 2. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the West by Locan, Temperance, and Minnewawa Avenues.

PROJECT HISTORY

The SEDA, previously known as the Southeast Growth Area (SEGA), was approved for incorporation into the City in 2006 by the Local Agency Formation Commission (LAFCo) with several provisions that included preparation of a Specific Plan and associated environmental assessment before any annexations of land to the City could be approved. The City initiated the process of preparing a Specific Plan for SEGA but put it aside amid the uncertainty of the recession in 2008. Concepts from the SEGA planning process were rolled into the current Fresno General Plan that was adopted in 2014. The Fresno General Plan includes the SEDA as one of several growth areas.

Located in Growth Area II, SEDA was conceived to be developed after other infill initiatives, to give those time to gain momentum. SEDA's later time frame is reflected in the General Plan's buildout numbers, which include one-third of SEDA's residential capacity (approximately 15,000 dwelling units out of a total 45,000 dwelling unit capacity) to accommodate Fresno's anticipated 2035 population. It is assumed that the remaining residential capacity of 30,000 dwelling units will not be developed until after 2035. While there is still ample residential capacity within the current city limits and in Growth Area I (which includes the Southwest Fresno and the West Area Neighborhoods Specific Plan areas),

there is a sense of urgency about the current housing crisis and the City's ability to provide housing for existing population and its natural growth as well as the unanticipated in-migration occurring at this time.

EXISTING CONDITIONS

The predominant use in the Plan Area is agriculture, with the primary crops being vineyards, orchards, and vegetables. The Plan Area also contains agriculture-related and commercial operations, such as plant nurseries, wineries, and other various agricultural businesses. The second most predominant use is rural residential development, which is primarily concentrated in the area between State Route (SR) 180 and McKinley Avenues, but also scattered throughout the Plan Area.

In addition to these uses, schools, churches, and other uses also occupy the Plan Area. The Plan Area includes land that falls within both the Sanger and Clovis Unified School Districts, with Fowler and Fresno Unified School Districts bordering the Plan Area. Clovis Unified is constructing an educational center for middle and high school students in the northern portion of the Plan Area on a site along the Clinton Avenue alignment between Leonard and Highland Avenues, with phased opening expected in 2025.

The current roadway network is mainly comprised of two-lane county roads at 0.5-mile intervals, interspersed with local streets. Major roadway access corridors include Temperance, Clovis, and Jensen Avenues. Each accommodate four lanes of traffic with a central turning lane. The SR-180 has been extended eastward along the old Kings Canyon alignment from Temperance Avenue to Academy Avenue in Sanger. This route extension provides an east–west connection to Interstate 5 (I-5), serving commuters and the movement of agricultural goods from eastern portion of the County. Temperance Avenue has been expanded to four lanes where needed to serve new development.

The Plan Area is traversed by several constructed drainage features and natural waterways: Gould Canal, Redbank Slough, Dry Creek Canal, Mill Ditch, Fancher Creek Canal, and Briggs Canal. Some canals in the Plan Area are mostly unvegetated and the banks are enforced with rock or broken asphalt and concrete, with some portions fully concrete-lined. In addition, there are several small ponds and numerous lateral irrigation ditches present that deliver water from the canals to agricultural fields.

PROJECT DESCRIPTION

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels.

The proposed project land use categories are shown in Table 1 along with the total proposed acreage. A description of the proposed project and these associated land use categories are provided in the discussion below.

Table 1: Proposed Specific Plan Estimated Acreages

Land Use	Proposed Plan Acres	Percentages
Mixed-Use Land Uses		
Regional Center	310	3.5%
Community Center	290	3.3%
Neighborhood Center	520	5.9%
Residential Land Uses		
Mixed Residential	1,090	12.4%
Neighborhood Residential	1,520	17.3%
Rural Residential	2,160	24.5%
Rural Cluster Residential	810	9.2%
Employment Land Uses		
Office Center	160	1.8%
Flexible Research and Development	1,380	15.7%
Institutional	280	3.2%
Other Land Uses		
Flood Control Basin	280	3.2%
TOTAL	*8,799*	*100%*
Notes: ** Rounded to the nearest acre. Figures may not sum due to rounding.*		

The SEDA Specific Plan

The proposed project provides a vision and implementation mechanisms for a sustainable future for the Southeast Development Area. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Vibrant Mixed-Use Town Centers

The proposed project is based upon a hierarchy of walkable Mixed-Use Town Centers supported by a multimodal transportation network. Town Centers, which would serve as commercial and civic focal points for the Plan Area, are designed to include a mix and intensity of uses. Town Centers are human-scaled and defined by quality design features and a rich mixture of uses. They incorporate living and working opportunities with entertainment, cultural activities, and shops serving the daily needs of residents and employees.

Regional Town Center

The Regional Town Center is at the top of the mixed-use center hierarchy in the Plan Area, serving 40,000 to 60,000 households across the site and within the surrounding communities. The Regional Town Center features region-serving retail and office activity, as well as medium- and higher-density housing. It is well served by a high-capacity transit service.

Community Town Centers

Seven Community Town Centers dispersed across the Plan Area would provide commercial, civic, and other services to meet the needs of Community Town Center residents and employees, as well as those of surrounding neighborhoods. Community Town Center services, including grocery stores, support between 5,000 and 10,000 households. Community Town Centers feature a variety of medium-density housing options. Some Community Town Centers are focused on major rapid transit stations.

Neighborhood Town Centers

Neighborhood Town Centers are dispersed throughout the Plan Area and would serve as focal points of adjacent residential areas. Neighborhood Centers include employment and residential uses, but primarily provide a majority of the Plan Area residents with essential walk, bike, transit, and short-drive access to civic services and amenities, including elementary schools, local parks, community gardens, and other services.

Each Neighborhood Town Center would serve approximately 1,500 to 2,000 households and include a range of housing options.

Diverse Residential Districts

The Plan Area includes a rich and complete fabric of residential communities that support mixed-use centers and include a variety of housing types and affordability levels. The proposed project would distribute a variety of housing across the Plan Area to accommodate current and future housing needs. The range of housing types and densities throughout the communities would provide flexibility to meet the evolving needs of households in the region.

Mixed Residential

Mixed Residential districts support the Regional and Community Town Centers with a variety of medium- and higher-density housing, including a diverse mix of attached and detached single-family and multi-family homes.

Neighborhood Residential

Neighborhood Residential districts surround Neighborhood Town Centers and support the retail, employment, and other services provided throughout the Plan Area. Neighborhood Residential areas include a variety of detached and attached single-family housing types, as well as multi-family housing options.

Rural Cluster Residential

Rural Cluster districts, located along the eastern edge of the Plan Area, concentrate residential lots within a small, clustered area of a larger parcel or groups of parcels. This clustering of homes preserves

the continuity and viability surrounding land for agricultural uses and open space conservation. Rural Cluster districts serve as a transitional buffer between more intense urban uses within the Plan Area and the commercial agricultural operations outside of the Plan Area.

Rural Residential

There are approximately 1,700 acres in the Plan Area currently developed as very low-density rural residential homes and ranchettes. These homes are designated in the proposed project as Rural Residential.

Innovative Employment Districts

The proposed project provides opportunities to attract diverse high-quality employers and job opportunities while meeting the environmental challenges associated with growth in the City and the Central Valley. Many jobs would be located within a short distance to amenities in Regional and Community Town Centers, Office Centers, and in Flexible Research and Development districts.

In these locations, they can be closely linked to regional transit service and trail systems. The proposed project would put a significant portion of Plan Area residents within walking distance of major employment areas and high-capacity transit service that links to regional employment centers, including Downtown Fresno.

Reducing reliance on the automobiles for work trips would significantly reduce greenhouse gas (GHG) emissions, playing a significant role in meeting the proposed project's sustainability goals.

Office Center

Office Center districts are located adjacent to Regional and Community Centers or along regionally significant transportation corridors (e.g., SR-180, Kings Canyon Boulevard, Clovis Avenue). Office Centers accommodate professional offices and compatible commercial uses such as restaurants, coffee shops, cafés, banks, and book shops. Some residential uses could be permitted in Office Centers.

Flexible Research and Development

Flexible Research and Development districts are primarily located west of the Briggs Canal and/or south of Jensen Avenue and are intended to contain uses such as research and development, light manufacturing, product testing centers, and office development. The area may also include compatible commercial uses such as restaurants, coffee shops, cafés, printing and publishing, dry cleaners, and other supporting businesses. Access to regional transportation corridors (both road and rail) is critical. Residential uses are not allowed in Flexible Research and Development areas.

Transportation Choices

The multimodal circulation network in the proposed project includes a hierarchy of transportation options, ensuring that residents would have real choices for their daily travel needs.

Complete Streets

The Plan Area will be served by a network of Complete Streets as defined by City's Complete Streets Policy adopted in 2019. A Complete Street is defined in the policy as a transportation facility that is

planned, designed, operated, and maintained to provide safe mobility for all users–including bicyclists, pedestrians, transit vehicles, trucks, and motorists–appropriate to the function and context of the facility while connecting to a larger transportation network.

Transit Service

Transit Corridors/arterials with high-capacity public transit would serve major town centers, while collectors and local streets provide safe, convenient options for local trips. The Kings Canyon high frequency Q Bus Route is planned to extend into the Regional Town Center and eventually terminate service in the Community Town Center located on South DeWolf Avenue.

Bicycle/Pedestrian Trails

A network of pedestrian and bicycle routes, including dedicated trails and multi-purpose paths will serve work, school, and recreational trips. This extensive non-auto travel network will be coordinated with existing and proposed regional trails. Trail systems connect regional and sub-regional destinations for bicyclists, pedestrians, and equestrians (where appropriate). Multiuse trails are parallel to canals and other east–west open space networks within the Plan Area.

There will also be a network of bicycle lanes reflective of the Fresno Active Transportation Plan (ATP). This will consist of at least Class II Bike Lanes and other bicycle facilities as described in the Caltrans Bikeway Classification Guide.

Open Spaces, Agriculture, and Green Infrastructure

The proposed project features an integrated system of natural and developed open spaces that would serve many vital uses, from recreation to community farming and agriculture, to stormwater management. The open space system is designed to be a valuable amenity accessible to the entire community.

Parks and Open Spaces

The proposed project's open space system provides places for active and passive recreation and includes corridors for trails and paths that connect many areas of the Plan Area.

Sustainable Infrastructure

Sustainable infrastructure components capture and retain runoff, then treat the water by allowing it to move slowly through natural systems, such as constructed wetlands and rock filters. Stormwater management systems help reduce impacts on the environment and regional infrastructure systems can also be designed as visual and active amenities for residents in the Plan Area.

Community Farming and Agriculture

The proposed project integrates community-scale farming and agriculture into the urban fabric. Agricultural activities range from neighborhood gardens to agricultural education, and from small farming operations in green belts to those on the rural cluster edge.

Setting the Stage for Implementation

The proposed project sets a vision for how the Plan Area would develop over time. It defines where Mixed-Use Town Centers, residential neighborhoods, and employment areas would be located, the types of travel options, and transit and roadway infrastructure that would serve and connect these areas. It also sets standards for how districts would be organized and how streets would be designed to enhance walkability and meet the needs of all users. The plan includes the targets established by State and federal policies that address water and energy conservation, reduced air quality and GHG emissions, available parks and open space, housing opportunities, and many other important elements.

The following components will be part of the planning process and will be required prior to construction:

1. Complete a phasing plan that would define the optimal sequence of development for various areas within SEDA.

2. Complete a comprehensive Infrastructure Plan. Working from the SEDA Land Use Plan as its starting point, the Infrastructure Plan will delineate the specific bounds and design of the Plan Area's overall flood control and green infrastructure plan; identify bicycle and pedestrian trail alignments; specify the location of high schools, middle schools, and elementary schools; establish the specific alignments of arterial, and collector roadways, and identify the location of major transit stations along transit routes and corridors. The plan will also include new sewer and water infrastructure needed to serve new development. This plan must be accompanied by a comprehensive and detailed financing and implementation strategy that includes the phasing and financing of development and all major infrastructure. The City would convene all requisite agencies in the development of the Infrastructure Plan, including the following, and others as required:

    - Fresno Municipal Flood Control District
    - Fresno Irrigation District
    - City of Fresno Department of Public Utilities Water Division, Wastewater Management Division, and Solid Waste Management Division
    - City of Fresno Department of Public Works Streets Division
    - City of Fresno Parks After School, Recreation, and Community Services Department
    - Clovis and Sanger Unified School Districts
    - Fresno Council of Governments
    - Fresno Area Express (FAX) transit agency
    - California Department of Transportation

3. **Address Annexation with Fresno County, the Local Agency Formation Commission, and the State of California.** This includes addressing all issues to allow strategic and proactive annexation into the City of designated portions of the Plan Area targeted for planned and financed extension of infrastructure development by the City. The typically fragmented annexations associated with incremental private development proposals, Memorandum of Understanding (MOU), and inter-jurisdictional competition would not promote the coherent, sustainable, and fiscally sound development of the proposed project.

4. **General Plan Amendment and Development Code Change.** Amend the General Plan and Development Code to implement the land use and zoning described in the proposed project.

RESPONSIBLE AGENCIES

For the purposes of CEQA, the term "Responsible Agency" includes all public agencies other than the Lead Agency (that have discretionary approval power over the proposed project) (State CEQA Guidelines § 15381).

Discretionary approval may include such actions as issuance of a permit, authorization, or easement needed to complete some aspect of the proposed project. Responsible agencies may include, but are notlimited to:

- California Department of Transportation (Caltrans)
- California State Water Resources Control Board (State Water Board)
- California Department of Fish and Wildlife (CDFW)
- Central Valley Regional Water Quality Control Board (Central Valley RWQCB)
- Fresno Local Agency Formation Commission (LAFCo)
- San Joaquin Valley Air Pollution Control District (Valley Air District)
- Fresno Municipal Flood Control District
- Fresno Irrigation District

AREAS OF POTENTIAL ENVIRONMENTAL EFFECTS

The Program EIR will analyze the significant environmental effects associated with adoption and implementation of the proposed project. Specific areas of analysis would include the following topics based on Appendix G of the State CEQA Guidelines:

- Aesthetics
- Agricultural and Forestry Services
- Air Quality
- Biological Resources
- Cultural/Tribal Cultural Resources
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services

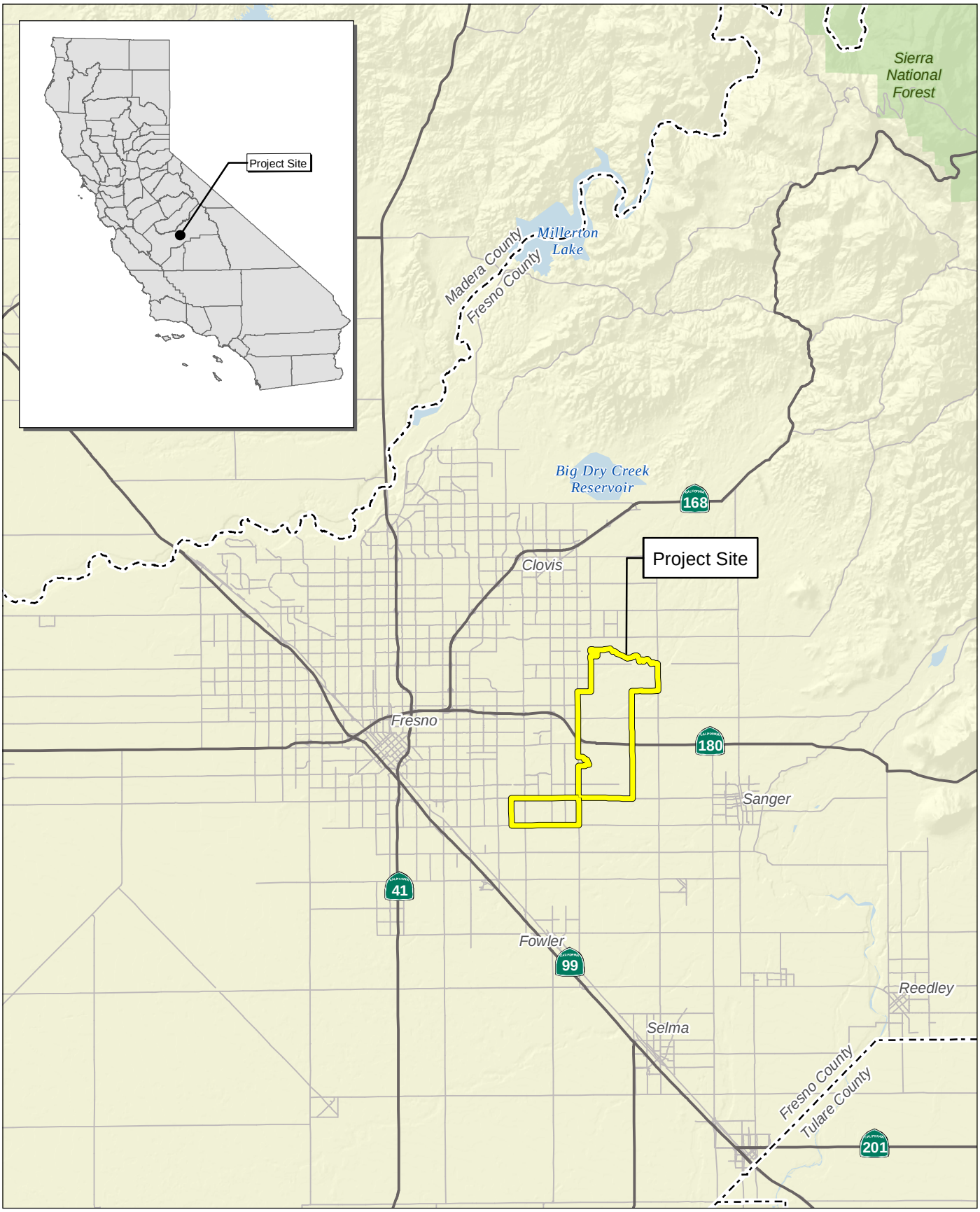
- Energy
- Geology and Soils
- Greenhouse Gas Emissions and Climate Change
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Recreation
- Transportation
- Utilities and Service Systems
- Wildfire
- Mandatory Findings of Significance

The Program EIR will also include a discussion of environmental justice issues and identify and evaluate a range of reasonable alternatives to the proposed project, including a No Project Alternative, pursuant to CEQA Guidelines.

SUBMITTING COMMENTS

Comments and suggestions as to the appropriate scope of analysis in the Program EIR are invited from all interested parties. Written comments or questions concerning the Program EIR for the proposed project should bedirected to the City's Environmental Project Manager at the following address by 5:00 p.m. on March 25, 2022. Please include the commenter's full name and address.

Jennifer Clark, Director, Planning and Development Department
c/o Shawn Monk, Planner, Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721
559.621.8031
Jennifer.Clark@fresno.gov
Shawn.Monk@fresno.gov



Source: Census 2000 Data, The California Spatial Information Library (CaSIL). City of Fresno, SEDA Regulating Districts.

FIRSTCARBON SOLUTIONS™

5 2.5 0 5 Miles

Exhibit 1
Regional Location Map

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CITY OF FRESNO
SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN
NOTICE OF PREPARATION

SEDA PROPOSED LAND USE

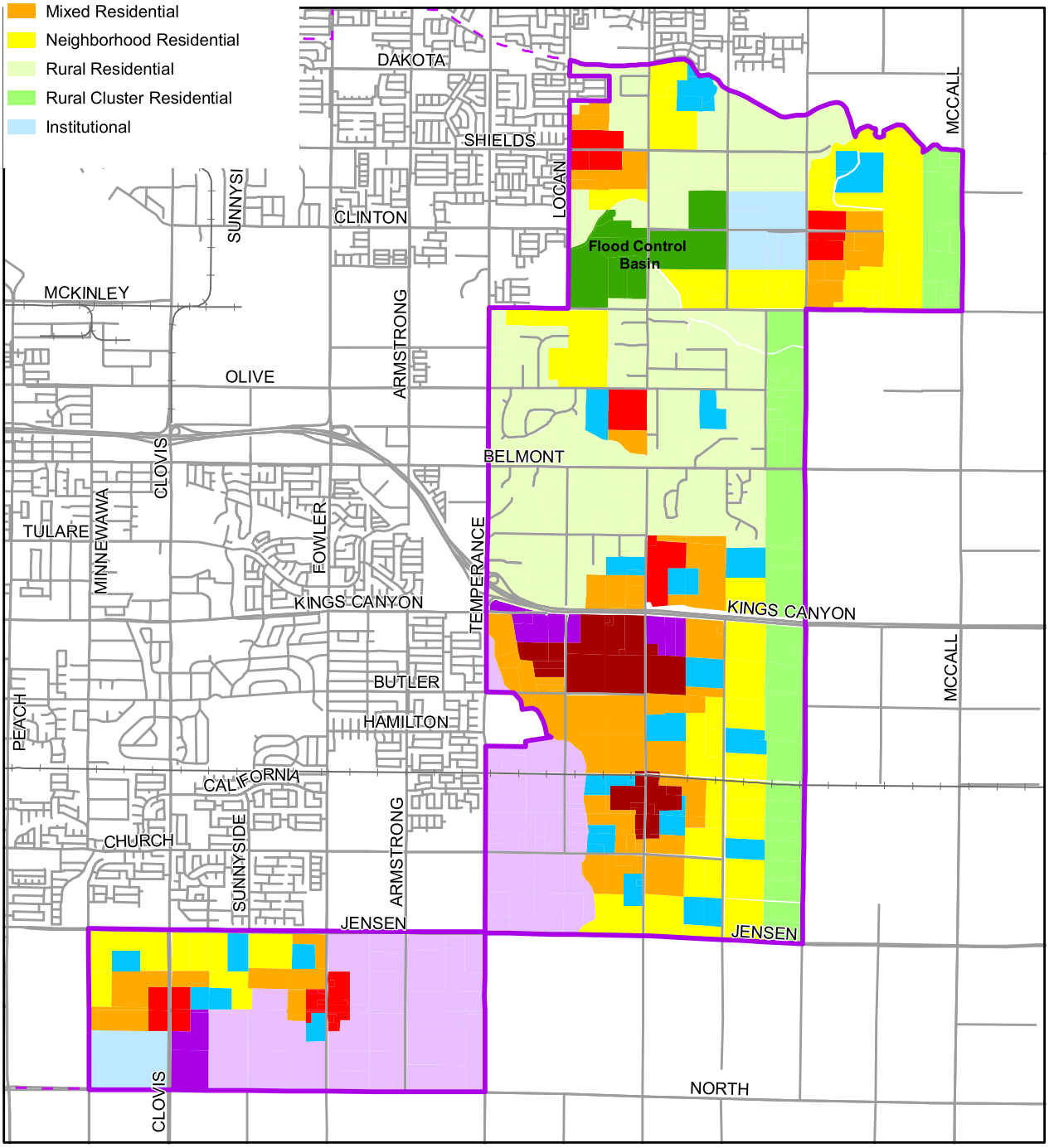
Legend

- Regional Center
- Community Center
- Neighborhood Center
- Office Center
- Flexible Reseach & Development
- Mixed Residential
- Neighborhood Residential
- Rural Residential
- Rural Cluster Residential
- Institutional

- Fresno Southeast Development Area
- Fresno Sphere of Influence
- Major & Local Roads

0 3,000 6,000 Feet
0 0.5 1 Miles

Source: City of Fresno, SEDA Illustrative Plan derived from community and stakeholder meetings.



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

FIRSTCARBON SOLUTIONS™

Exhibit 2
Specific Plan Map

A.2 - NOP Public Scoping Comments

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Rachel Krusenoski

From: Secrest Jr., William <William.Secrest@fresnolibrary.org>
Sent: Thursday, February 24, 2022 4:03 PM
To: Shawn Monk
Cc: Coletti, Karen
Subject: Notice of Preparation for SEDA EIR

Follow Up Flag: Follow up
Flag Status: Flagged

External Email: Use caution with links and attachments

On behalf of the Fresno County Historical Landmarks and Records Advisory Commission, I'm responding to your February 22 Notice of Preparation and Scoping Meeting for the above.

Please keep us informed of all developments related to the CEQA-mandated analysis of cultural/tribal cultural resources, as outlined on p. 9 of your Notice. The SEDA encompasses a large swath of area that might include houses and structures of historical interest, in excess of 100 years of age, with an outside possibility of Yokuts artifacts present.

We are also available to assist any individuals who compile the EIR itself.

Thank you for your consideration.

Bill Secrest, Librarian
Heritage Center
Fresno County Public Library

MARCH 14, 2022

VIA EMAIL: JENNIFER.CLARK@FRESNO.GOV; SHAWN.MONK@FRESNO.GOV
Jennifer Clark, Director, Planning and Development Department
c/o Shawn Monk, Planner, Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721

Dear Ms. Clark and Mr. Monk:

NOTICE OF PREPARATION OF THE ENVIRONMENTAL IMPACT REPORT FOR THE SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN PROJECT, SCH#2022020486

The Department of Conservation's (Department) Division of Land Resource Protection (Division) has reviewed the Notice of Preparation of the Environmental Impact Report for the Southeast Development Area Specific Plan Project (Project). The Division monitors farmland conversion on a statewide basis, provides technical assistance regarding the Williamson Act, and administers various agricultural land conservation programs. We offer the following comments and recommendations with respect to the project's potential impacts on agricultural land and resources.

Project Description

The proposed project is a Specific Plan for the Southeast Development Area (Plan Area) that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Department Comments

The conversion of agricultural land represents a permanent reduction and significant impact to California's agricultural land resources. CEQA requires that all feasible and

reasonable mitigation be reviewed and applied to projects. Under CEQA, a lead agency should not approve a project if there are feasible alternatives or feasible mitigation measures available that would lessen the significant effects of the project.

All mitigation measures that are potentially feasible should be included in the project's environmental review. A measure brought to the attention of the lead agency should not be left out unless it is infeasible based on its elements.

Consistent with CEQA Guidelines, the Department recommends the County consider agricultural conservation easements, among other measures, as potential mitigation. (See Cal. Code Regs., tit. 14, § 15370 [mitigation includes "compensating for the impact by replacing or providing substitute resources or environments, including through permanent protection of such resources in the form of conservation easements."])

Mitigation through agricultural easements can take at least two forms: the outright purchase of easements or the donation of mitigation fees to a local, regional, or statewide organization or agency whose purpose includes the acquisition and stewardship of agricultural easements. The conversion of agricultural land should be deemed an impact of at least regional significance. Hence, the search for replacement lands should not be limited strictly to lands within the project's surrounding area.

A helpful source for regional and statewide agricultural mitigation banks is the California Council of Land Trusts. They provide helpful insight into farmland mitigation policies and implementation strategies, including a guidebook with model policies and a model local ordinance. The guidebook can be found at:

California Council of Land Trusts

Of course, the use of conservation easements is only one form of mitigation that should be considered. Any other feasible mitigation measures should also be considered. Indeed, the recent judicial opinion in King and Gardiner Farms, LLC v. County of Kern (2020) 45 Cal.App.5th 814 ("KG Farms") holds that agricultural conservation easements on a 1 to 1 ratio are not alone sufficient to adequately mitigate a project's conversion of agricultural land. KG Farms does not stand for the proposition that agricultural conservation easements are irrelevant as mitigation. Rather, the holding suggests that to the extent they are considered, they may need to be applied at a greater than 1 to 1 ratio, or combined with other forms of mitigation (such as restoration of some land not currently used as farmland).

Conclusion

The Department recommends further discussion of the following issues:

- Type, amount, and location of farmland conversion resulting directly and indirectly from implementation of the proposed project.

- Impacts on any current and future agricultural operations in the vicinity; e.g., land-use conflicts, increases in land values and taxes, loss of agricultural support infrastructure such as processing facilities, etc.
- Incremental impacts leading to cumulative impacts on agricultural land. This would include impacts from the proposed project, as well as impacts from past, current, and likely future projects.
- Proposed mitigation measures for all impacted agricultural lands within the proposed project area.
- Projects compatibility with lands within an agricultural preserve and/or enrolled in a Williamson Act contract.
- If applicable, notification of Williamson Act contract non-renewal and/or cancellation.

Thank you for giving us the opportunity to comment on the Notice of Preparation of the Environmental Impact Report for the Southeast Development Area Specific Plan Project. Please provide this Department with notices of any future hearing dates as well as any staff reports pertaining to this project. If you have any questions regarding our comments, please contact Farl Grundy, Associate Environmental Planner via email at Farl.Grundy@conservation.ca.gov.

Sincerely,

Monique Wilber

Monique Wilber

Conservation Program Support Supervisor

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State of California – Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE
Central Region
1234 East Shaw Avenue
Fresno, California 93710
(559) 243-4005
www.wildlife.ca.gov

GAVIN NEWSOM, Governor
CHARLTON H. BONHAM, Director

March 25, 2022

Shawn Monk, Planner
City of Fresno
2600 Fresno St, Room 3065
Fresno, California 93721
Shawn.Monk@fresno.gov

Subject: Southeast Development Area Specific Plan (Project)
Notice of Preparation (NOP)
SCH No.: 2022020486

Dear Mr. Monk:

The California Department of Fish and Wildlife (CDFW) received a NOP from the City of Fresno for the above-referenced Project pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.[1]

Thank you for the opportunity to provide comments and recommendations regarding those activities involved in the Project that may affect California fish and wildlife. Likewise, CDFW appreciates the opportunity to provide comments regarding those aspects of the Project that CDFW, by law, may be required to carry out or approve through the exercise of its own regulatory authority under Fish and Game Code.

CDFW ROLE

CDFW is California's **Trustee Agency** for fish and wildlife resources and holds those resources in trust by statute for all the people of the State (Fish & G. Code, §§ 711.7, subd. (a) & 1802; Pub. Resources Code, § 21070; CEQA Guidelines § 15386, subd. (a)). CDFW, in its trustee capacity, has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and habitat necessary for biologically sustainable populations of those species (*Id*., § 1802). Similarly, for purposes of CEQA, CDFW is charged by law to provide, as available, biological expertise during public agency environmental review efforts, focusing specifically on projects and related activities that have the potential to adversely affect fish and wildlife resources.

[1] CEQA is codified in the California Public Resources Code in section 21000 et seq. The "CEQA Guidelines" are found in Title 14 of the California Code of Regulations, commencing with section 15000.

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CDFW is also submitting comments as a **Responsible Agency** under CEQA (Pub. Resources Code, § 21069; CEQA Guidelines, § 15381). CDFW expects that it may need to exercise regulatory authority as provided by the Fish and Game Code. As proposed, for example, the Project may be subject to CDFW's lake and streambed alteration regulatory authority (Fish & G. Code, § 1600 et seq.). Likewise, to the extent implementation of the Project as proposed may result in "take" as defined by State law of any species protected under the California Endangered Species Act (CESA) (Fish & G. Code, § 2050 et seq.), related authorization as provided by the Fish and Game Code may be required.

PROJECT DESCRIPTION SUMMARY

Proponent: City of Fresno

Objective: The proposed project is a Specific Plan for the Southeast Development Area (SEDA) that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. The proposed project land use categories are shown in Table 1 (below) along with the total proposed acreage.

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Other Land Uses		
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TOTAL	*8,799*	*100%*
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DocuSign Envelope ID: 7EB6AFEE-6B04-4A06-B79A-94949170702E

Figures may not sum due to rounding.		

The SEDA Specific Plan
The proposed project provides a vision and implementation mechanisms for a sustainable future for the SEDA. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Location: The regional location of the nearly 9,000-acre SEDA Specific Plan Area (Plan Area) is in the southeast portion of the City, in Fresno County (County), California. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the West by Locan, Temperance, and Minnewawa Avenues.

Timeframe: The proposed project would be implemented over approximately 28 years, through the horizon year of 2050 per Project information.

COMMENTS AND RECOMMENDATIONS

After reviewing the NOP document, CDFW has concerns regarding potential Project impacts to the following.

CDFW is concerned regarding potential impacts to special-status species including, but not limited to, the State and federally endangered California jewelflower (*Caulanthus californicus*), San Joaquin adobe sunburst (*Pseudobahia peirsonii*), San Joaquin kit fox (*Vulpes macrotis mutica*), and least Bell's vireo (*Vireo bellii pusillus*); the State endangered and federally threatened succulent owl's clover (*Castilleja campestris var. succulenta*), western yellow-billed cuckoo (*Coccyzus americanus occidentalis*); the federally endangered valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*); the federally threatened vernal pool fairy shrimp (*Branchinecta lynchi*); the State and federally threatened California tiger salamander (*Ambystoma californiense*); the State threatened Swainson's hawk (*Buteo swainsoni*) and tricolored blackbird (*Agelauis tricolor*); the State species of special concern burrowing owl (*Athene cunicularia*), western spadefoot (*Spea hammondii*), western pond turtle (*Emys* marmorata), American badger (*Taxidea taxus*), and coast horned lizard (*Phrynosoma blainvillii*).

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Special-status species may occur in previously disturbed agricultural lands, orchards, pasture, and row and field crops as well as the undisturbed areas occurring within the Project area. Based on the information provided in the NOP, CDFW cannot determine the extent of impacts that are likely to occur to fish and wildlife resources, or what mitigation measures may be necessary to reduce impacts to less than significant and/or avoid unauthorized take of species listed pursuant to CESA. Therefore, CDFW recommends that the EIR prepared for the Project analyze potential impacts for all of the previous listed species and what, if any, mitigation measures are necessary to reduce impacts to less than significant.

CDFW appreciates the opportunity to comment on the Project to assist the City of Fresno in identifying and mitigating the Project's impacts on biological resources. We are happy to meet with you to discuss the Project, our recommended mitigation measures, and/or consider alternative measures. If you have any questions, please contact Kelley Nelson, Environmental Scientist, at the address provided on this letterhead, or by electronic mail at Kelley.Nelson@wildlife.ca.gov.

Sincerely,

DocuSigned by:
Julie Vance
FA83F09FE08945A...

Julie A. Vance
Regional Manager

ec: Patricia Cole
United States Fish and Wildlife Service
Patricia.Cole@fws.gov

Department of Toxic Substances Control

Jared Blumenfeld
Secretary for
Environmental Protection

Meredith Williams, Ph.D.
Director
8800 Cal Center Drive
Sacramento, California 95826-3200

Gavin Newsom
Governor

March 15, 2022

Mr. Shawn Monk
Planner
City of Fresno
2600 Fresno Street, Suite 3065
Fresno, CA 93721
Shawn.Monk@fresno.gov

NOTICE OF PREPARATION OF A PROGRAM ENVIRONMENTAL IMPACT REPORT FOR THE SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN – DATED FEBRUARY 22, 2022 (STATE CLEARINGHOUSE NUMBER: 2022020486)

Dear Mr. Monk:

The Department of Toxic Substances Control (DTSC) received a Notice of Preparation of a Program Environmental Impact Report (EIR) for the Southeast Development Area Specific Plan (Project). The Lead Agency is receiving this notice from DTSC because the Project includes one or more of the following: groundbreaking activities, work in close proximity to a roadway, work in close proximity to mining or suspected mining or former mining activities, presence of site buildings that may require demolition or modifications, importation of backfill soil, and/or work on or in close proximity to an agricultural or former agricultural site.

DTSC recommends that the following issues be evaluated in the Hazards and Hazardous Materials section of the EIR:

1. The EIR should acknowledge the potential for historic or future activities on or near the project site to result in the release of hazardous wastes/substances on the project site. In instances in which releases have occurred or may occur, further studies should be carried out to delineate the nature and extent of the contamination, and the potential threat to public health and/or the environment should be evaluated. The EIR should also identify the mechanism(s) to initiate any required investigation and/or remediation and the government agency who will be responsible for providing appropriate regulatory oversight.

2. Refiners in the United States started adding lead compounds to gasoline in the 1920s in order to boost octane levels and improve engine performance. This practice did not officially end until 1992 when lead was banned as a fuel additive in California. Tailpipe emissions from automobiles using leaded gasoline contained lead and resulted in aerially deposited lead (ADL) being deposited in and along roadways throughout the state. ADL-contaminated soils still exist along roadsides and medians and can also be found underneath some existing road surfaces due to past construction activities. Due to the potential for ADL-contaminated soil DTSC, recommends collecting soil samples for lead analysis prior to performing any intrusive activities for the project described in the EIR.

3. If buildings or other structures are to be demolished on any project sites included in the proposed project, surveys should be conducted for the presence of lead-based paints or products, mercury, asbestos containing materials, and polychlorinated biphenyl caulk. Removal, demolition and disposal of any of the above-mentioned chemicals should be conducted in compliance with California environmental regulations and policies. In addition, sampling near current and/or former buildings should be conducted in accordance with DTSC's 2006 *Interim Guidance Evaluation of School Sites with Potential Contamination from Lead Based Paint, Termiticides, and Electrical Transformers*.

4. If any projects initiated as part of the proposed project require the importation of soil to backfill any excavated areas, proper sampling should be conducted to ensure that the imported soil is free of contamination. DTSC recommends the imported materials be characterized according to *DTSC's 2001 Information Advisory Clean Imported Fill Material*.

5. If any sites included as part of the proposed project have been used for agricultural, weed abatement or related activities, proper investigation for organochlorinated pesticides should be discussed in the EIR. DTSC recommends the current and former agricultural lands be evaluated in accordance with DTSC's 2008 *Interim Guidance for Sampling Agricultural Properties (Third Revision)*.

DTSC appreciates the opportunity to comment on the EIR. Should you need any assistance with an environmental investigation, please visit DTSC's Site Mitigation and Restoration Program page to apply for lead agency oversight. Additional information regarding voluntary agreements with DTSC can be found at DTSC's Brownfield website.

If you have any questions, please contact me at (916) 255-3710 or via email at Gavin.McCreary@dtsc.ca.gov.

Sincerely,



Gavin McCreary
Project Manager
Site Evaluation and Remediation Unit
Site Mitigation and Restoration Program
Department of Toxic Substances Control

cc: (via email)

Governor's Office of Planning and Research
State Clearinghouse
State.Clearinghouse@opr.ca.gov

Mr. Dave Kereazis
Office of Planning & Environmental Analysis
Department of Toxic Substances Control
Dave.Kereazis@dtsc.ca.gov

California Department of Transportation

DISTRICT 6 OFFICE
1352 WEST OLIVE AVENUE | P.O. BOX 12616 | FRESNO, CA 93778-2616
(559) 981-1041 | FAX (559) 488-4195 | TTY 711
www.dot.ca.gov

March 18, 2022

FRE-180-R65.1
NOTICE OF PREPARATION, EIR
https://ld-igr-gts.dot.ca.gov/district/6/report/25659

SENT VIA EMAIL
Shawn Monk, Planner
City of Fresno
Long Range Planning Division
Office: 559-621-8031
shawn.monk@fresno.gov

Dear Mx. Monk,

Thank you for the opportunity to review the Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan. The proposed Southeast Development Area covers nearly 9,000 acres and has the potential to accommodate approximately 45,000 homes by the year 2050. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the West by Locan, Temperance, and Minnewawa Avenues.

Caltrans provides the following comments consistent with the State's smart mobility goals that support a vibrant economy and sustainable communities:

1. Caltrans anticipates this development area would add substantial traffic to the State Route 180 interchanges at Clovis Avenue, Fowler Avenue, and Temperance Avenue. The result could be significant speed differentials between the off-ramp queues and the mainline of the freeway. **It is highly recommended that a peak hour ramp queue analysis is completed at each of these interchanges to determine potential impacts.**

2. This development area would also be expected to add traffic to the State Route 180 intersections at De Wolf Avenue, Highland Avenue, and McCall Avenue. The result could be significant speed differentials between the turn lane queues and the through lane traffic caused by insufficient left turn lanes or intersection control. **Therefore, it is also recommended that a peak hour queue analysis is completed at each of these intersections to determine potential impacts.**

3. Future development(s) should also consider traffic safety impacts on the State Highway System due to new pedestrian and bicyclist needs based on new origins or destinations that intersect a State Route. Additionally, multimodal conflict points and change in traffic composition (such as an increase in bicyclists or pedestrians, where features such as shoulders or sidewalks may not exist or are inconsistent with facility design) should be included. The State Route 180 interchanges at Fowler Avenue and Temperance Avenue; and the State Route 180 intersections at De Wolf Avenue, Highland Avenue, and McCall

Avenue should be included in this analysis.

4. Future development(s) should conduct a Vehicle Miles Traveled (VMT) study for projects that may substantially induce Vehicle Miles Traveled (VMT). Pedestrian and bicycle facilities within the project site should be considered in this study. The project proponents should also consider coordinating with nearby planned bike networks for a larger active transportation network. The City should consider creating a VMT Mitigation Impact Fee to help reduce potential impacts on the State Highway System.

5. For future residential development, Caltrans recommends project proponents consider working with the City to convert a portion of the planned residential units to affordable housing units.

6. The City should establish policies for the installation of Level 2 Electric Vehicle (EV) charging for single- and multi-family residential units as well as DC Fast Charging EV charging stations for retail, commercial, park and public facilities.

7. Caltrans recommends the Project implement multimodal strategies, such as those that originate from Transit-oriented development (TOD), in an effort to further reduce future projects' traffic related impacts.

8. Active Transportation Plans and Smart Growth efforts support the state's 2050 Climate goals. Caltrans supports reducing VMT and GHG emissions in ways that increase the likelihood people will use and benefit from a multimodal transportation network.

9. Early engagement with Caltrans is highly requested for future projects that would impact state right-of-way. Furthermore, prior to initiating the traffic study, please include Caltrans in the scoping.

If you have any other questions, please call or email Edgar Hernandez at (559) 981-7436 or edgar.hernandez@dot.ca.gov.

Sincerely,

David Padilla, Branch Chief
Transportation Planning – North

CARPENTERS 701
FRESNO, CALIFORNIA
United Brotherhood of Carpenters & Joiners of America

March 25, 2022

VIA EMAIL AND OVERNIGHT MAIL

Jennifer Clark, Director, Planning and
Development Department
c/o Shawn Monk, Planner, Planning and
Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721
Jennifer.Clark@fresno.gov
Shawn.Monk@fresno.gov

Re: Carpenters Local 701 - Comment on Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California

Dear Ms. Clark:

Carpenters Local 701 is presenting this comment to request that the County add mandatory local hire and apprenticeship language to the economic development, land use, and environmental justice elements of the Specific Plan for the proposed Southeast Development Area (SEDA). Such language would greatly assist in achieving the California Environmental Quality Act (CEQA) goals required for the SEDA's EIR. This letter presents the mandatory language that the Carpenters seek and assesses how this language is consistent with the stated goals of the SEDA and CEQA and why it assists the County in compliance with certain statutorily mandatory provisions of a local general plan.

The Carpenters propose that the Specific Plan for the SEDA include the following as mandatory language in the economic development and environmental justice elements of the Report.

Apprenticeship:

For every apprenticeable craft, the construction contractor participates in a Joint Apprenticeship Program Approved by the State of California, Division of Apprenticeship Standards **OR** in an apprenticeship program approved by the State of California Division of Apprenticeship Standards that has a graduation rate of 50% or higher or has graduated an average of at least thirty (30) apprentices over the five (5) years immediately preceding submission of the pre-qualification documents. A construction contractor without construction craft employees shall show a

contractual obligation that its subcontractors so comply. Any change in participation must be immediately provided to the City of Fresno. Construction contractors shall maintain compliance with this provision until project completion.

Local Hire Policy:

Each construction contractor will hire a minimum of twenty-five percent (25%) of staff for each apprenticeable craft job classification with more than four (4) employees employed whose primary residence, which is not a post office box, has been within the Counties of Fresno, Kings, Madera or Tuolumne for at least 180 days immediately prior to the expected date of issuance of the Notice to Proceed for the project. A construction contractor without construction craft employees shall show a contractual obligation that all of its subcontractors so comply. Construction contractors shall maintain compliance with this provision until project completion.

Fresno County should also require all projects above 20,000 square feet in the aggregate to hire local people and to train them with proper state certified legitimate apprenticeship programs. Local hire and apprenticeship requirements mitigate the environmental impact of development, enhance reaching the policy goals and assist in complying with economic development and environmental justice CEQA requirements.

The Notice of Preparation (NOP) for the SEDA's EIR and the SEDA's webpage imply that four of the biggest challenges and objectives for SEDA's Specific Plan are improving factors of local economics, land use, transportation, and environmental justice. Taken together, mandatory local hire and apprenticeship requirements greatly enhance the County's development policy goals and state CEQA requirements for all four policy objectives of the SEDA.

Including apprenticeship and local hire requirements will expand the Fresno economy and help meet the General Plan's land use element. Workers on SEDA projects that live in Fresno or the four County area are members of the local community. The developments will improve the local quality of life if the people that build the projects do not leave every night. They will also spend the money they earn locally. That spending will generally improve the local economy. Local jobs will provide workers with the resources and job security to improve their quality of life in the short-term. The jobs will also provide workers the resources to move into SEDA housing or housing that becomes vacant due to others moving into the SEDA. These housing trends will reduce burdens on affordable housing and increasing home-ownership in the County. Finally, ensuring Fresno projects employ Fresno residents lowers the County's unemployment rate and increases the County's economic strength.

Local hire and apprenticeship also easily and clearly meet the needs of the transportation element of the SEDA plan. The Draft Fresno County General Plan Background Report finds that traffic volumes in Fresno County have increased substantially and will continue to do so. 5:15-5:17. 44% of Fresno residents commute more than 10 miles each way to work. If current trends continue, this will get worse. 5:29. Worse yet, the demand for automobile travel will increase. 5:71-5:79. Construction job growth has increased 3.8% annually through 2022—the fastest growing job sector in the County. 2:26, 2:30-2:31. A local hire and apprenticeship requirement will reduce the

impact of construction workers traveling from outside the four county area, thereby easing the impact on road use and reducing the environmental costs related to long commutes.

Further, local hire and apprenticeship will positively affect the environmental justice goals of the SEDA plan. 3:170. State law provisions adopted by Senate Bill 244 and Senate Bill 1000 require all EIRs to address environmental justice. One measure of environmental justice is the Enviro Score. Viable apprenticeship training and making work available in Fresno County directly impact four of the elements of the Enviro Score. Those elements are education, poverty, unemployment, and housing burden. 3:70-3:76. Training local workers and reserving local jobs for those workers will improve education and reduce poverty unemployment and the housing burden. The Enviro Score would improve dramatically because the score on four of the elements would increase. 3:85-3:143.

A local hire and apprenticeship requirement will also assist the goal of environmental justice because it will reduce the downward pressure on construction wages and reserve the building trades' work for local residents. From 2011-2015 the average annual wages in the construction and extractions sector dropped from an average of $46,418.00 a year to $44,386.00 a year. 2:401. Construction workers with higher skill level earn higher wages. The SEDA Specific Plan section of the EIR's NOP provides there will be a substantial amount of transportation infrastructure construction for commercial and residential development. A local hire and apprenticeship requirement would enhance local participation. 3:26-3:27, 3:50, 3:69. Doing that work with local skilled workers will substantially reduce the environmental impact and positively affect the environmental justice goals of the next General Plan. 5:1, generally.

Carpenters Local 701 urges the City of Fresno to adopt the local hire and apprenticeship prequalification standards proposed. Mandatory local hire and apprenticeship prequalification requirements would help the City achieve its environmental goals for the SEDA specific plan. A local hire policy is a critical part of sustainable building and development, while also minimizing vehicle trips and reducing greenhouse gas emissions. Apprenticeship utilization will assure an adequate skilled workforce to meet the infrastructure industrial and housing goals of the General Plan. Carpenters Local 701 looks forward to working with the City and its staff as you consider the project and further prepare the SEDA specific plan.

Please contact me if you have any questions or concerns.

Sincerely,

T Alexander

Travis Alexander
Carpenters Local 701

132325\1256793

Voicemail left from 559-554-5433

From Dirk Charlie, Dunlap Mono Tribal Liaison

Dunlap Mono Tribe, Dunlap, CA

Voicemail transcript as follows: The Dunlap Mono Tribe has no comments for the SEDA area. There is no knowledge of historical or cultural resources for the Dunlap Mono Tribe in this area of the Central Valley, CA. I suggest you contact the following tribes and ask if they are aware of any Historical and/or Cultural resources in the SEDA area:

- Table Mountain Ranch
- Big Sandy
- Traditional Transundi Tribe

2907 S. Maple Avenue
Fresno, California 93725-2208
Telephone: (559) 233-7161
Fax: (559) 233-8227

CONVEYANCE. COMMITMENT. CUSTOMER SERVICE.

March 25, 2022

Jennifer Clark
Development and Resource Management Department
City of Fresno
2600 Fresno Street, Room 3065
Fresno, CA 93721

RE: Notice of Preparation of a Program Environmental Impact Report of the Southeast Development Area Specific Plan for the City of Fresno
FID Facilities: Various

Dear Ms. Clark:

The Fresno Irrigation District (FID) has reviewed the Notice of Preparation of a Program Environmental Impact Report of the Southeast Development Area Specific Plan for the City of Fresno (Project). We appreciate the opportunity to review and comment on the subject documents for the proposed project. FID's comments are as follows:

Impacted Facilities

1. FID has many canals within the Project Area as shown on the attached FID exhibit map. The facilities include: Fresno No. 3, Fancher No. 6, Mill No. 36, Briggs No. 7, Gould No. 97, Gray Colony No. 111, Eisen No. 11, Temperance No. 37, Hanson No. 129, East Branch No. 5, and Kutner Colony S. Br. No. 329. FID's canals range from smaller diameter pipelines to large open canals. In most cases, the existing facilities will need to be upgraded to meet then-current urban standards or relocated by the developer to accommodate new urban developments which will require new pipelines and new exclusive easements. FID will impose the same conditions on future projects as it would with any other project located within the common boundary of the City of Fresno and FID. FID will require that it review and approve all maps and plans which impact FID canals and easements.

    a. Small/Medium Canal Crossings – The majority of the proposed planned will impact existing pipelines and small open channel canals. FID will require all open channels and existing pipelines impacted by the project area development be upgraded to meet FID's then-current standards for

BOARD OF DIRECTORS
President RYAN JACOBSEN Vice President JERRY PRIETO, JR. CHRISTOPHER WOOLF
GEORGE PORTER GREGORY BEBERIAN General Manager BILL STRETCH

urban, rural, industrial areas. The majority of FID's facilities that lie within the proposed Planning Area do not meet FID's urban specifications, including road or highway crossings. The majority of the existing pipelines are monolithic cast-in-place concrete pipe (CIPCP), low head/thin wall PVC, and non-reinforced mortar jointed concrete pipeline. These pipelines were designed for a rural environment and will fail if they are not replaced as development occurs.

b. Large Canal Crossing – There are large canals called Gould No. 97, Fresno No. 3, Mill No. 36, and Fancher No. 6 that will more than likely be too large to be contained within a pipeline. Development impacts to these facilities shall require designs that protect the canal's integrity for an urban setting including the need for access and full right-of-way widths for FID's operations and maintenance needs.

2. FID's facilities that are within the Planning Area carry irrigation water for FID users, recharge water for the City of Fresno, and flood waters during the winter months. In addition to FID's facilities, private facilities also traverse the Planned Area.

3. Canal Access – FID will continue to access the Canal from public roads. In order to access the maintenance bank with our larger equipment, FID requires a drive approach wide enough to accommodate the equipment. FID requires a 50-foot wide drive approach narrowing to a 20 feet wide drive banks. The 50-foot width is defined as starting from the end portion of a bridge/railing outward (away from the bridge). Every road and canal intersection is different and therefore each access will be different. The major factors affecting the proposed width will be the angle of the road intersecting the Canal, grade of canal bank vs. City road, median vs. no median, etc.

    a. If guard railings extend beyond attachment points at each wing-wall, they will obstruct FID's access to the canal and additional right-of-way will need to be acquired. FID will require the developer demonstrate FID's longest vehicle will be able to make the turns onto the drive banks. FID's right-of-way is a minimum 20-feet from the canal hinge on both sides of the canal, and FID will require the developer acquire and dedicate to FID exclusive easements for this purpose.

4. Canal Banks – If there will be any work on canal banks, the following will apply:

    a. All in-channel disturbed soil shall be concrete lined (both side slopes and bottom). FID will require reinforced concrete to limit the on-going maintenance that typically occurs with gunite or shotcrete slope protection.

b. Drive banks must be sloped a minimum of 2% away with a maximum of 4% from the canal with provisions made for rainfall. Drainage will not be accepted into the Canal and must be routed away from FID property/drive banks. Runoff must be conveyed to nearby public streets or drainage system by drainage swales or other FID acceptable alternatives outside FID's easements/property.

c. All existing trees, bushes, debris, old canal structures, pumps, canal gates, and other non- or in-active FID and private structures must be removed within FID's property/easement and the City's project limits.

5. Trail - It is FID's understanding that many trails are master-planned within the Southeast Development Area. As with other developments with trails along the canals, FID will not allow the trail to encroach/overlap FID's canal easement unless an agreement is in place for this purpose. The following requirements are intended for trail projects adjacent to FID-owned properties and right-of-ways for open canals:

   a. FID will not allow the trail easement to be in common use with FID-owned property or easements.

   b. FID requires all trail improvements be placed outside of FID-owned properties and easements.

   c. FID will not allow any portion of a tree canopy to encroach within its properties or easements.

   d. FID's canals will not accept any drainage from the trail or the canal bank.

   e. FID may require some improvements be made to the canal depending on the existing canal condition, the proposed trail, and the adjacent development.

   f. City parks that are adjacent to open canals are treated the same as trails, therefore the same requirements shall apply.

Water Supply Impact

1. The project encompasses the City of Fresno Growth Area 1 and 2 and portions of the project are not entitled to water under the current City of Fresno Conveyance Agreement. Under the executed agreement between the City of Fresno and FID development within Growth Area 2 will not result in an increase in the City's surface water allocation from FID. The document must consider how

to best handle future developments, if any, within the areas designated Growth Area 2 and areas outside of the agreement to evaluate all potential impacts.

2. The document must evaluate whether the City's Water Master Plan needs to be updated and how the Cooperative Agreement between the City of Fresno and FID may impact the developments within the Planning Area. The report must evaluate the City's growth with the recent water issues , including climate change, and whether the City's Water Master Plan can still provide the necessary guidance for the City.

3. The City of Fresno has implemented many of the projects previously proposed in the City's Water Master Plan. The Proposed document should consider and evaluated whether the constructed projects have resulted in benefits that were anticipated.

4. The proposed land use (or changes in land use) should be such that the need for water is minimized and/or reduced so that groundwater impacts to the proposed project area and any surrounding areas are eliminated.

5. If treated surface water will be used and the City has a deficit water supply or groundwater levels continue to drop, the City must acquire additional water from a water purveyor, such as FID for that purpose, so as to not impact water supplies to or create greater water supply deficits in other areas of the City or in the groundwater basin. Water supply issues must be resolved before any further "hardening" of the water supply demand is allowed to take place.

6. The potential for increase in water consumption by the project will result in additional groundwater overdraft. There is a significant cone of depression beneath the City of Fresno. FID is concerned that the increased water demand due to a change in land use may have a significant impact to the groundwater quantity and/or quality underneath the City of Fresno, FID and the Kings Groundwater Sub-basin. The "demand" side of water consumed needs to be evaluated or scrutinized as much as the "supply" side of the water supply. Many of the areas are historically native, and/or rural residential with minimal to no water use. Under current circumstances the project area is experiencing a modest but continuing groundwater overdraft. Should the proposed project result in a significant increase in dependence on groundwater, this deficit will increase. FID recommends the City of Fresno require proposed projects balance anticipated groundwater use with sufficient recharge of imported surface water in order to preclude increasing the area's existing groundwater overdraft problem.

7. California enacted landmark legislation in 2014 known as the Sustainable Groundwater Management Act (SGMA). The act requires the formation of local groundwater sustainability agencies (GSAs) that must assess conditions in their

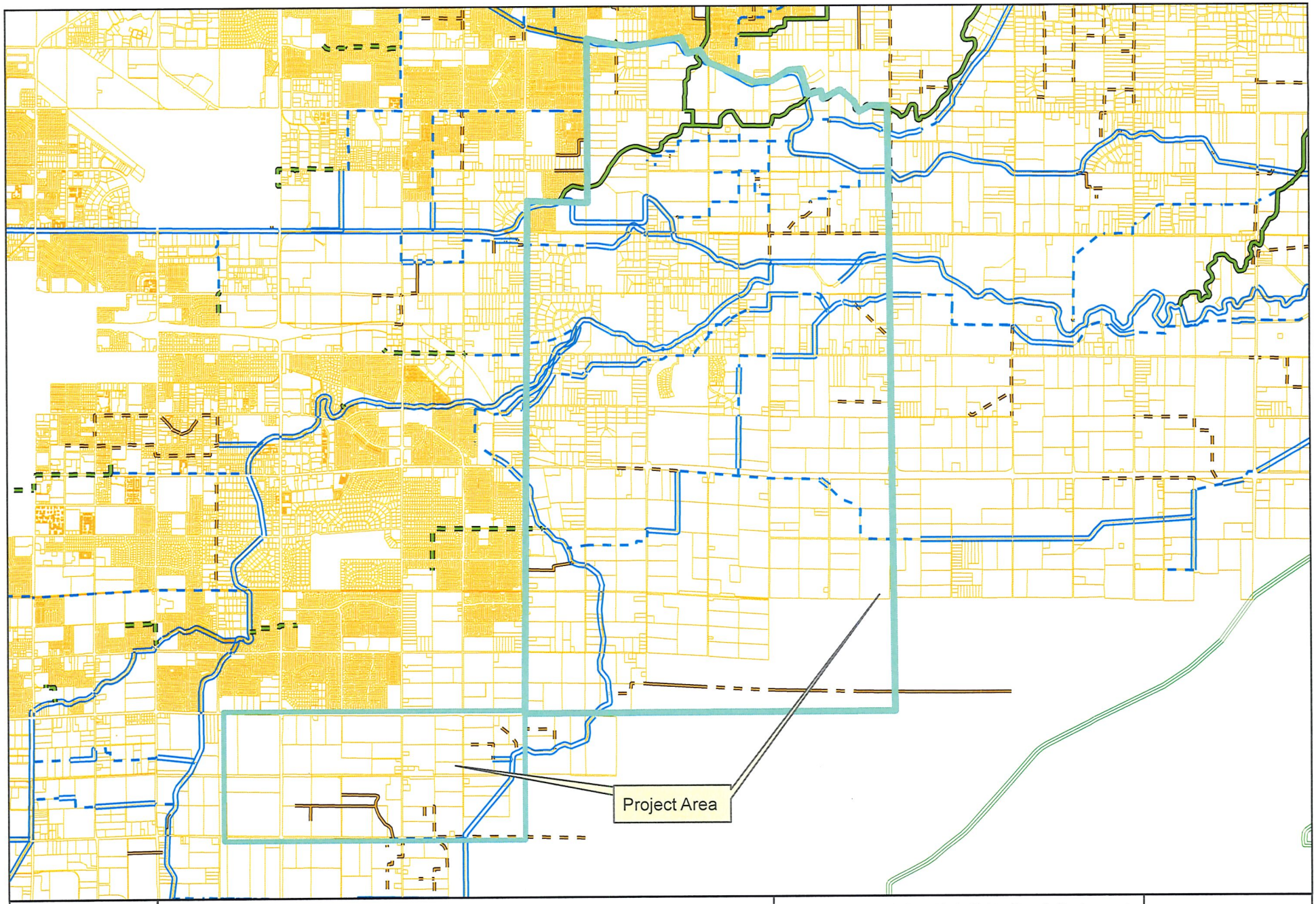
local water basins and adopt locally-based management plans. FID and the City of Fresno are members of the North Kings Groundwater Sustainability Agency which will manage the groundwater basin within the FID service area. This area is in an over drafted groundwater basin and SGMA will impact all users of groundwater and those who rely on it. The City of Fresno should consider the impacts of the project on the City's ability to comply with the requirements of SGMA.

Thank you for making available to us the Notice of Preparation of a Program Environmental Impact Report of the Southeast Development Area Specific Plan for our review and allowing us the opportunity to provide comments. We appreciate the opportunity to comment on the subject Notice for this project. While it is difficult to envision all of the potential impacts without all of the improvement details and impact report, we have attempted to provide you as much information as possible. We reserve the right to provide additional comments when more detailed information becomes available. If you have any questions please feel free to contact me Jeremy Landrith at (559) 233-7161 extension 7407 or jlandrith@fresnoirrigation.com.

Sincerely,

Laurence Kimura, P.E.
Chief Engineer

Attachments



FRESNO IRRIGATION DISTRICT

Legend

- FID Canal
- Private Canal
- Abandoned Canal
- FID Pipeline
- Private Pipeline
- Abandoned Pipeline
- Stream Group
- Other-Creek\River
- Other-Pipeline
- FID Boundary
- Railroad
- Streets & Hwys
- Parcel
- FMFCD Acquired Basins
- FMFCD Proposed Basins

This map was produced by the Fresno Irrigation District and is provided for reference and informational purposes only and is not intended to show map scale accuracy or all inclusive map features, nor for legal purposes. FID makes no statements regarding the accuracy of this map as the features shown are in their approximate location. Please contact the FID Engineering Dept. at (559) 233-7161 for further information on FID facilities.

Path: G:\Fidgis\20220103 FID Master.mxd
Spatial Reference
Name: NAD 1983 StatePlane California IV FIPS 0404

0 2,600 5,200
Feet
1 inch = 5,416.67 feet

NOTICE OF PREPARATION

Date: February 22, 2022

To: State Clearinghouse and Interested Public Agencies, Parties, and Organizations

Subject: Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California

Lead Agency: City of Fresno

Contact: Jennifer Clark, Director, Planning and Development Department
c/o Shawn Monk, Planner, Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721
559.621.8166
Jennifer.Clark@fresno.gov
Shawn.Monk@fresno.gov

Comment Period: February 22, 2022, to March 25, 2022

PURPOSE OF NOTICE

The City of Fresno (Lead Agency and/or City) will prepare a Program Environmental Impact Report (Program EIR) for the proposed Southeast Development Area (SEDA) Specific Plan (proposed project), located in the City of Fresno. The Program EIR will address potential environmental and physical effects of the proposed project for each environmental topic listed in the California Environmental Quality Act (CEQA). The City of Fresno will use the Program EIR when considering approval of the proposed project. Pursuant to CEQA Guidelines Section 15082, the project history, description, location, and potential environmental effects of the project plan are described in the attached materials.

PUBLIC REVIEW PERIOD

The City is soliciting comments from public agencies, organizations, and members of the public regarding the scope and content of the Program EIR. In accordance with CEQA time regulations, the Notice of Preparation (NOP) 30-day period of public review will begin February 22, 2022, and will end on March 25, 2022. The City will hold a public scoping meeting to inform the public and interested agencies about the proposed project and solicit comments on the scope of the environmental factors addressed in the Program EIR, along with alternatives that are being considered. The meeting will be held on March 3, 2022, and will only be conducted electronically due to COVID-19 restrictions. Meeting details are as follows:

Web link: https://zoom.us/j/ 92678285600 Call-in Information: [(669) 900-9128

Webinar ID: 926 7828 5600

Meeting Date: March 3, 2022

Meeting Time: 6:00 p.m. to 8:00 p.m.

Because of COVID-19 restrictions, copies of the NOP may be reviewed at the following locations:

- Online at: https://www.fresno.gov/cityclerk/notices-publications/ or
- www.fresno.gov/SEDA

For information on additional viewing methods, contact Project Manager, Planning and Development Department, Summer Rooks, at Summer.Rooks@fresno.gov.

Your views and comments on how the project may affect the environment are welcomed and encouraged.

PROJECT LOCATION

The regional location of the nearly 9,000-acre SEDA Specific Plan Area (Plan Area) is in the southeast portion of the City, in Fresno County (County), California as shown in Exhibit 1. The Plan Area with the proposed land use designations in the proposed project, are shown in Exhibit 2. The Plan Area is bounded on the north by the Gould Canal, on the east by McCall and Highland Avenues, on the south by Jensen and North Avenues, and on the West by Locan, Temperance, and Minnewawa Avenues.

PROJECT HISTORY

The SEDA, previously known as the Southeast Growth Area (SEGA), was approved for incorporation into the City in 2006 by the Local Agency Formation Commission (LAFCo) with several provisions that included preparation of a Specific Plan and associated environmental assessment before any annexations of land to the City could be approved. The City initiated the process of preparing a Specific Plan for SEGA but put it aside amid the uncertainty of the recession in 2008. Concepts from the SEGA planning process were rolled into the current Fresno General Plan that was adopted in 2014. The Fresno General Plan includes the SEDA as one of several growth areas.

Located in Growth Area II, SEDA was conceived to be developed after other infill initiatives, to give those time to gain momentum. SEDA's later time frame is reflected in the General Plan's buildout numbers, which include one-third of SEDA's residential capacity (approximately 15,000 dwelling units out of a total 45,000 dwelling unit capacity) to accommodate Fresno's anticipated 2035 population. It is assumed that the remaining residential capacity of 30,000 dwelling units will not be developed until after 2035. While there is still ample residential capacity within the current city limits and in Growth Area I (which includes the Southwest Fresno and the West Area Neighborhoods Specific Plan areas),

there is a sense of urgency about the current housing crisis and the City's ability to provide housing for existing population and its natural growth as well as the unanticipated in-migration occurring at this time.

EXISTING CONDITIONS

The predominant use in the Plan Area is agriculture, with the primary crops being vineyards, orchards, and vegetables. The Plan Area also contains agriculture-related and commercial operations, such as plant nurseries, wineries, and other various agricultural businesses. The second most predominant use is rural residential development, which is primarily concentrated in the area between State Route (SR) 180 and McKinley Avenues, but also scattered throughout the Plan Area.

In addition to these uses, schools, churches, and other uses also occupy the Plan Area. The Plan Area includes land that falls within both the Sanger and Clovis Unified School Districts, with Fowler and Fresno Unified School Districts bordering the Plan Area. Clovis Unified is constructing an educational center for middle and high school students in the northern portion of the Plan Area on a site along the Clinton Avenue alignment between Leonard and Highland Avenues, with phased opening expected in 2025.

The current roadway network is mainly comprised of two-lane county roads at 0.5-mile intervals, interspersed with local streets. Major roadway access corridors include Temperance, Clovis, and Jensen Avenues. Each accommodate four lanes of traffic with a central turning lane. The SR-180 has been extended eastward along the old Kings Canyon alignment from Temperance Avenue to Academy Avenue in Sanger. This route extension provides an east–west connection to Interstate 5 (I-5), serving commuters and the movement of agricultural goods from eastern portion of the County. Temperance Avenue has been expanded to four lanes where needed to serve new development.

The Plan Area is traversed by several constructed drainage features and natural waterways: Gould Canal, Redbank Slough, Dry Creek Canal, Mill Ditch, Fancher Creek Canal, and Briggs Canal. Some canals in the Plan Area are mostly unvegetated and the banks are enforced with rock or broken asphalt and concrete, with some portions fully concrete-lined. In addition, there are several small ponds and numerous lateral irrigation ditches present that deliver water from the canals to agricultural fields.

PROJECT DESCRIPTION

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels.

The proposed project land use categories are shown in Table 1 along with the total proposed acreage. A description of the proposed project and these associated land use categories are provided in the discussion below.

Table 1: Proposed Specific Plan Estimated Acreages

Land Use	Proposed Plan Acres	Percentages
Mixed-Use Land Uses		
Regional Center	310	3.5%
Community Center	290	3.3%
Neighborhood Center	520	5.9%
Residential Land Uses		
Mixed Residential	1,090	12.4%
Neighborhood Residential	1,520	17.3%
Rural Residential	2,160	24.5%
Rural Cluster Residential	810	9.2%
Employment Land Uses		
Office Center	160	1.8%
Flexible Research and Development	1,380	15.7%
Institutional	280	3.2%
Other Land Uses		
Flood Control Basin	280	3.2%
TOTAL	*8,799*	*100%*
Notes: ** Rounded to the nearest acre. Figures may not sum due to rounding.*		

The SEDA Specific Plan

The proposed project provides a vision and implementation mechanisms for a sustainable future for the Southeast Development Area. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Vibrant Mixed-Use Town Centers

The proposed project is based upon a hierarchy of walkable Mixed-Use Town Centers supported by a multimodal transportation network. Town Centers, which would serve as commercial and civic focal points for the Plan Area, are designed to include a mix and intensity of uses. Town Centers are human-scaled and defined by quality design features and a rich mixture of uses. They incorporate living and working opportunities with entertainment, cultural activities, and shops serving the daily needs of residents and employees.

Regional Town Center
The Regional Town Center is at the top of the mixed-use center hierarchy in the Plan Area, serving 40,000 to 60,000 households across the site and within the surrounding communities. The Regional Town Center features region-serving retail and office activity, as well as medium- and higher-density housing. It is well served by a high-capacity transit service.

Community Town Centers
Seven Community Town Centers dispersed across the Plan Area would provide commercial, civic, and other services to meet the needs of Community Town Center residents and employees, as well as those of surrounding neighborhoods. Community Town Center services, including grocery stores, support between 5,000 and 10,000 households. Community Town Centers feature a variety of medium-density housing options. Some Community Town Centers are focused on major rapid transit stations.

Neighborhood Town Centers
Neighborhood Town Centers are dispersed throughout the Plan Area and would serve as focal points of adjacent residential areas. Neighborhood Centers include employment and residential uses, but primarily provide a majority of the Plan Area residents with essential walk, bike, transit, and short-drive access to civic services and amenities, including elementary schools, local parks, community gardens, and other services.

Each Neighborhood Town Center would serve approximately 1,500 to 2,000 households and include a range of housing options.

Diverse Residential Districts

The Plan Area includes a rich and complete fabric of residential communities that support mixed-use centers and include a variety of housing types and affordability levels. The proposed project would distribute a variety of housing across the Plan Area to accommodate current and future housing needs. The range of housing types and densities throughout the communities would provide flexibility to meet the evolving needs of households in the region.

Mixed Residential
Mixed Residential districts support the Regional and Community Town Centers with a variety of medium- and higher-density housing, including a diverse mix of attached and detached single-family and multi-family homes.

Neighborhood Residential
Neighborhood Residential districts surround Neighborhood Town Centers and support the retail, employment, and other services provided throughout the Plan Area. Neighborhood Residential areas include a variety of detached and attached single-family housing types, as well as multi-family housing options.

Rural Cluster Residential
Rural Cluster districts, located along the eastern edge of the Plan Area, concentrate residential lots within a small, clustered area of a larger parcel or groups of parcels. This clustering of homes preserves

the continuity and viability surrounding land for agricultural uses and open space conservation. Rural Cluster districts serve as a transitional buffer between more intense urban uses within the Plan Area and the commercial agricultural operations outside of the Plan Area.

Rural Residential

There are approximately 1,700 acres in the Plan Area currently developed as very low-density rural residential homes and ranchettes. These homes are designated in the proposed project as Rural Residential.

Innovative Employment Districts

The proposed project provides opportunities to attract diverse high-quality employers and job opportunities while meeting the environmental challenges associated with growth in the City and the Central Valley. Many jobs would be located within a short distance to amenities in Regional and Community Town Centers, Office Centers, and in Flexible Research and Development districts.

In these locations, they can be closely linked to regional transit service and trail systems. The proposed project would put a significant portion of Plan Area residents within walking distance of major employment areas and high-capacity transit service that links to regional employment centers, including Downtown Fresno.

Reducing reliance on the automobiles for work trips would significantly reduce greenhouse gas (GHG) emissions, playing a significant role in meeting the proposed project's sustainability goals.

Office Center

Office Center districts are located adjacent to Regional and Community Centers or along regionally significant transportation corridors (e.g., SR-180, Kings Canyon Boulevard, Clovis Avenue). Office Centers accommodate professional offices and compatible commercial uses such as restaurants, coffee shops, cafés, banks, and book shops. Some residential uses could be permitted in Office Centers.

Flexible Research and Development

Flexible Research and Development districts are primarily located west of the Briggs Canal and/or south of Jensen Avenue and are intended to contain uses such as research and development, light manufacturing, product testing centers, and office development. The area may also include compatible commercial uses such as restaurants, coffee shops, cafés, printing and publishing, dry cleaners, and other supporting businesses. Access to regional transportation corridors (both road and rail) is critical. Residential uses are not allowed in Flexible Research and Development areas.

Transportation Choices

The multimodal circulation network in the proposed project includes a hierarchy of transportation options, ensuring that residents would have real choices for their daily travel needs.

Complete Streets

The Plan Area will be served by a network of Complete Streets as defined by City's Complete Streets Policy adopted in 2019. A Complete Street is defined in the policy as a transportation facility that is

planned, designed, operated, and maintained to provide safe mobility for all users–including bicyclists, pedestrians, transit vehicles, trucks, and motorists–appropriate to the function and context of the facility while connecting to a larger transportation network.

Transit Service

Transit Corridors/arterials with high-capacity public transit would serve major town centers, while collectors and local streets provide safe, convenient options for local trips. The Kings Canyon high frequency Q Bus Route is planned to extend into the Regional Town Center and eventually terminate service in the Community Town Center located on South DeWolf Avenue.

Bicycle/Pedestrian Trails

A network of pedestrian and bicycle routes, including dedicated trails and multi-purpose paths will serve work, school, and recreational trips. This extensive non-auto travel network will be coordinated with existing and proposed regional trails. Trail systems connect regional and sub-regional destinations for bicyclists, pedestrians, and equestrians (where appropriate). Multiuse trails are parallel to canals and other east–west open space networks within the Plan Area.

There will also be a network of bicycle lanes reflective of the Fresno Active Transportation Plan (ATP). This will consist of at least Class II Bike Lanes and other bicycle facilities as described in the Caltrans Bikeway Classification Guide.

Open Spaces, Agriculture, and Green Infrastructure

The proposed project features an integrated system of natural and developed open spaces that would serve many vital uses, from recreation to community farming and agriculture, to stormwater management. The open space system is designed to be a valuable amenity accessible to the entire community.

Parks and Open Spaces

The proposed project's open space system provides places for active and passive recreation and includes corridors for trails and paths that connect many areas of the Plan Area.

Sustainable Infrastructure

Sustainable infrastructure components capture and retain runoff, then treat the water by allowing it to move slowly through natural systems, such as constructed wetlands and rock filters. Stormwater management systems help reduce impacts on the environment and regional infrastructure systems can also be designed as visual and active amenities for residents in the Plan Area.

Community Farming and Agriculture

The proposed project integrates community-scale farming and agriculture into the urban fabric. Agricultural activities range from neighborhood gardens to agricultural education, and from small farming operations in green belts to those on the rural cluster edge.

Setting the Stage for Implementation

The proposed project sets a vision for how the Plan Area would develop over time. It defines where Mixed-Use Town Centers, residential neighborhoods, and employment areas would be located, the types of travel options, and transit and roadway infrastructure that would serve and connect these areas. It also sets standards for how districts would be organized and how streets would be designed to enhance walkability and meet the needs of all users. The plan includes the targets established by State and federal policies that address water and energy conservation, reduced air quality and GHG emissions, available parks and open space, housing opportunities, and many other important elements.

The following components will be part of the planning process and will be required prior to construction:

1. **Complete a phasing plan** that would define the optimal sequence of development for various areas within SEDA.

2. **Complete a comprehensive Infrastructure Plan.** Working from the SEDA Land Use Plan as its starting point, the Infrastructure Plan will delineate the specific bounds and design of the Plan Area's overall flood control and green infrastructure plan; identify bicycle and pedestrian trail alignments; specify the location of high schools, middle schools, and elementary schools; establish the specific alignments of arterial, and collector roadways, and identify the location of major transit stations along transit routes and corridors. The plan will also include new sewer and water infrastructure needed to serve new development. This plan must be accompanied by a comprehensive and detailed financing and implementation strategy that includes the phasing and financing of development and all major infrastructure. The City would convene all requisite agencies in the development of the Infrastructure Plan, including the following, and others as required:

    - Fresno Municipal Flood Control District
    - Fresno Irrigation District
    - City of Fresno Department of Public Utilities Water Division, Wastewater Management Division, and Solid Waste Management Division
    - City of Fresno Department of Public Works Streets Division
    - City of Fresno Parks After School, Recreation, and Community Services Department
    - Clovis and Sanger Unified School Districts
    - Fresno Council of Governments
    - Fresno Area Express (FAX) transit agency
    - California Department of Transportation

3. **Address Annexation with Fresno County, the Local Agency Formation Commission, and the State of California.** This includes addressing all issues to allow strategic and proactive annexation into the City of designated portions of the Plan Area targeted for planned and financed extension of infrastructure development by the City. The typically fragmented annexations associated with incremental private development proposals, Memorandum of Understanding (MOU), and inter-jurisdictional competition would not promote the coherent, sustainable, and fiscally sound development of the proposed project.

4. **General Plan Amendment and Development Code Change.** Amend the General Plan and Development Code to implement the land use and zoning described in the proposed project.

RESPONSIBLE AGENCIES

For the purposes of CEQA, the term "Responsible Agency" includes all public agencies other than the Lead Agency (that have discretionary approval power over the proposed project) (State CEQA Guidelines § 15381).

Discretionary approval may include such actions as issuance of a permit, authorization, or easement needed to complete some aspect of the proposed project. Responsible agencies may include, but are notlimited to:

- California Department of Transportation (Caltrans)
- California State Water Resources Control Board (State Water Board)
- California Department of Fish and Wildlife (CDFW)
- Central Valley Regional Water Quality Control Board (Central Valley RWQCB)
- Fresno Local Agency Formation Commission (LAFCo)
- San Joaquin Valley Air Pollution Control District (Valley Air District)
- Fresno Municipal Flood Control District
- Fresno Irrigation District

AREAS OF POTENTIAL ENVIRONMENTAL EFFECTS

The Program EIR will analyze the significant environmental effects associated with adoption and implementation of the proposed project. Specific areas of analysis would include the following topics based on Appendix G of the State CEQA Guidelines:

- Aesthetics
- Agricultural and Forestry Services
- Air Quality
- Biological Resources
- Cultural/Tribal Cultural Resources
- Land Use and Planning
- Mineral Resources
- Noise
- Population and Housing
- Public Services

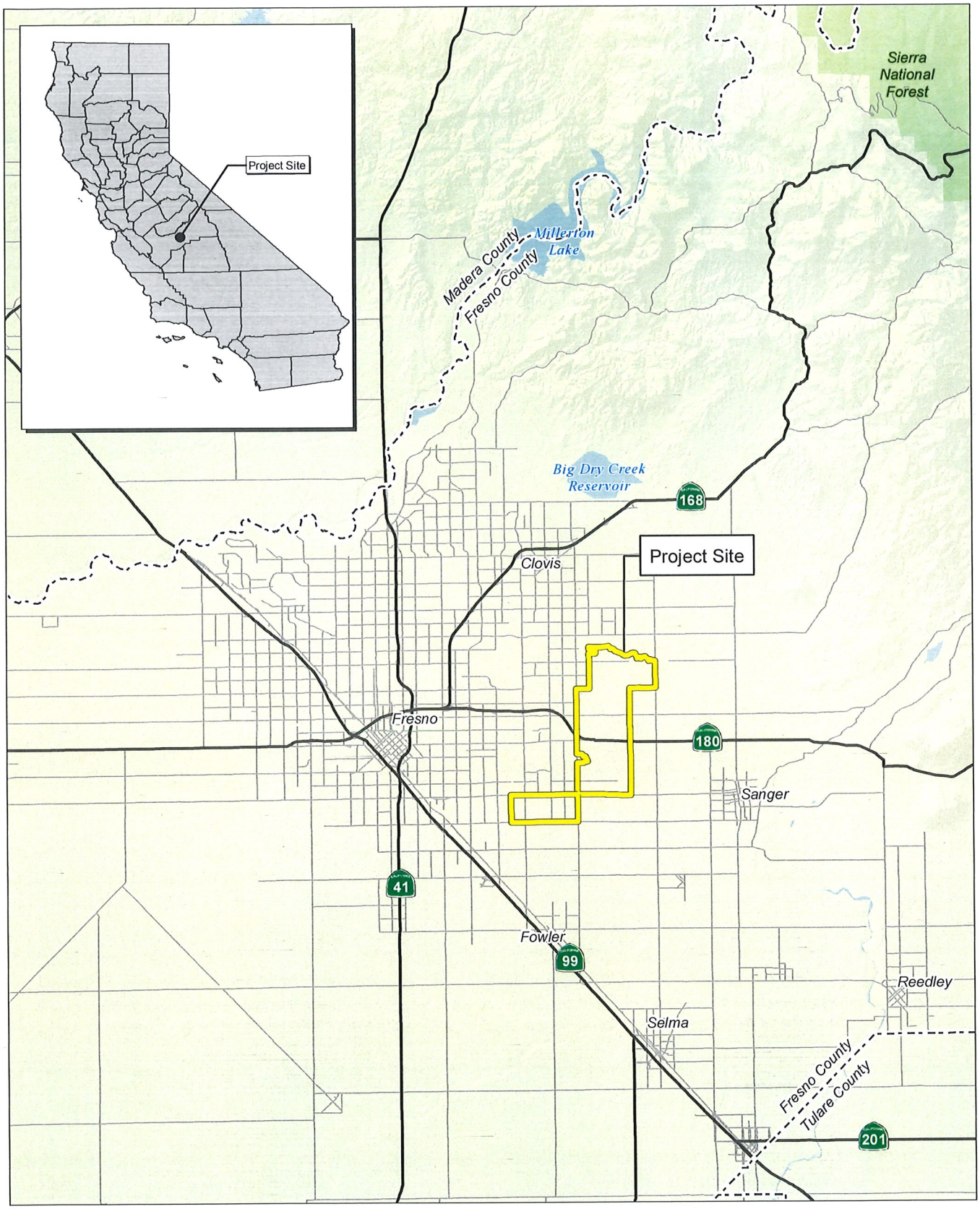
- Energy
- Geology and Soils
- Greenhouse Gas Emissions and Climate Change
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Recreation
- Transportation
- Utilities and Service Systems
- Wildfire
- Mandatory Findings of Significance

The Program EIR will also include a discussion of environmental justice issues and identify and evaluate a range of reasonable alternatives to the proposed project, including a No Project Alternative, pursuant to CEQA Guidelines.

SUBMITTING COMMENTS

Comments and suggestions as to the appropriate scope of analysis in the Program EIR are invited from all interested parties. Written comments or questions concerning the Program EIR for the proposed project should bedirected to the City's Environmental Project Manager at the following address by 5:00 p.m. on March 25, 2022. Please include the commenter's full name and address.

Jennifer Clark, Director, Planning and Development Department
c/o Shawn Monk, Planner, Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721
559.621.8031
Jennifer.Clark@fresno.gov
Shawn.Monk@fresno.gov



Source: Census 2000 Data, The California Spatial Information Library (CaSIL). City of Fresno, SEDA Regulating Districts.

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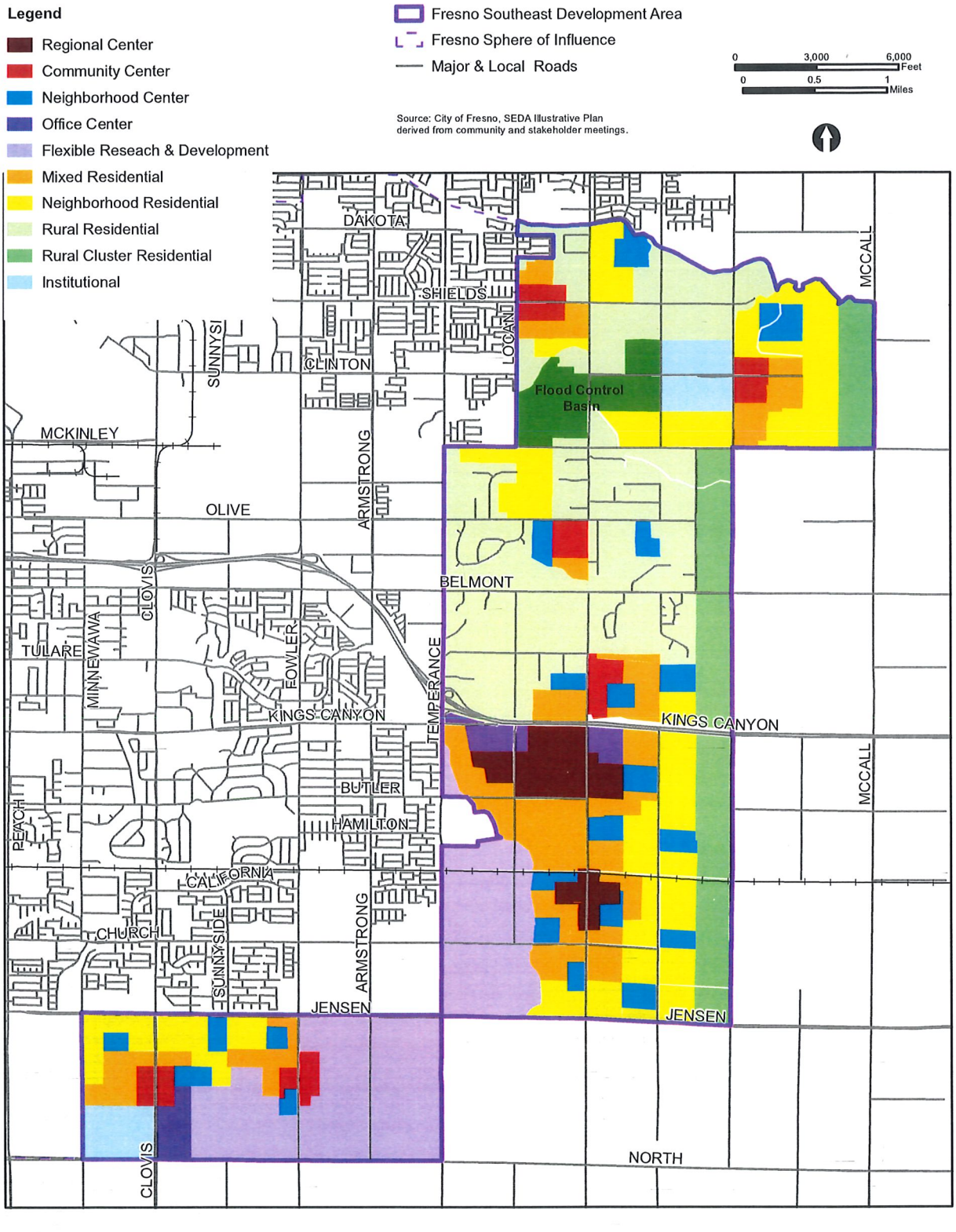
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Exhibit 1
Regional Location Map

31680033 • 09/2021 | 1_regional.mxd

CITY OF FRESNO
SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN
NOTICE OF PREPARATION

SEDA PROPOSED LAND USE



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

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Exhibit 2
Specific Plan Map

Fresno Metropolitan Flood Control District
Capturing Stormwater since 1956

File 310. "BG", "BL", "BM",
"CS", "DS", "DV"
410.214

March 25, 2022

Ms. Jennifer Clark, Director
c/o Mr. Shawn Monk, Planner
City of Fresno Planning and Development Department
2600 Fresno Street, Rm. 3065
Fresno, CA 93721

Dear Ms. Clark,

Fresno Metropolitan Flood Control District (FMFCD) Comments on the Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California
Drainage Areas BG", "BL", "BM", "CS", "DS", "DV"

FMFCD staff has reviewed the Notice of Preparation for the Southeast Development Area (SEDA) Specific Plan PEIR, and offers the following comments:

1. In all references to FMFCD, replace the word Municipal with Metropolitan.

2. Portions of the SEDA Specific Plan Area (Plan Area) are currently not located within a planned "drainage area" as shown on the attached Exhibit No. 1. It is FMFCD's intention to work with the City of Fresno to provide Master Planned drainage area systems to serve the Plan Area.

3. FMFCD recognizes that this Plan Area was previously approved for incorporation into the City in 2006 for urban development by the Local Agency Formation Commission (LAFCo) with several provisions that included preparation of a Specific Plan. Approximately 4200 acres of the Plan Area is outside of the current FMFCD boundary. In conjunction with an adopted Plan Area, the FMFCD Sphere of Influence will also need to be adjusted and this same area annexed by FMFCD to include the Plan Area (see Exhibit No. 1) to ensure appropriate provisions of urban drainage and flood control services. FMFCD's LAFCo annexation process will require CEQA.

4. All impacts to storm water runoff created by increasing densities in developed areas that effect the capacity of the existing Master Planned storm drainage system must be fully mitigated. The Plan Area encompasses existing Drainage Areas "DS", "DV", and portions of Drainage Areas "BG", "BL", "BM", and "CS". FMFCD is currently analyzing how proposed land use changes within the developed areas of the Plan Area will impact the capacity requirements of existing drainage systems due to increased density. In general, in areas where no drainage facilities have been constructed, the Master Plan can be revised to

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www.fresnofloodcontrol.org

accommodate new land uses and pipeline alignments proposed within the Plan Area, (i.e. street circulation plans and proposed street widths, open space concepts, and trailway alignments). FMFCD's Basin "DS", located at the northwest corner of Clinton and Leonard Avenues, was acquired in anticipation of Clinton Avenue not going through between Leonard and DeWolf Avenues. FMFCD requests the Plan Area maintain this same circulation plan for Clinton Avenue and it not go through west of Leonard Avenue.

5. FMFCD has studied the areas currently not located within a Master Planned area and has located the tentative basin facilities shown on Exhibit No. 1. The City shall incorporate the locations of the tentative basin facilities into the SEDA Proposed Land Use plan. The County of Fresno Business Industrial Campus is currently in the preliminary stages and once complete will be incorporated into FMFCD's Master Plan; changes in size and/or location of the tentative basin locations shown on Exhibit No. 1 may be effected by this County Plan. The final basin locations will be determined by the on-going Storm Drainage and Flood Control Master Plan planning process. FMFCD will ensure conformance and consistency by providing drainage facilities appropriate to serve the proposed land uses, and develop residential design basins, which include provisions for recreational open spaces, in areas where the basin site is bordered on two or more sides by residential uses. FMFCD shall be notified of any revisions to the SEDA Proposed Land Use plan as changes will effect the existing as well as new Master Plan drainage systems.

6. The City of Fresno, FMFCD, the County of Fresno, the City of Clovis, and the California State University, Fresno are currently covered as Co-Permittees for Municipal Separate Storm Sewer System (MS4) discharges through National Pollutant Discharge Elimination System (NPDES) General Order No. R5-2016-0040 and NPDES Permit No. CAS0085324 (Storm Water Permit) effective May 17, 2018. The previous Storm Water Permit adopted on May 31, 2013 required the adoption of Stormwater Quality Management Program (SWQMP) that describes the Storm Water Permit implementation actions and Co-Permittee responsibilities. That SWQMP was approved by the Central Valley Regional Water Quality Control Board on April 17, 2015 and is effective until adoption of a new SWQMP, which is anticipated within the next two years.

   It is FMFCD's understanding that the City will adopt a Program EIR for the proposed SEDA Specific Plan and that the Program EIR may be used when considering approval of future discretionary actions. The Storm Water Permit requires that Co-Permittees update their CEQA process to incorporate procedures for considering potential stormwater quality impacts when preparing and reviewing CEQA documents. This requirement is found on Provision D.14 of the 2013 Storm Water Permit and in Section 7: Planning and Land Development Program – PLD 3 – Update CEQA Process. The District has created a guidance document that will meet this Storm Water Permit requirement entitled *Guidance for Addressing Stormwater Quality for CEQA Review*, which has been attached. In an effort to streamline future CEQA processing and maintain compliance with the Storm

Water Permit, FMFCD recommends that all future CEQA review within the City of Fresno, including the SEDA area, utilize the attached guidance document.

Additionally, the City's authority as a land use agency gives the City responsibility to implement certain storm water quality measures. The SWQMP requires a Memorandum of Understanding (MOU) between the District and the City of Fresno that identify those activities best suited for the City to perform related to planning, inspection and enforcement of NPDES Permit requirements. The District has a current MOU adopted in 2014 and this MOU will need to be updated after adoption of the next SWQMP. Since the 2014 MOU was adopted, the following regulatory programs have been adopted by the State Water Resources Control Board that the City must coordinate with FMFCD to effectively implement:

- Amendment to the Water Quality Control Plan for Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California; and

- Amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins for the Control of Pyrethroid Pesticide Discharges.

These regulatory requirements, however, often coincide with other community planning goals. For example, it is noted in the NOP that the Specific Plan may include provisions for sustainable infrastructure, including capture and retention of rainfall and stormwater runoff. Such approaches, when coordinated, can assist in meeting the stormwater quality regulatory requirements listed above. Existing FMFCD Policy requires post-development requirements for areas not served by stormwater basins or areas that discharge to sensitive waterbodies, such as the San Joaquin River. Should the City desire to include sustainable infrastructure provisions in its Specific Plan, coordination between the City and FMFCD must take place to ensure plans are suited to meet stormwater quality regulatory objectives and compatible with drainage standards in the Fresno area.

7. As stated in the NOP, FMFCD is a Responsible Agency for the purposes of CEQA review and has discretionary approval over part of the proposed project. As future projects within the Specific Plan are approved, FMFCD may require project proponents to construct master planned storm drainage facilities. To prevent duplicate CEQA processing, the Program EIR should evaluate impacts related to the construction of master planned storm drainage facilities to the extent feasible.

Additional FMFCD General Comments

FMFCD bears responsibility for storm water management within the Fresno-Clovis metropolitan area, including portions of the area within the Plan Area. Within this area, the community has developed and adopted Storm Drainage and Flood Control Master Plans as shown in the attached

Exhibit No. 1. In general, each property contributes its pro-rata share to the cost of the public drainage system. All properties are required to participate in the community system for everyone. It is this form of participation in the cost and/or construction of the drainage system that will mitigate the impact of development. The subject property shall pay drainage fees pursuant to the Drainage Fee Ordinance prior to approval of any final maps and/or issuance of building permits at the rates in effect at the time of such approval. Please contact FMFCD for a final fee obligation prior to issuance of the construction permits within the Plan Area. For areas located outside a Master Planned area, once these areas are adopted by the FMFCD Board of Directors', drainage fee payment will be required per the criteria listed above.

The grading of proposed development within the Plan Area shall be designed such that there are not adverse impacts to the passage of major storm flow through that development. Additionally, the development shall provide any surface flowage easements or covenants for any portions of the developing area that cannot convey storm water to public right of way without crossing private property.

If there are to be storm water discharges from the private facilities to FMFCD's storm drainage system, they shall consist only of storm water runoff and shall be free of solids and debris. Landscape and/or area drains are not allowed to connect directly onto FMFCD's facilities.

FMFCD will need to review and approve the final improvement plans for all development (i.e. grading, street improvement and storm drain facilities) within the boundaries of the proposed project to insure consistency with the future Storm Drainage Master Plan.

Storm drain easement will be required whenever storm drain facilities are located on private property. No encroachments into the easement will be permitted including, but not limited to, foundations, roof overhangs, swimming pools, and trees.

Where permanent drainage service is available the developer shall verify to the satisfaction of the City and FMFCD that runoff can be safely conveyed to existing Master Plan facilities. Permanent drainage service will not be available if the downstream Master Plan facilities are not constructed or operational and in this instance FMFCD recommends the City require temporary drainage facilities until permanent drainage service is available. Prior to submitting any development proposal, it is recommended to contact FMFCD for information regarding the status of the Master Plan drainage facilities and the availability of permanent drainage service.

FMFCD may require the developer to construct certain storm drain facilities as described in the Storm Drain Master Plan. The cost of construction of Master Plan facilities excluding dedication of storm drainage easements is eligible for credit against the drainage fee of the drainage area served by the facilities. A development agreement shall be executed with FMFCD to affect such credit. Reimbursement provisions, in accordance with the Drainage Fee Ordinance, will be included to the extent that developer's Master Plan costs for an individual drainage area exceed

the fee of said area. Should the facilities cost for such individual area total less than the fee of said area, the difference shall be paid upon demand to the City or FMFCD.

The individual properties may be located within a flood prone area as designated on the most current official Flood Insurance Rate Maps. The maps are available at the Federal Emergency Management Agency (FEMA) Flood Map Service Center.

In an effort to improve storm runoff quality, outdoor storage areas shall be constructed and maintained such that material that may generate contaminants will be prevented from contact with rainfall and runoff and thereby prevent the conveyance of contaminants in runoff into the storm drain system.

FMFCD encourages, but does not require that roof drains from non-residential development be constructed such that they are directed onto and through a landscaped grassy swale area to filter out pollutants from roof runoff.

Runoff from areas where industrial activities, product, or merchandise come into contact with and may contaminate storm water must be directed through landscaped areas or otherwise treated before discharging it off-site or into a storm drain. Roofs covering such areas are recommended. Cleaning of such areas by sweeping instead of washing is to be required unless such wash water can be directed to the sanitary sewer system. Storm drains receiving untreated runoff from such areas that directly connect to FMFCD's system will not be permitted. Loading docks, depressed areas, and areas servicing or fueling vehicles are specifically subject to these requirements. FMFCD's policy governing said industrial site NPDES program requirements are available. Contract FMFCD's Environmental Department for further information regarding these policies related to industrial site requirements.

We look forward to working closely with the City on these items to successfully execute the EIR and Specific Plan for the Southeast Development Area.

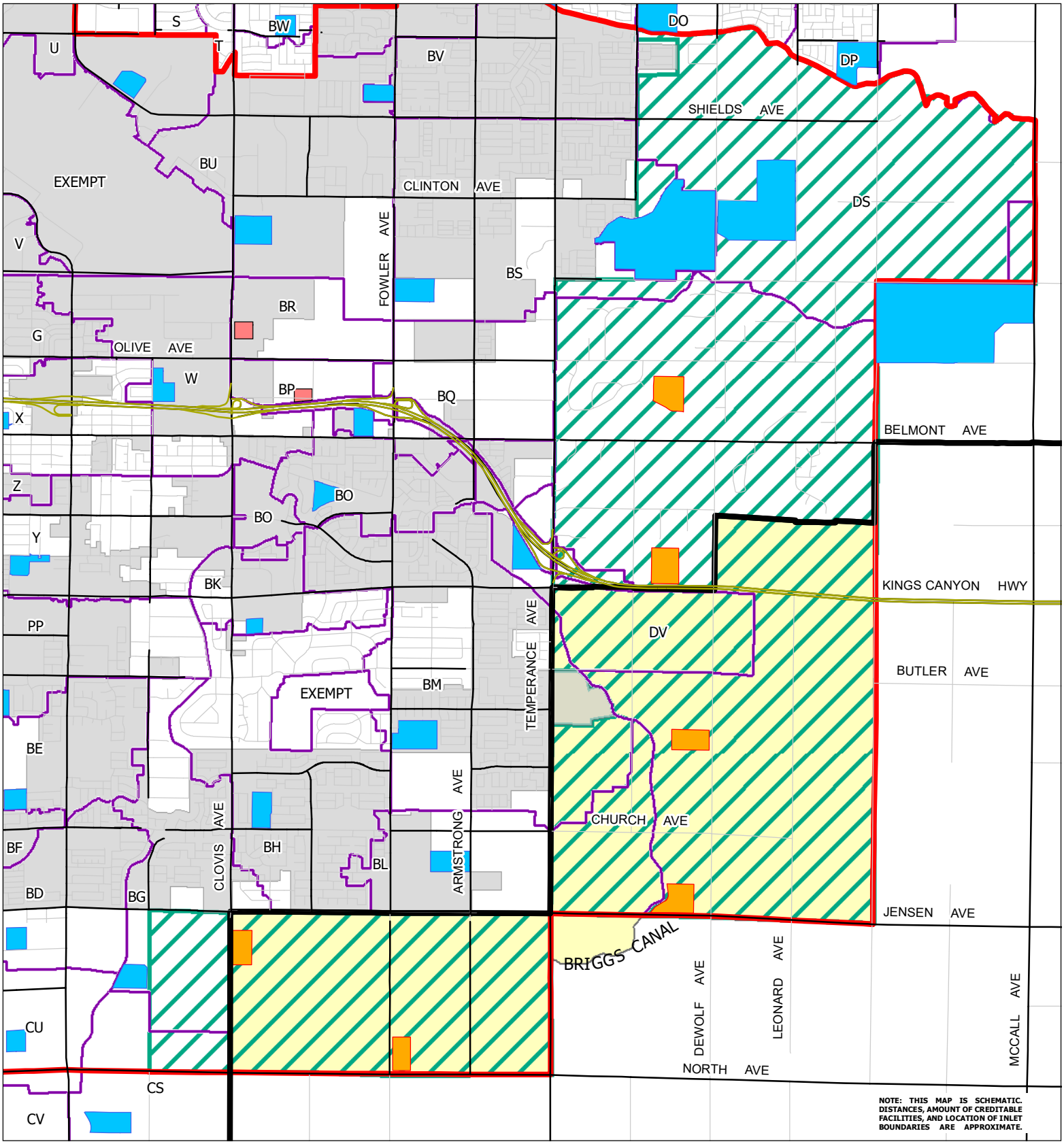
If you have any questions or concerns regarding our comments, please feel free to contact the District at (559) 456-3292.

Respectfully,

Denise Wade
Master Plan Special Projects Manager

DW/lrl

Attachment(s)



FMFCD BOUNDARY
CITY OF FRESNO SPHERE OF INFLUENCE
DRAINAGE AREA
CITY LIMITS
SOUTHEAST DEVELOPMENT AREA
FMFCD ANNEXATION AREA

BASINS
EXISTING
PROPOSED
TENTATIVE

Prepared by: rebeccal
Date: 3/23/2022
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FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

EXHIBIT NO. 1

1 " = 4300 '

Fresno Metropolitan Flood Control District

Guidance for Addressing Stormwater Quality for CEQA Review

Stormwater Checklist for CEQA Review

a. Potential impact of project construction on stormwater runoff.

Stormwater runoff from construction activities can have a significant impact on water quality. To build on sites with over one acre of disturbed land, property owners must obtain coverage under the California Construction General Permit for Discharges of Stormwater (CGP). The CGP is issued by the State Water Resources Control Board (SWRCB). The CGP requires sites that do not qualify for an erosivity waiver to create a Stormwater Pollution Prevention Plan (SWPPP). The SWPPP is a site-specific plan that is designed to control the discharge of pollutants from the construction site to local storm drains and waterways.

b. Potential impact of project post-construction activity on stormwater runoff.

FMFCD operates the Regional Stormwater Mitigation System, which consists of facilities to handle stormwater runoff and non-stormwater discharges in the FMFCD service area. However, river discharging drainage areas and drainage areas without basin service are subject to FMFCD Policy: Providing for Compliance with Post-Development and Industrial Storm Water Pollution Control Requirements (Policy).

Development and redevelopment projects can result in discharge of pollutants to receiving waters. Pollutants of concern for a project site depend on the following factors:

- Project location;
- Land use and activities that have occurred on the project site in the past;
- Land use and activities that are likely to occur in the future; and
- Receiving water impairments.

As land use activities and site design practices evolve, particularly with increased incorporation of stormwater quality BMPs, characteristic stormwater runoff concentrations and pollutants of concern from various land use types are also likely to change.

Typical Pollutants of Concern and Sources for Post-Development Areas

Pollutant	Potential Sources
Sediment (total suspended solids and turbidity), trash and debris (gross solids and floatables)	Streets, landscaped areas, driveways, roads, construction activities, atmospheric deposition, soil erosion (channels and slopes)

Pesticides and herbicides	Residential lawns and gardens, roadsides, utility right-of-ways, commercial and industrial landscaped areas, soil wash-off
Organic materials/oxygen demanding substances	Residential laws and gardens, commercial landscaping, animal waste
Metals	Automobiles, bridges, atmospheric deposition, industrial areas, soil erosion, metal surfaces, combustion processes
Oil and grease, organics associated with petroleum	Roads, driveways, parking lots, vehicle maintenance areas, gas stations, illicit dumping to storm drains, automobile emissions, and fats, oils, and grease from restaurants
Bacteria and viruses	Lawns, roads, leaking sanitary sewer lines, sanitary sewer cross-connections, animal waste (domestic and wild), septic systems, homeless encampments, sediments/biofilms in storm drain system
Nutrients	Landscape fertilizers, atmospheric deposition, automobile exhaust, soil erosion, animal waste, detergents

Source: Adapted from USEPA, 1999 (Preliminary Data Summary of Urban Storm Water BMPs)

FMFCD's Post-Development Standards Technical Manual provides guidance for implementing stormwater quality Best Management Practices (BMPs) for drainage areas subject to the Policy, with the intention of improving water quality and mitigating potential water quality impacts from stormwater and non-stormwater discharges. The Post-Development Standards Technical Manual addresses the following objectives and goals:

- Minimize impervious surfaces and directly connect impervious surfaces in areas of new development and redevelopment, and where feasible, to maximize on-site infiltration of stormwater runoff;
- Implement pollution prevention methods supplemented by pollutant source controls and treatment, and where practical, use strategies that control the sources of pollutants or constituents (i.e., where water initially meets the ground) to minimize the transport of runoff and pollutants offsite and into MS4s;
- Preserve, and where possible create or restore, areas that provide important water quality benefits, such as riparian corridors, wetlands, or buffer zones
- Limit disturbances of natural water bodies and natural drainage systems by development, including roads, highways, and bridges;
- Identify and avoid development in areas that are particularly susceptible to erosion and sediment loss or establish guidance that protects areas from erosion and sediment loss;
- Implement source and structural controls as necessary and appropriate to protect downstream receiving water quality from increased pollutant loadings and flows (hydromodification concepts) from new development and significant redevelopment;

- Control the post-development peak stormwater runoff discharge rates and velocities to maintain or reduce pre-development downstream erosion and to protect downstream habitat; and
- Consider integration of Low Impact Development (LID) principles into project design.

The Post-Development Standards Technical Manual describes the stormwater management requirements for Priority Projects, which are identified as meeting one or more of the following and discharge to the San Joaquin River or do not have basin service:

- Home subdivisions of 10 housing units or more;
- Commercial developments greater than 100,000 square feet;
- Automotive repair shops;
- Restaurants;
- Parking lots 5,000 square feet or greater with 25 or more parking spaces and potentially exposed to urban runoff;
- Streets and roads;
- Retail gasoline outlets (RGOs); and
- Significant redevelopment projects, which are developments that result in creation or addition of at least 5,000 square feet of impervious surface on an already developed site. Significant redevelopment includes, but is not limited to, expansion of a building footprint or addition or replacement of a structure, structural developing including an increase in gross floor area and/or exterior construction or remodeling, replacement of impervious surface that is not part of a routine maintenance activity, and land disturbing activities related with structural or impervious surfaces. Where significant redevelopment results in an increase of less than 50 percent of the impervious surfaces of a previously existing development and the existing development was not subject to Post-Construction Standards, only the proposed alteration must meet the requirements of the Post-Development Standards Technical Manual.

All Priority Projects must mitigate the Stormwater Quality Design Volume (SWQDV) or Stormwater Quality Design Flow (SWQDF) through LID- or treatment-based stormwater quality BMPs or a combination thereof.

For new development or significant redevelopment projects for restaurants with less than 5,000 square feet, the project applicant must meet all the requirements of the Post-Development Standards Technical Manual except for mitigating the SWQDV or SWQDF and implementing stormwater quality BMPs.

The Post-Development Standards Technical Manual can be found on FMFCD's website here:

http://www.fresnofloodcontrol.org/wp-content/uploads/2014/11/Post-Development-Standards-Technical-Manual.pdf

c. Potential for discharge of stormwater from areas from material storage, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work areas.

Development projects may create potential impacts to stormwater from non-stormwater discharge from areas with material storage, vehicle or equipment fueling, vehicle or equipment maintenance (including washing), waste handling, hazardous materials handling or storage, delivery areas or loading docks, or other outdoor work area.

Some materials, such as those containing heavy metals or toxic compounds, are of more concern than other materials. Toxic and hazardous materials must be prevented from coming in contact with stormwater runoff. Non-toxic or non-hazardous materials, such as debris and sediment, can also have significant impacts on receiving waters. Contact between non-toxic or non-hazardous materials and stormwater runoff should be limited, and such materials prevented from being discharged with stormwater runoff. To help mitigate these potential impacts, BMPs should be included to prevent discharges from leaving the property.

Refer to FMFCD Post-Development Standards Technical Manual for more information or go to http://water.epa.gov/polwaste/nps/urban.cfm.

d. Potential for discharge of stormwater to impact the beneficial uses of the receiving waters or areas that provide water quality benefits.

Identify receiving waters and describe activities that may impact the beneficial uses of the receiving waters or that project water quality benefits. Project that can impact beneficial uses or receiving waters may be mitigated by implementation of the FMFCD Post-Development Standards Technical Manual.

e. Potential for the discharge of stormwater to cause significant harm on the biological integrity of the water ways and water bodies.

Conservation of natural areas, soils, and vegetation helps to retain numerous functions of pre-development hydrology, including rainfall interception, infiltration, and evapotranspiration. Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Sensitive areas, such as streams and their buffers, floodplains, wetlands, steep slopes, and highly-permeable soils, should be protected and/or restored. Slopes can be a major source of sediment and should be properly protected and stabilized. Locating development in less sensitive areas of a project site and conserving naturally vegetated areas can minimize environmental impacts from stormwater runoff.

The evaluation of a project's effect on sensitive natural communities should encompass aquatic and wetland habitats. Consider "aquatic and wetland habitat" as examples of sensitive habitat.

f. Potential for significant changes in the flow velocity or volume of stormwater runoff that can cause environmental harm.

The evaluation of a project's effect on drainage patterns should refer to the FMFCD's Storm Drainage and Flood Control Master Plan and have their project reviewed by FMFCD to assess the significance of altering existing drainage patterns and to develop any mitigation measures in addition to our stormwater mitigation system. The evaluation should also consider any potential for streambed or bank erosion downstream from the project.

g. Potential for significant increases in erosion of the project site or surrounding areas.

The evaluation of a project's effect on drainage patterns should refer to the FMFCD's Storm Drainage and Flood Control Master Plan and have their project reviewed by FMFCD to assess the significance of altering existing drainage patterns and to develop any mitigation measures in addition to our stormwater mitigation system. The evaluation should also consider any potential for streambed or bank erosion downstream from the project.

County of Fresno

DEPARTMENT OF PUBLIC WORKS AND PLANNING
STEVEN E. WHITE, DIRECTOR

March 24, 2022

Jennifer Clark, Director
Planning and Development Department
City of Fresno
2600 Fresno Street, Suite 3065
Fresno, CA 93721

SUBJECT: Southeast Development Area Plan

Dear Jennifer Clark:

The County of Fresno appreciates the opportunity to review and comment on the subject project being reviewed by the City of Fresno. Staff's understanding is that the proposal is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels.

I am providing the following comments provided by our County of Fresno divisions, as it relates to proposed project Southeast Development Area Plan.

Development Engineering:

1. Refer to Road Maintenance & Operations Division, Road Operations for comments on roads.

2. According to FEMA FIRM Panel 1595, 1615H and 2135H, portions of the area of the subject property are found to be under Flood Zone A, Flood Zone AE, Flood Zone AO and Floodway Areas in Zone AE, subject to flooding from the 100-year storm. Floodway Are.as in Zone AE refers to the channel of a stream plus adjacent floodplain areas that must be kept free of encroachment so that the 1 % annual chance flood can be carried without substantial increases in flood heights according to FEMA FIRM. Any development within the Special Flood Hazard Area shall conform to provisions established in Fresno County Ordinance Code Title 15, Chapter 15.48 Flood Hazard Areas. Any proposed structure and associated electrical equipment/electrical system components (e.g., service panels, meters, switches, outlets, electrical wiring, walk-in equipment cabinets, generators, bottom of the lowest edge of the solar array, pool-associated motors and water heater, receptacles, junction boxes, inverter, transformers, etc.) in the Special Flood Hazard Area must comply with the FEMA flood elevation requirements. All electrical wiring below the flood elevation shall be in a watertight conduit or approved direct burial cable. Grading import is not allowed within the flood zone. Any dirt material used for grading must be obtained within the designated flood area as to not cause an impact to the determined area of flooding. FEMA Elevation

Certificate is required for every structure proposed to be constructed within the Special Flood Hazard Area. If the proposed building/structure is near the Special Flood Hazard Area, a certified Map of Survey/Map of Flood Hazard Area (MOS), stamped and signed by a Professional Land Surveyor delineating the distances from proposed structure(s) to the flood zone boundary and at least two property lines will be required. The MOS must show spot elevations within the perimeter of the proposed structure and the flood zone for verification purposes.

Furthermore, other portions of the subject property are found to be under shaded Flood Zone X. The shaded flood zone x refers to areas of 0.2% annual chance flood, areas of 1 % annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from 1 % annual chance flood.

Normally, for property within flood zone shaded x, any proposed building pad should be elevated above the existing ground to at least a minimum of twelve inches (12") and/or the finish floor elevation must be elevated above the crown of the adjacent street. And any proposed associated electrical equipment/electrical system components in the shaded flood zone x shall be elevated above the finish floor elevation. All proposed electrical wiring below the flood elevation shall be in a watertight conduit or approved direct burial cable. All sides of any proposed building shall be sloped 2% for a distance of 5' to provide positive drainage away from the building.

3. According to the U.S.G.S. Quad Map, an intermittent stream may be present within the subject property. Any proposed work within or near a stream will require a clearance from California Department of Fish and Wildlife (CDFW) and a Streambed Alteration Agreement (SAA) if the proposed project would result in the alteration or degradation of a stream.

   Furthermore, Briggs Canal, Gould Canal, Fancher Creek Canal and Mill Ditch traverse the subject property. Any improvements constructed within or near a canal should be coordinated with the owners of the canal/appropriate agency.

4. Portions of the area of the project site are located within the Fresno Metropolitan Flood Control District (FMFCD) Boundary and Drainage Zone. FMFCD should be consulted regarding any requirements they may have for the proposed work.

   Fresno Metropolitan Flood Control District
   5469 E. Olive Avenue
   Fresno, CA 93727
   (559) 456-3292
   developmentreview@fresnofloodcontrol.org

   Several FMFCD Drainage Basins are within the subject property. Any proposed building pad must be elevated above the high-water level of the adjacent FMFCD Drainage Basin or as required by FMFCD, whichever is higher. Furthermore, the finish floor of the

building should be above the crown of the adjacent street and any proposed associated electrical equipment/electrical system components should be elevated above the finish floor elevation. All sides of the proposed building shall be sloped 2% for a minimum distance of 5 feet to provide positive drainage away from the building.

5. Records indicate that portions of the area of the subject property are within an Agricultural Preserve. Any construction or development proposed within an Agricultural Preserve may require approval from Policy Planning. Policy Planning can be reached at (559) 600-4205/4230.

6. Discharging pollutants through a "point source" into a "water of the United States" are prohibited unless an NPDES permit has been obtained. A Notice of Intent (NOi) shall be filed with the State Water Resources Control Board (SWRCB) before the commencement of any construction activities disturbing 1.0 acre or more of area. Copies of completed NOi with WDID # and SWPPP incorporated into the construction improvement plans shall be submitted to the County prior to commencement of any grading activities.

7. A Traffic Impact Study should be included as part of the EIR to determine the impact of the additional traffic generated for roads and intersections under County control. The County of Fresno staff, which includes the Maintenance & Operations Division, and the Design Division should attend the scoping meeting.

8. Any work done within the County-road right-of-way to construct a new driveway or improve an existing driveway will require an Encroachment Permit from the Road Maintenance and Operations Division.

9. Any encroachment or access over S.P.R.R. (Southern Pacific Railroad Right-of-Way) should require approval from the owner.

10. Any grading, including onsite grading, will require either an engineered grading and drainage plan, road improvement plan, permit, or voucher. However, if the parcel lots are annexed to the City, all improvements for the subject property shall comply with the City Standards/requirements and all submittals shall be forwarded to the City of Clovis for their review and approval.

Environmental Health:

Hazards and Hazardous Materials

1. If future applicants propose to use and/or store hazardous materials and/or hazardous wastes, they shall meet the requirements set forth in the California Health and Safety Code (HSC), Division 20, Chapter 6.95, and the California Code of Regulations (CCR), Title 22, Division 4.5. Any business that handles a hazardous material or hazardous waste may be required to submit a Hazardous Materials Business Plan pursuant to the California Health and Safety Code (HSC), Division 20, Chapter 6.95, Section 25507

(http://cers.calepa.ca.gov/). Contact the Fresno County Hazmat Compliance Program at (559) 600-3271 for more information.

2. If any underground petroleum storage tank(s) are discovered during construction activities, the applicant/property owner shall apply for and secure an Underground Storage Tank Removal Permit from the Fresno County Department of Public Health, Environmental Health Division. Contact the Fresno County Hazmat Compliance Program at (559) 600-3271 for more information.

Hydrology and Water Quality

1. As a measure to protect groundwater, all water wells (not intended for use) and septic systems within the property shall be properly destroyed by an appropriately licensed contractor. Contact the Fresno County Department of Public Health, Water Surveillance Program at (559) 600-3357 for more information.

Noise

1. Appropriate measures should be incorporated into the construction phase of future projects to minimize potentially significant short-term localized noise impacts to noise sensitive receivers caused by the operation of construction equipment. Construction specifications for projects should require that all construction equipment is maintained according to the manufacturers' specifications, and that noise generating construction equipment is equipped with mufflers. In addition, consideration should be given to limiting noise-generating construction activities to daytime hours.

2. Future projects have the potential to expose nearby residents to elevated noise levels. Consideration should be given to conformance with the applicable standards of the Noise Element of the City of Fresno General Plan. Consideration should be given to noise sensitive receivers within the City's Zoning Map.

Resources:

On behalf of the Resources Division, we would like the project manager to note that the County has a water providing CSA (CSA 14) which is interested in connecting to the City of Fresno water system. In addition, the County has several road CSAs within the project area.

Design:

1. At this time, the County of Fresno, Design Division requests to be forwarded any future routings of transportation studies associated with the SEDA.

If you have any questions regarding the information described in this letter, please contact me at DRandall@FresnoCountyCA.gov or (559) 600-4052.

Sincerely,

David Randall, Senior Planner
Development Services and Capital Projects Division

DR:im:cwm
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Jennifer Clark c/o Shawn Monk
Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721

March 25, 2022

Sent via Email

Dear Ms. Jennifer Clark and Mr.Shawn Monk,

We are writing to provide comments in response to the Notice of Preparation ("NOP") of a Program Environmental Impact Report ("PEIR") for the Southeast Development Area (SEDA) in the City of Fresno. The undersigned organizations work closely alongside community leaders throughout Southeast Fresno. We aim to support and elevate resident-identified priorities and solutions while also dismantling the systemic barriers that have historically excluded low-income communities and Black, Indigenous, and People of Color (BIPOC) communities.

First, given the significance of the SEDA to the future development of Southeast Fresno communities, it is of the utmost importance that the City proactively and meaningfully engage residents within and around the planning area. This means that the City must incorporate residents' input into the SEDA and EIR by revising land use designations to include community-led development like higher density housing, green space, affordable commercial and residential spaces, and so on. It must also have policies and implementation measures for active investment into Southeast Fresno neighborhoods by businesses and the City alike in essential infrastructure, services, amenities, and community greening. To do less is to perpetuate the long-held City practice of denying Southeast Fresno residents their rights to shape the future of their neighborhoods and access to opportunity on the same terms as other Fresno residents.

Below you will find additional comments in response to the Notice of Preparation:

I. The Proposed Land Use Map is Inconsistent with Local and State Climate, Housing, and Transportation Goals and Policies to Build Equitable Climate Resilient Communities

As previously noted, it is unclear and of significant concern to what extent authentic public participation took place during this process from over a decade ago. The former process took place at the tail end of the housing bubble when building single-family homes in the

outskirts of the city limits was the priority and norm. This type of "leapfrog" development remains reflected in the SEDA land use map as a large portion of the 9,000 acres is zoned for low-density single-family housing. This is inconsistent with the current climate, housing, and transportation goals that aim to build communities with a variety of development and density to make them accessible to various incomes and for communities to get around by alternative modes of transportation.

Further, the second-largest land use is zoned for flexible research and development, which leaves space for more light industrial use, further industrializing south Fresno BIPOC communities. This current process is in stark contrast with other specific plans prepared and adopted by the City in recent years, which have emphasized resident self-determination in shaping their built environment, planning for complete and healthy communities, smart growth-promoting land use compatibility, and investment strategies and implementation measures designed to bring those plans' vision to life. The City must not proceed with its efforts to further cement unjust and exclusive land-use patterns in City planning practices.

Fourteen years later, we have learned that this growth pattern is economically and environmentally unsustainable as the City now struggles to balance the need to build out the infrastructure and maintain public services in these communities while attending to decades of deferred maintenance in established neighborhoods. This is reflected in the 2015 General Plan praised for limiting unsustainable sprawl growth and focusing on efficient infill development[1].

II. The Draft SEDA Proposed Land Use Map Violates Fair Housing, and Civil Rights Laws

The Draft SEDA Proposed Land Use Map lacks community input from the populations and people most affected by the SEDA. Nearby communities and residents have not had any meaningful engagement to develop the proposed land use map. And we have yet to see any evidence for community engagement or a community-guided land use map. The City should not proceed with an EIR for the SEDA until it corrects these failings.

Government Code section 8899.50(b) requires public agencies in California to affirmatively further fair housing in all policies and programs relating to housing and community development and "take no action that is materially inconsistent" with this obligation. Affirmatively further fair housing means:

> Taking 'meaningful actions, in addition to combating discrimination, that overcome patterns of segregation and fosters inclusive communities free from barriers that restrict

[1] Defined as being within the city limits by December 31, 2012. City of Fresno General Plan 2015, Objective UF-12.

> access to opportunity based on a protected characteristic. Specifically, affirmatively furthering fair housing means taking meaningful actions that, taken together, address significant disparities in housing needs and in access to opportunity, replacing segregated living patterns with truly integrated and balanced living patterns, transforming racially and ethnically concentrated areas of poverty into areas of opportunity, and fostering and maintaining compliance with civil rights laws and fair housing laws. Gov. Code § 8899.50(a)

As drafted, the land use map will mostly exclusively allow for medium to low-density single-family housing. Since the 1910s, this type of housing was promoted by local and federal agencies to further segregate low-income families from living in the more affluent neighborhoods as was known that these families would not be able to afford to purchase a home. These exclusive practices are even more evident as rankings from The Urban Institute ranked Fresno 253rd of 274 cities in overall inclusion, meaning we are one of the country's largest, most exclusive cities. Rather than learning from history, the City perpetuates these same exclusionary land-use practices by not including relatively more affordable higher-density housing. Thus, ensuring lower-income populations cannot live in this community.

Additionally, the City exposes residents to environmental hazards by applying industrial and business park land-use designations to a thousand acres within the SEDA area. It conflicts with the City's duty to avoid actions materially inconsistent with the City's duty to AFFH. *See* California Housing and Community Development's, Affirmatively Furthering Fair Housing: Guidance for All Public Entities and For Housing Elements, p. 16 (citing "zoning or siting toxic or polluting land uses or projects near a disadvantaged community" and "lack of investment in concentrated areas of poverty" as actions which are materially inconsistent with an agency's duty to AFFH).

III. Comments Relating to EIR Content

Should the City choose to proceed to develop a PEIR based on the Proposed Land Use Map, the City of Fresno must thoroughly assess the numerous significant impacts the SEDA will have on the environment, public health, air quality, economic feasibility, and housing for Southeast Fresno residents. The PEIR must adopt enforceable mitigation measures to avoid and minimize those impacts to the fullest extent possible. Further, the City must assess alternatives to the proposed project, including alternative land use designations that protect communities from developing new industrial land uses near sensitive land uses and provide a variety of housing

opportunities for all incomes and populations. Specifically, the City must ensure the SEDA PEIR:

- Accurately captures and analyzes baseline conditions and potentially significant project-specific and cumulative impacts within and adjacent to the planning area;
- Identifies plan alternatives, which would mitigate negative impacts of plan implementation and promote positive outcomes aligned with community members' expressed vision and priorities;
- Identifies and adopts all feasible and enforceable mitigation measures that avoid and reduce negative impacts;
- Analyzes and creates mitigation measures consistent with all applicable laws, including but not limited to state and federal fair housing, civil rights, and climate laws like Senate Bill 743 and;
- Meaningfully engages the public through a robust, accessible, and responsive process.

IV. Conclusion:

We urge City leaders and decision-makers to postpone developing the SEDA and instead reallocate Staff's limited capacity to finalize the Central Southeast Specific Plan and South Central Specific Plan, and, more notably, prepare to update the Housing Element on December 31, 2023, as required by California law[2]. City leaders should also be motivated to implement already adopted plans to avoid wasting City resources by having these documents, which take hundreds of thousands of dollars and countless staff hours to develop, "sit on the shelf." In jumping over other projects in line, SEDA will only facilitate "leapfrog" development perpetuating Fresno's unsustainable exclusive development patterns to the detriment of established neighborhoods.

Thank you for your consideration of these comments. Please contact us should you wish to find a time to discuss them.

Sincerely,

Karla Martinez
Leadership Counsel for Justice and Accountability

Nayamin Martinez
CCEJN

Kimberly McCoy
Fresno Building Healthy Communities

Ruben Espinoza
Fresno Barrios Unidos

[2] As required by California Government Section Code 65588.

NATIVE AMERICAN HERITAGE COMMISSION

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NAHC.ca.gov

February 23, 2022

Shawn Monk, Planner
City of Fresno
2600 Fresno Street, Suite 3065
Fresno, CA 93721

Re: 2022020486, Southeast Development Area Specific Plan Project, Fresno County

Dear Mr. Monk:

The Native American Heritage Commission (NAHC) has received the Notice of Preparation (NOP), Draft Environmental Impact Report (DEIR) or Early Consultation for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code §21000 et seq.), specifically Public Resources Code §21084.1, states that a project that may cause a substantial adverse change in the significance of a historical resource, is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, §15064.5 (b) (CEQA Guidelines §15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an Environmental Impact Report (EIR) shall be prepared. (Pub. Resources Code §21080 (d); Cal. Code Regs., tit. 14, § 5064 subd.(a)(1) (CEQA Guidelines §15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources within the area of potential effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code §21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code §21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code §21084.3 (a)). **AB 52 applies to any project for which a notice of preparation, a notice of negative declaration, or a mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements.** If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. §800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments.

Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:

- **a.** A brief description of the project.
- **b.** The lead agency contact information.
- **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code §21080.3.1 (d)).
- **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code §21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code §21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or Environmental Impact Report. (Pub. Resources Code §21080.3.1(b)).

- **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code §65352.4 (SB 18). (Pub. Resources Code §21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:

- **a.** Alternatives to the project.
- **b.** Recommended mitigation measures.
- **c.** Significant effects. (Pub. Resources Code §21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:

- **a.** Type of environmental review necessary.
- **b.** Significance of the tribal cultural resources.
- **c.** Significance of the project's impacts on tribal cultural resources.
- **d.** If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code §21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code §6254 (r) and §6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code §21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:

- **a.** Whether the proposed project has a significant impact on an identified tribal cultural resource.
- **b.** Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code §21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code §21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:

a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or

b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code §21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code §21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code §21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code §21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code §21084.3 (b). (Pub. Resources Code §21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:

a. Avoidance and preservation of the resources in place, including, but not limited to:

i. Planning and construction to avoid the resources and protect the cultural and natural context.

ii. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.

b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:

i. Protecting the cultural character and integrity of the resource.

ii. Protecting the traditional use of the resource.

iii. Protecting the confidentiality of the resource.

c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.

d. Protecting the resource. (Pub. Resource Code §21084.3 (b)).

e. Please note that a federally recognized California Native American tribe or a non-federally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code §815.3 (c)).

f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code §5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An Environmental Impact Report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:

a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code §21080.3.1 and §21080.3.2 and concluded pursuant to Public Resources Code §21080.3.2.

b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.

c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code §21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code §21082.3 (d)).

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code §65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf.

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code §65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code §65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code §5097.9 and §5097.993 that are within the city's or county's jurisdiction. (Gov. Code §65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/.

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
   a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
   b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
   a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, §15064.5(f) (CEQA Guidelines §15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
   b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
   c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code §7050.5, Public Resources Code §5097.98, and Cal. Code Regs., tit. 14, §15064.5, subdivisions (d) and (e) (CEQA Guidelines §15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

If you have any questions or need additional information, please contact me at my email address: Cameron.Vela@nahc.ca.gov.

Sincerely,

Cameron Vela

Cameron Vela
Cultural Resources Analyst

cc: State Clearinghouse

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ADELA MADRIGAL JONES
SUPERINTENDENT

March 25, 2022

Jennifer Clark, Director
City of Fresno
Planning and Development Department
2600 Fresno Street, Room 3065
Fresno, CA 93721

Subject: Notice of Preparation for SEDA Specific Plan Program EIR

Dear Ms. Clark:

This letter constitutes the response of the Sanger Unified School District to the Notice of Preparation for the Southeast Development Area (SEDA) Specific Plan EIR. The Sanger Unified School District encompasses most of the territory within SEDA (all land south of Tulare Avenue) and the majority of the potential 45,000 housing units.

The proposed plan shows 16 neighborhood centers within the Sanger Unified portion of SEDA, which will include an elementary school integrated with a park and other neighborhood center functions. Schools are key to facilitating livable, walkable, safe and sustainable neighborhoods. The District is ultimately responsible for planning for schools within its boundary and would like to partner with the City of Fresno in planning for schools within SEDA. The Draft Program EIR should analyze whether the number of schools shown is appropriate to adequately serve the buildout population of the SEDA Specific Plan based on anticipated student generation rates for the various types of planned housing units. The number of schools may need to be adjusted up or down accordingly.

The District has opened a new high school (Sanger West) at the northeast corner of Jensen and Fowler Avenues, which will also include a middle school serving grades 7-8. Although these new facilities will ultimately serve some of the future students in SEDA, at least one additional high school and middle school will be needed to serve development within SEDA.

Any future school site locations designated as part of the Specific Plan should be considered conceptual rather than locked into parcel specific locations. To obtain California Department of Education (CDE) site approval for a school site, the District has to go through a site-specific CEQA process, a rigorous hazardous materials testing process under the oversight of the Department of Toxic Substances Control, as well as prepare a number of other safety-related analyses and studies. This type of work usually occurs within five years or less of anticipated school construction as

CDE site approval is only good for five years. We need to have the flexibility to acquire the most appropriate sites in the optimal time frame for providing facilities to serve new development, taking into consideration the requirements of the CDE site approval process.

We note that this Program EIR will ultimately be useful to the District by allowing for tiering off the EIR when it prepares subsequent CEQA documents for individual school sites within the plan.

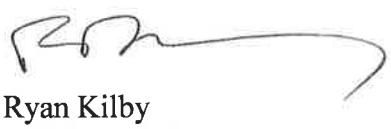
Another important consideration for the District is the issue of providing adequate school funding for facilities needed to accommodate growth. Schools are funded by a combination of statewide bond measures, local bond measures, and developer fees. State bond measures require voter approval and are anything but certain. When they are approved, the funds are often depleted quickly due to a backlog of unfunded projects. To get state funding, school districts must match with a local funding contribution that mostly comes from local bond measures which must be approved by local voters. The amount of the bond measures are based on assessed valuation, and the measures require a supermajority vote of either a 55% or 66.6% vote depending on the amount requested. Developer fees are an important school funding component, but they are substantially inadequate for funding schools unless state and local bond measures are approved.

Obtaining the funding necessary over time for 16 new elementary schools and at least another high school and middle school will be daunting, and Sanger Unified has traditionally had inadequate assessed valuation to provide for bond amounts necessary to meet its school facility needs. The business park and commercial designations within the Specific Plan will be helpful in this regard should these areas come to substantial fruition along with the residential component. However, the residential uses in these plans usually develop first, which leaves the District with inadequate assessed valuation to allow for bond measure amounts that will provide enough funding for adequate facilities to serve the students generated by the new homes. Consequently, the school facilities necessary to serve students from housing development within the Specific Plan may not be available when they are needed.

As you indicate in the NOP, a very important component of the Specific Plan is a comprehensive infrastructure plan. The infrastructure plan "must be accompanied by a comprehensive and detailed financing and implementation strategy that includes the phasing and financing of development and all major infrastructure." Sanger Unified needs to be an integral part of the infrastructure plan and we may need to look at alternative and innovative ways to adequately fund school construction so that school facilities can be provided when needed to serve new development.

Thank you for the opportunity to review and comment on the Notice of Preparation. We look forward to working with the City of Fresno on the infrastructure planning and EIR processes for the SEDA Specific Plan. Please let me know if you have any questions about this letter.

Sincerely,



Ryan Kilby
Chief Operations Officer

San Joaquin Valley
AIR POLLUTION CONTROL DISTRICT

HEALTHY AIR LIVING™

March 24, 2022

Jennifer Clark
c/o Shawn Monk
City of Fresno
Planning and Development Department
2600 Fresno Street, Suite 3065
Fresno, CA 93721

Project: Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan

District CEQA Reference No: 20220202

Dear Ms. Clark:

The San Joaquin Valley Unified Air Pollution Control District (District) has reviewed the City of Fresno's (City) Notice of Preparation (NOP) of a Program Environmental Impact Report (PEIR) for the Southeast Development Area Specific Plan (SEDA) (Project). Per the NOP, the proposed Project would designate land uses, establish a planning framework, and development standards to facilitate and guide future development within the approximately 9,000-acre planning area through the year 2050. The Project is located in the southeast portion of the City. The Project proposes revised land use and zoning designations, specific design guidelines, and process improvements. Future development would be required to comply with the proposed specific plan land use designations, development standards, and policy framework.

The District offers the following comments:

1) Land Use Planning

Nearly all development projects within the San Joaquin Valley Air Basin, from Specific Plans to individual projects have the potential to generate air pollutants, making it more difficult to attain state and federal ambient air quality standards. Land use decisions are critical to improving air quality within the San Joaquin Valley Air Basin because land use patterns greatly influence transportation needs, and motor vehicle emissions are the largest source of air pollution in the Valley. Land use decisions and project design elements such as preventing urban sprawl, encouraging mix-use development, and project design elements that reduce vehicle miles traveled (VMT) have proven to be beneficial for air quality.

Samir Sheikh
Executive Director/Air Pollution Control Officer

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The District recommends that the PEIR incorporate strategies that reduce VMTs and require the cleanest available heavy heavy-duty trucks (HHD) and vehicles, including zero and near-zero technologies. VMTs can be reduced through encouragement of mix-use development, walkable communities, etc. Additional design element options can be found at: http://www.valleyair.org/transportation/Mitigation-Measures.pdf

In addition, the District recommends that the PEIR incorporate strategies that will advance implementation of the best practices listed in Tables 5 and 6 of California Air Resource Board's (CARB's) Freight Handbook Concept Paper, to the extent feasible. This document compiles best practices designed to address air pollution impacts as "practices" which may apply to the siting, design, construction, and operation of freight facilities to minimize health impacts on nearby communities. The concept paper is available at:
https://ww2.arb.ca.gov/sites/default/files/2020-03/2019.12.12%20-%20Concept%20Paper%20for%20the%20Freight%20Handbook_1.pdf

2) Project Siting

The SEDA is the blueprint for future growth and provides guidance for the community's development. Without appropriate mitigation and associated policy, future development projects within the City may contribute to negative impacts on air quality due to increased traffic and ongoing operational emissions. Appropriate project siting helps ensure there is adequate distance between differing land uses, which can prevent or reduce localized and cumulative air pollution impacts from business operations that are in close proximity to receptors (e.g. residences, schools, health care facilities, etc.). SEDA siting-related goals, policies, and objectives should include measures and concepts outlined in the following resources:

- CARB's Air Quality and Land Use Handbook: A Community Health Perspective. The document includes tables with recommended buffer distances associated with various types of common sources (e.g. distribution centers, chrome platers, gasoline dispensing facilities, etc.), and can be found at: https://ww3.arb.ca.gov/ch/handbook.pdf

- CARB's Freight Handbook Concept Paper: This document compiles best practices designed to address air pollution impacts, which may apply to the siting, design, construction, and operation of freight facilities to minimize health impacts on nearby communities, and can be found at:
https://ww2.arb.ca.gov/sites/default/files/2020-03/2019.12.12%20-%20Concept%20Paper%20for%20the%20Freight%20Handbook_1.pdf

3) Criteria Pollutant Emissions

At the federal level under the National Ambient Air Quality Standards (NAAQS), the District is designated as extreme nonattainment for the 8-hour ozone standards and serious nonattainment for the particulate matter less than 2.5 microns in size (PM2.5) standards. At the state level under California Ambient Air Quality Standards (CAAQS), the District is designated as nonattainment for the 8-hour ozone, PM10, PM2.5 standards.

As such, the District recommends that the PEIR stipulate that future development projects within the SEDA identify and characterize project construction and operational air emissions. The District recommends the air emissions be compared to the following California Environmental Quality Act (CEQA) significance thresholds for annual emissions of criteria pollutants: 100 tons per year of carbon monoxide (CO), 10 tons per year of oxides of nitrogen (NOx), 10 tons per year of reactive organic gases (ROG), 27 tons per year of oxides of sulfur (SOx), 15 tons per year of particulate matter with an aerodynamic diameter less than or equal to a nominal 10 or 2.5 microns (PM10 or PM2.5). The District recommends that future proposed projects be mitigated to the extent feasible, and that future proposed projects with air emissions above the aforementioned thresholds be mitigated to below these thresholds.

The District understands that the SEDA is a program-level Project where future individual project-specific data may not be available at this time. As such, the PEIR should include a discussion of policies, which when implemented, will require assessment and characterization of project-level emissions, and subsequently require mitigation of air quality impacts to the extent feasible at the individual project-specific level. Environmental reviews of potential impacts on air quality should incorporate the following items:

3a) Construction Emissions

Construction air emissions are short-term emissions generated from construction activities such as mobile heavy-duty diesel off-road equipment, and should be evaluated separately from operational emissions. If air emissions from ongoing operational activities occur within the same year as construction emissions, those emissions should be combined.

Recommended Measure: To reduce impacts from construction-related diesel exhaust emissions, the Project should utilize clean off-road construction equipment, including the latest tier equipment as feasible.

3b) Operational Emissions

Operational (ongoing) air emissions from mobile sources and stationary sources should be analyzed separately. For reference, the District's annual criteria thresholds of significance are listed above.

Recommended Mitigation Measure: At a minimum, project related impacts on air quality should be reduced to levels of significance through incorporation of design elements such as the use of cleaner heavy-duty trucks and vehicles, measures that reduce VMTs, and measures that increase energy efficiency. More information on transportation mitigation measures can be found at: http://www.valleyair.org/transportation/Mitigation-Measures.pdf.

3c) Recommended Model for Quantifying Air Emissions

Project related criteria pollutant emissions from construction and operational sources should be identified and quantified. Emissions analysis should be performed using CalEEMod (**Cal**ifornia **E**mission **E**stimator **Mod**el), which uses the most recent approved version of relevant Air Resources Board (ARB) emissions models and emission factors. CalEEMod is available to the public and can be downloaded from the CalEEMod website at: www.caleemod.com.

4) Health Risk Screening/Assessment

To determine potential health impacts on surrounding receptors (residences, businesses, hospitals, day-care facilities, health care facilities, etc.) a Prioritization and/or a health risk assessment (HRA) should be performed for future projects within the SEDA. These health risk determinations should quantify and characterize potential Toxic Air Contaminant (TAC) air pollutants identified by the Office of Environmental Health Hazard Assessment (OEHHA) and CARB (that pose a present or potential hazard to human health.

Health risk analyses should include all potential air emissions from the project, which include emissions from construction of the facility, including multi-year construction, as well as ongoing operational activities of the facility. Note, two common sources of TACs can be attributed to diesel exhaust emitted from heavy-duty off-road earth moving equipment during construction, and from ongoing operation of heavy-duty on-road trucks. A list of TACs identified by OEHHA and CARB can be found at: https://ww2.arb.ca.gov/resources/documents/carb-identified-toxic-air-contaminants

Prioritization (Screening Health Risk Assessment):
A "Prioritization" is the recommended method for a conservative screening-level health risk assessment. The Prioritization should be performed using the California Air Pollution Control Officers Association's (CAPCOA) methodology. The District recommends that a more refined analysis, in the form of an HRA, be performed for any project resulting in a Prioritization score of 10 or greater. This is because the prioritization results are a conservative health risk representation, while the detailed HRA provides a more accurate health risk evaluation.

To assist land use agencies and project proponents with Prioritization analyses, the District has created a prioritization calculator based on the aforementioned CAPCOA guidelines, which can be found here:
http:www.valleyair.org/busind/pto/emission_factors/Criteria/Toxics/Utilities/PRIORITIZATION%20RMR%202016.XLS

Health Risk Assessment:
Prior to performing an HRA, it is strongly recommended that land use agencies/development project proponents contact the District to review the proposed health risk modeling protocol. A development project would be considered to have a potentially significant health risk if the HRA demonstrates that the project-related health impacts would exceed the Districts significance threshold of 20 in a million for carcinogenic risk, or 1.0 for either the Acute or Chronic Hazard Indices. A project with a significant health risk would trigger all feasible mitigation measures. The District strongly recommends that development projects that result in a significant health risk not be approved by the land use agency.

The District is available to review HRA protocols and analyses. For HRA submittals please provide the following information electronically to the District for review:

- HRA AERMOD model files
- HARP2 files
- Summary of emissions source locations, emissions rates, and emission factor calculations and methodology.

For assistance, please contact the District's Technical Services Department by:

- E-Mailing inquiries to: hramodeler@valleyair.org
- Calling (559) 230-5900

Recommended Measure: Development projects resulting in toxic air contaminant emissions should be located an adequate distance from residential areas and other

sensitive receptors in accordance to CARB's Air Quality and Land Use Handbook: A Community Health Perspective located at https://ww3.arb.ca.gov/ch/handbook.pdf.

5) Ambient Air Quality Analysis

An Ambient Air Quality Analysis (AAQA) uses air dispersion modeling to determine if emissions increases from a project will cause or contribute to a violation of State or National Ambient Air Quality Standards. The District recommends that the EIR requires an AAQA to be performed for any future development project with emissions that exceed 100 pounds per day of any pollutant.

An acceptable analysis would include emissions from both project-specific permitted and non-permitted equipment and activities. The District recommends consultation with District staff to determine the appropriate model and input data to use in the analysis.

Specific information for assessing significance, including screening tools and modeling guidance, is available online at the District's website: www.valleyair.org/ceqa.

6) Voluntary Emission Reduction Agreement

Future development projects within the SEDA could have a significant impact on air quality. The District recommends the PEIR also include a discussion on the feasibility of implementing a Voluntary Emission Reduction Agreement (VERA) for this Project.

A VERA is a mitigation measure by which the project proponent provides pound-for-pound mitigation of emissions increases through a process that develops, funds, and implements emission reduction projects, with the District serving a role of administrator of the emissions reduction projects and verifier of the successful mitigation effort. To implement a VERA, the project proponent and the District enter into a contractual agreement in which the project proponent agrees to mitigate Project specific emissions by providing funds for the District's incentives programs. The funds are disbursed by the District in the form of grants for projects that achieve emission reductions. Thus, project-related impacts on air quality can be mitigated. Types of emission reduction projects that have been funded in the past include electrification of stationary internal combustion engines (such as agricultural irrigation pumps), replacing old heavy-duty trucks with new, cleaner, more efficient heavy-duty trucks, and replacement of old farm tractors.

In implementing a VERA, the District verifies the actual emission reductions that have been achieved as a result of completed grant contracts, monitors the emission

reduction projects, and ensures the enforceability of achieved reductions. After the project is mitigated, the District certifies to the Lead Agency that the mitigation is completed, providing the Lead Agency with an enforceable mitigation measure demonstrating that project-specific regional emissions have been mitigated to less than significant. To assist the Lead Agency and project proponent in ensuring that the environmental document is compliant with CEQA, the District recommends the Draft PEIR includes an assessment of the feasibility of implementing a VERA.

7) Truck Routing

Truck routing involves the path/roads heavy-duty trucks take to and from their destination. The air emissions from heavy-duty trucks can impact residential communities and sensitive receptors.

The District recommends the City evaluate heavy-duty truck routing patterns as they consider the detailed zoning changes within the scope of the Project, with the aim of limiting emission exposure to residential communities and sensitive receptors. This evaluation would consider the current truck routes, the quantity and type of each truck (Medium Heavy Duty (MHD), (HHD), etc.), the destination and origin of each trip, traffic volume correlation with the time of day or the day of the week, overall VMT, and associated exhaust emissions. The truck routing evaluation would also identify alternative truck routes and their impacts on VMT, GHG emissions, and air quality.

8) Cleanest Available Truck

The San Joaquin Valley will not be able to attain stringent health-based federal air quality standards without significant reductions in emissions from HHD Trucks, the single largest source of NOx emissions in the San Joaquin Valley. The District recently adopted the 2018 PM2.5 Plan, which includes significant new reductions from HHD Trucks, including emissions reductions by 2023 through the implementation of the CARB Statewide Truck and Bus Regulation, which requires truck fleets operating in California to meet the 2010 0.2 g/bhp-hr NOx standard by 2023. Additionally, to meet the federal air quality standards by the 2020 to 2024 attainment deadlines, the District's Plan relies on a significant and immediate transition of heavy-duty truck fleets to zero or near-zero emissions technologies, including the near-zero truck standard of 0.02 g/bhp-hr NOx established by the CARB.

If future development projects include Industrial (e.g. warehouse, distribution)which typically generate a high volume of heavy duty truck traffic traveling to-and-from the project location at longer trip length distances for potential distribution, the District recommends that the following mitigation measures be considered by the City for inclusion in the PEIR for project related operational emissions.

- Recommended Measure: Fleets associated with project operational activities utilize the cleanest available HHD truck technologies, including zero and near-zero (0.02 g/bhp-hr NOx) technologies as feasible.

- Recommended Measure: All on-site service equipment (cargo handling, yard hostlers, forklifts, pallet jacks, etc.) utilize zero-emissions technologies as feasible.

In addition, the District recommends that the City include mitigation measures to reduce project related operational impacts through incorporation of design elements, for example, increased energy efficiency, reducing vehicle miles traveled, etc. More information on mitigation measures can be found on the District's website at: http://www.valleyair.org/transportation/ceqa_idx.htm.

9) Reduce Idling of Heavy-Duty Trucks

The goal of this strategy is to limit the potential for localized PM2.5 and toxic air quality impacts associated with failure to comply with the state's Heavy Duty anti-idling regulation (e.g limiting vehicle idling to specific time limits). The diesel exhaust from excessive idling has the potential to impose significant adverse health and environmental impacts. Therefore, efforts to ensure compliance of the anti-idling regulation, especially near sensitive receptors, is important to limit the amount of idling, which will result in air quality benefits.

10) Electric On-Site Off-Road and On-Road Equipment

Future development may have the potential to result in increased use of off-road equipment (i.e. forklifts) and/or on-road equipment (i.e. mobile yard trucks with the ability to move materials). The District recommends the City advise the project proponent to utilize electric or zero emission off-road and on-road equipment used on-site for this Project.

11) Under-fired Charbroilers

Future development projects for restaurants with under-fired charbroilers may pose the potential for immediate health risk, particularly when located in densely developed locations near sensitive receptors. Since the cooking of meat can release carcinogenic PM2.5 species like polycyclic aromatic hydrocarbons, controlling emissions from new under-fired charbroilers will have a substantial positive impact on public health. The air quality impacts on neighborhoods near restaurants with under-fired charbroilers can be significant on days when meteorological conditions are

stable, when dispersion is limited and emissions are trapped near the surface within the surrounding neighborhoods. This potential for neighborhood-level concentration of emissions during evening or multi-day stagnation events raises air quality concerns.

Furthermore, reducing commercial charbroiling emissions is essential to achieving attainment of multiple federal PM2.5 standards and associated health benefits in the Valley. Therefore, the District recommends that the PEIR include a measure requiring the assessment and potential installation, as technologically feasible, of particulate matter emission control systems for new large restaurants operating under-fired charbroilers. The District is available to assist the City and project proponents with this assessment. Additionally, to ease the financial burden for Valley businesses, the District is currently offering substantial incentive funding that covers the full cost of purchasing, installing, and maintaining the system for up to two years. Please contact the District at (559) 230-5800 or technology@valleyair.org for more information.

12) Health Impact Discussion

As required by the recent decision in Sierra Club v. County of Fresno (2018) 6 Cal.4th 502, a reasonable effort to discuss relevant specifics regarding the connection between potential adverse air quality impacts from the Project with the likely nature and magnitude of potential health impacts may be required. If the potential health impacts from the Project cannot be specifically correlated, explain what is known and why, given scientific constraints, potential health impacts cannot be translated.

13) Vegetative Barriers and Urban Greening

For future development projects within the SEDA, and at strategic locations throughout the SEDA in general, the District suggests the City consider incorporating vegetative barriers and urban greening as a measure to further reduce air pollution exposure on sensitive receptors (i.e. residences, schools, healthcare facilities).

While various emission control techniques and programs exist to reduce air quality emissions from mobile and stationary sources, vegetative barriers have been shown to be an additional measure to potentially reduce a population's exposure to air pollution through the interception of airborne particles and the update of gaseous pollutants. Examples of vegetative barriers include, but not limited to the following: trees, bushes, shrubs, or a mix of these. Generally, a higher and thicker vegetative barrier with full coverage will result in greater reductions in downwind pollutant concentrations. In the same manner, urban greening is also a way to help improve air quality and public health in addition to enhancing the overall beautification of a project with drought resistant low maintenance greenery.

14) On-site Solar Deployment

It is the policy of the State of California that renewable energy resources and zero-carbon resources supply 100% of retail sales of electricity to California end-use customers by December 31, 2045. While various emission control techniques and programs exist to reduce air quality emissions from mobile and stationary sources, the production of solar energy is contributing to improving air quality and public health. The District suggests that the City consider the feasibility of incorporating solar power systems, as an emission reduction strategy for future development projects within the SEDA.

15) Electric Vehicle Charger

To support and accelerate the installation of electric vehicle charging equipment and development of required infrastructure, the District offers incentives to public agencies, businesses, and property owners of multi-unit dwellings to install electric charging infrastructure (Level 2 and 3 chargers). The purpose of this incentive program is to promote clean air alternative-fuel technologies and the use of low or zero-emission vehicles. The District suggests that the City and project proponents install electric vehicle chargers at project sites, and at strategic locations throughout the SEDA.

Please visit www.valleyair.org/grants/chargeup.htm for more information.

16) Nuisance Odors

While offensive odors rarely cause any physical harm, they can be unpleasant, leading to considerable distress among the public and often resulting in citizen complaints.

The City should consider all available pertinent information to determine if future development projects could have a significant impact related to nuisance odors. Nuisance odors may be assessed qualitatively taking into consideration the proposed business or industry type and its potential to create odors, as well as proximity to off-site receptors that potentially would be exposed to objectionable odors. The intensity of an odor source's operations and its proximity to receptors influences the potential significance of malodorous emissions. Any project with the potential to frequently expose members of the public to objectionable odors should be deemed to have a significant impact.

According to the District Guidance for Assessing and Mitigating air Quality Impacts (GAMAQI), a significant odor impact is defined as more than one confirmed complaint per year averaged over a three-year period, or three unconfirmed complaints per year

averaged over a three-year period. An unconfirmed complaint means that either the odor or air contaminant release could not be detected, or the source of the odor could not be determined.

As the future development projects that will fall within the SEDA do not yet exist and cannot be evaluated against the above complaint-driven odor significance criteria, the City should determine which business or industry types have historically triggered the significance criteria, and stipulate odor mitigation measures in the PEIR as conditions of approval for those business and industry types. The District recommends that any project proponent whose project is determined to have a potentially significant odor impact should be required to draft and maintain an Odor Management Plan (OMP) as a mitigation measure in the PEIR.

17) District Rules and Regulations

The District issues permits for many types of air pollution sources and regulates some activities not requiring permits. A project subject to District rules and regulation would reduce its impacts on air quality through compliance with regulatory requirements. In general, a regulation is a collection of rules, each of which deals with a specific topic. Here are a couple of example, Regulation II (Permits) deals with permitting emission sources and includes rules such as District permit requirements (Rule 2010), New and Modified Stationary Source Review (Rule 2201), and implementation of Emission Reduction Credit Banking (Rule 2301).

The list of rules below is neither exhaustive nor exclusive. Current District rules can be found online at: www.valleyair.org/rules/1ruleslist.htm. To identify other District rules or regulations that apply to this Project or to obtain information about District permit requirements, the applicant is strongly encouraged to contact the District's Small Business Assistance (SBA) Office at (559) 230-5888.

17a) District Rules 2010 and 2201 - Air Quality Permitting for Stationary Sources

Stationary Source emissions include any building, structure, facility, or installation which emits or may emit any affected pollutant directly or as a fugitive emission. District Rule 2010 requires operators of emission sources to obtain an Authority to Construct (ATC) and Permit to Operate (PTO) from the District. District Rule 2201 requires that new and modified stationary sources of emissions mitigate their emissions using best available control technology (BACT).

Future development projects may be subject to District Rule 2010 (Permits Required) and Rule 2201 (New and Modified Stationary Source Review) and may

require District permits. Prior to construction, the project proponents should submit to the District an application for an Authority to Construct (ATC).

Recommended Mitigation Measure: For projects subject to permitting by the San Joaquin Valley Air Pollution Control District, demonstration of compliance with District Rule 2201 shall be provided to the City before issuance of the first building permit.

For further information or assistance, the project proponent may contact the District's Small Business Assistance (SBA) Office at (559) 230-5888.

17b) <u>District Rule 9510 (Indirect Source Review)</u>

The purpose of District Rule 9510 is to reduce the growth in both NOx and PM10 emissions associated with development and transportation projects from mobile and area sources associated with construction and operation of development projects. The rule encourages clean air design elements to be incorporated into development projects. In case the proposed development project clean air design elements are insufficient to meet the targeted emission reductions, the rule requires developers to pay a fee used to fund projects to achieve off-site emissions reductions.

Accordingly, future development project(s) within the SEDA would be subject to District Rule 9510 if upon full buildout, the project would equal or exceed any of the following applicability thresholds, depending on the type of development and the public agency approval mechanism:

Table 1: ISR Applicability Thresholds

Development Type	Discretionary Approval Threshold	Ministerial Approval / Allowed Use / By Right Thresholds
Residential	50 dwelling units	250 dwelling units
Commercial	2,000 square feet	10,000 square feet
Light Industrial	25,000 square feet	125,000 square feet
Heavy Industrial	100,000 square feet	500,000 square feet
Medical Office	20,000 square feet	100,000 square feet
General Office	39,000 square feet	195,000 square feet
Educational Office	9,000 square feet	45,000 square feet
Government	10,00 square feet	50,000 square feet
Recreational	20,000 square feet	100,000 square feet
Other	9,000 square feet	45,000 square feet

District Rule 9510 also applies to any transportation or transit development projects where construction exhaust emissions equal or exceed two (2.0) tons of NOx or two (2.0) tons of PM10.

In the case the future development project(s) are subject to District Rule 9510, an Air Impact Assessment (AIA) application is required and the District recommends that demonstration of compliance with District Rule 9510, before issuance of the first building permit, be made a condition of Project approval.

Information about how to comply with District Rule 9510 can be found online at: http://www.valleyair.org/ISR/ISRHome.htm.

The AIA application form can be found online at: http://www.valleyair.org/ISR/ISRFormsAndApplications.htm.

District staff is available to provide assistance with determining if future development projects will be subject to Rule 9510, and can be reached by phone at (559) 230-6000 or by email at ISR@valleyair.org.

17c) District Rule 9410 (Employer Based Trip Reduction)

Future development projects may be subject to District Rule 9410 (Employer Based Trip Reduction) if the Project would result in employment of 100 or more "eligible" employees. District Rule 9410 requires employers with 100 or more "eligible" employees at a worksite to establish an Employer Trip Reduction Implementation Plan (eTRIP) that encourages employees to reduce single-occupancy vehicle trips, thus reducing pollutant emissions associated with work commutes. Under an eTRIP plan, employers have the flexibility to select the options that work best for their worksites and their employees.

Information about how District Rule 9410 can be found online at: www.valleyair.org/tripreduction.htm.

For additional information, you can contact the District by phone at 559-230-6000 or by e-mail at etrip@valleyair.org

17d) District Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)

The purpose of this rule is to limit emissions of carbon monoxide and particulate matter from wood burning fireplaces, wood burning heaters, and outdoor wood burning devices. This rule establishes limitations on the installation of new wood burning fireplaces and wood burning heaters. Specifically, at elevations below

3,000 feet in areas with natural gas service, no person shall install a wood burning fireplace, low mass fireplace, masonry heater, or wood burning heater.

Information about District Rule 4901 can be found online at:
http://valleyair.org/rule4901/

17e) District Regulation VII – Fugitive PM10 Prohibitions

The project proponent may be required to submit a Construction Notification Form or submit and receive approval of a Dust Control Plan prior to commencing any earthmoving activities as described in Regulation VIII, specifically Rule 8021 – *Construction, Demolition, Excavation, Extraction, and Other Earthmoving Activities.*

The application for both the Construction Notification and Dust Control Plan can be found online at:
https://www.valleyair.org/busind/comply/PM10/forms/DCP-Form.docx

Information about District Regulation VIII can be found online at:
http://www.valleyair.org/busind/comply/pm10/compliance_pm10.htm

17f) Other District Rules and Regulations

Future development projects may also be subject to the following District rules: Rule 4102 (Nuisance), Rule 4601 (Architectural Coatings), and Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving and Maintenance Operations). In the event an existing building will be renovated, partially demolished or removed, the project may be subject to District Rule 4002 (National Emission Standards for Hazardous Air Pollutants).

18) Future Projects / Land Use Agency Referral Documents

Future development projects may require an environmental review and air emissions mitigation. Referral documents and environmental review documents for these projects should include a project summary, the land use designation, project size, air emissions quantifications and impacts, and proximity to sensitive receptors and existing emission sources, and air emissions mitigation measures. For reference and guidance, more information can be found in the District's Guidance for Assessing and Mitigating Air Quality Impacts at: https://www.valleyair.org/transportation/GAMAQI.pdf

If you have any questions or require further information, please contact Cherie Clark by e-mail at Cherie.Clark@valleyair.org or by phone at (559) 230-5940.

Sincerely,

Brian Clements
Director of Permit Services



For Mark Montelongo
Program Manager

Appendix B:
Air Quality, Greenhouse Gas Emissions Supporting Information

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Appendix B: Air Quality, Greenhouse Gases Emissions and Supporting Information

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Project Existing Operational CalEEMod Output File 4

Project Proposed Construction and Operational CalEEMod Output File 40

Project Construction Emissions Summary

Model File: Fresno SEDA EIR Project - Fresno County, Annual

Timestamp: Date: 6/22/2022 9:53 AM

	ROG	NO_X	CO	SO_2	Fugitive PM_{10}	Exhaust PM_{10}	PM_{10} Total	Fugitive $PM_{2.5}$	Exhaust $PM_{2.5}$	$PM_{2.5}$ Total	Bio- CO_2	NBio- CO_2	Total CO_2	CH_4	N_2O	CO_2e
Year	tons/yr										MT/yr					
2024	1770.5964	201.5825	340.2451	1.6208	129.3799	2.1115	131.4914	35.2252	1.9855	37.2107	0	151683.704	151683.704	3.2035	12.9239	155615.1
2025	668.3045	188.8548	285.1465	1.4749	117.1887	1.7204	118.9091	31.761	1.6238	33.3848	0	138266.822	138266.822	2.4773	12.3046	141995.5
2026	30.4544	180.529	251.5594	1.3802	110.2011	1.4874	111.6886	29.8676	1.4089	31.2765	0	129564.913	129564.913	1.9166	11.8712	133150.4
2027	28.7114	178.017	239.1028	1.3455	110.2011	1.46	111.6611	29.8676	1.3833	31.2509	0	126314.12	126314.12	1.7689	11.5651	129804.8
2028	27.0101	175.3334	227.9141	1.3084	109.779	1.4266	111.2056	29.7532	1.3522	31.1054	0	122839.698	122839.698	1.6365	11.2392	126229.9
2029	25.5933	174.0968	219.8407	1.2838	110.2012	1.4042	111.6054	29.8677	1.3314	31.1991	0	120532.5	120532.5	1.5317	11.0196	123854.6
2030	24.1589	171.9972	212.3085	1.2576	110.2013	1.3298	111.5311	29.8677	1.2629	31.1306	0	118074.578	118074.578	1.3778	10.7859	121323.2
2031	22.8046	170.8218	205.8132	1.234	110.2014	1.3075	111.5089	29.8677	1.2422	31.1099	0	115855.553	115855.553	1.2921	10.582	119041.3
2032	21.6999	170.5107	201.1399	1.2178	110.6236	1.2918	111.9154	29.9822	1.2277	31.2099	0	114335.927	114335.927	1.2224	10.4461	117479.4
2033	20.472	168.4612	195.0109	1.1902	109.7792	1.2633	111.0426	29.7533	1.2011	30.9544	0	111750.226	111750.226	1.149	10.2156	114823.2
2034	19.5487	167.7409	191.0233	1.1739	109.7793	1.2452	111.0245	29.7533	1.1843	30.9376	0	110224.391	110224.391	1.092	10.0823	113256.2
2035	18.7751	167.5912	188.3113	1.164	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0	109299.305	109299.305	1.0457	10.0046	112306.8
2036	18.8471	168.2333	189.0328	1.1685	110.6238	1.23	111.8537	29.9822	1.1698	31.152	0	109718.076	109718.076	1.0497	10.0429	112737.1
2037	18.7751	167.5912	188.3113	1.164	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0	109299.305	109299.305	1.0457	10.0046	112306.8
2038	18.7751	167.5912	188.3113	1.164	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0	109299.305	109299.305	1.0457	10.0046	112306.8
2039	18.7032	166.9491	187.5898	1.1596	109.7793	1.2206	110.9999	29.7533	1.1609	30.9142	0	108880.533	108880.533	1.0417	9.9662	111876.5
2040	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.368	29.8679	1.1103	30.9782	0	104777.37	104777.37	0.8787	9.6159	107664.9
2041	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.368	29.8679	1.1103	30.9782	0	104777.37	104777.37	0.8787	9.6159	107664.9
2042	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.368	29.8679	1.1103	30.9782	0	104777.37	104777.37	0.8787	9.6159	107664.9
2043	5.1879	54.5964	58.3767	0.3677	36.3117	0.3843	36.696	9.8415	0.3659	10.2074	0	34524.344	34524.344	0.2895	3.1684	35475.8
Maximum	1770.5964	201.5825	340.2451	1.6208	129.3799	2.1115	131.4914	35.2252	1.9855	37.2107	0	151683.704	151683.704	3.2035	12.9239	155615.1
Total	**2805.6515**	**3337.5785**	**4100.5374**	**24.0226**	**2155.4605**	**26.0571**	**2181.5177**	**584.3506**	**24.7267**	**609.0773**	**0**	**2254795.41**	**2254795.41**	**26.8219**	**205.0745**	**2316578.1**
															Amortized	**77219.3**

Project Operational Emissions Summary

Model File: Fresno SEDA EIR Project - Fresno County, Annual
Timestamp: Date: 6/22/2022 9:53 AM
Model File: Fresno SEDA Baseline - Existing Land Uses - Fresno County, Annual
Timestamp: Date: 6/24/2022 11:31 AM

Emissions Source	ROG	NO_x	CO	SO_x	PM_{10} (Total)	$PM_{2.5}$ (Total)
	Tons per Year					
Area	1,100.19	19.43	320.23	0.12	3.02	3.02
Energy	6.47	56.24	30.23	0.35	4.47	4.47
Mobile	166.63	311.03	1,798.71	4.59	644.30	173.88
Waste	0.00	0.00	0.00	0.00	0.00	0.00
Water	0.00	0.00	0.00	0.00	0.00	0.00
Total	**1,273.29**	**386.69**	**2,149.17**	**5.06**	**651.79**	**181.37**
Existing Emissions	178.12	83.42	462.80	0.87	71.17	29.72
Net Total	**1,095.17**	**303.27**	**1,686.37**	**4.19**	**580.62**	**151.65**
SJVAPCD Significance Thresholds	10	10	100	27	15	15
Exceeds Threshold?	**Yes**	**Yes**	**Yes**	**No**	**Yes**	**Yes**

Project Operational GHG Emissions Summary

Construction - GHG Emissions

Fresno SEDA EIR Project - Fresno County, Annual

Date: 6/22/2022 9:53 AM

Operations - GHG Emissions

Fresno SEDA Baseline - Existing Land Uses - Fresno County, Annual

Date: 6/24/2022 11:31 AM

Emissions Source	CO_2e (Metric Tons per Year)
	2050
Area	18,945
Energy	111,179
Mobile	432,219
Waste	25,336
Water	14,233
Total	**601,912**
Existing Emissions	91,121
NET Emissions	**510,791**

Fresno SEDA Baseline - Existing Land Uses

Fresno County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Government (Civic Center)	233.67	1000sqft	5.36	233,670.00	0
Elementary School	1,254.22	1000sqft	28.79	1,254,220.00	0
Industrial Park	5,481.88	1000sqft	125.85	5,481,880.00	0
Other Non-Asphalt Surfaces	21,488.92	1000sqft	493.32	21,488,920.00	0
Parking Lot	536.18	Acre	536.18	23,356,000.80	0
City Park	6,171.71	Acre	6,171.71	268,839,687.60	0
Single Family Housing	1,390.00	Dwelling Unit	1,436.00	2,502,000.00	3975
Strip Mall	91.34	1000sqft	2.10	91,340.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2019
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Note 1

Construction Phase - Adjusted to represent operational emissions only

Grading -

Area Mitigation - Per SJVAPCD Rule 4601

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	11,000.00	0.00
tblConstructionPhase	NumDays	155,000.00	0.00
tblConstructionPhase	NumDays	10,000.00	0.00
tblConstructionPhase	NumDays	15,500.00	0.00
tblConstructionPhase	NumDays	11,000.00	0.00
tblConstructionPhase	NumDays	6,000.00	0.00
tblConstructionPhase	PhaseEndDate	11/3/2817	9/5/2775
tblConstructionPhase	PhaseEndDate	7/7/2733	5/22/2139
tblConstructionPhase	PhaseEndDate	12/22/2056	8/26/2018
tblConstructionPhase	PhaseEndDate	5/22/2139	12/22/2079
tblConstructionPhase	PhaseEndDate	9/5/2775	7/7/2733
tblConstructionPhase	PhaseEndDate	12/22/2079	12/22/2056
tblLandUse	LandUseSquareFeet	21,488,900.00	21,488,920.00
tblLandUse	LotAcreage	451.30	1,436.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

2079	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2139	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2733	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2775	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2018	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2056	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2079	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2139	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2733	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2775	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Maximum	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
		Highest		

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	137.1176	1.6166	105.4965	0.1537		13.0547	13.0547		13.0547	13.0547	1,154.8420	619.6473	1,774.4893	0.0298	0.1129	1,808.8896
Energy	0.7518	6.7366	5.0206	0.0410		0.5195	0.5195		0.5195	0.5195	0.0000	14,753.2870	14,753.2870	1.3257	0.2798	14,869.8123
Mobile	40.2554	75.0704	352.2783	0.6713	56.5246	1.0695	57.5940	15.1339	1.0125	16.1464	0.0000	62,072.8969	62,072.8969	4.3208	3.8617	63,331.7086
Waste						0.0000	0.0000		0.0000	0.0000	2,398.8701	0.0000	2,398.8701	141.7692	0.0000	5,943.0990
Water						0.0000	0.0000		0.0000	0.0000	459.3214	3,165.4677	3,624.7891	47.6888	1.1760	5,167.4632
Total	**178.1248**	**83.4236**	**462.7954**	**0.8659**	**56.5246**	**14.6436**	**71.1681**	**15.1339**	**14.5866**	**29.7205**	**4,013.0334**	**80,611.2989**	**84,624.3323**	**195.1342**	**5.4305**	**91,120.9727**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	137.1176	1.6166	105.4965	0.1537		13.0547	13.0547		13.0547	13.0547	1,154.8420	619.6473	1,774.4893	0.0298	0.1129	1,808.8896
Energy	0.7518	6.7366	5.0206	0.0410		0.5195	0.5195		0.5195	0.5195	0.0000	14,753.2870	14,753.2870	1.3257	0.2798	14,869.8123
Mobile	40.2554	75.0704	352.2783	0.6713	56.5246	1.0695	57.5940	15.1339	1.0125	16.1464	0.0000	62,072.8969	62,072.8969	4.3208	3.8617	63,331.7086
Waste						0.0000	0.0000		0.0000	0.0000	2,398.8701	0.0000	2,398.8701	141.7692	0.0000	5,943.0990
Water						0.0000	0.0000		0.0000	0.0000	459.3214	3,165.4677	3,624.7891	47.6888	1.1760	5,167.4632
Total	**178.1248**	**83.4236**	**462.7954**	**0.8659**	**56.5246**	**14.6436**	**71.1681**	**15.1339**	**14.5866**	**29.7205**	**4,013.0334**	**80,611.2989**	**84,624.3323**	**195.1342**	**5.4305**	**91,120.9727**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	8/27/2018	8/26/2018	5	0	
2	Site Preparation	Site Preparation	12/23/2056	12/22/2056	5	0	
3	Grading	Grading	12/23/2079	12/22/2079	5	0	

4	Building Construction	Building Construction	5/23/2139	5/22/2139	5	0	
5	Paving	Paving	7/8/2733	7/7/2733	5	0	
6	Architectural Coating	Architectural Coating	9/6/2775	9/5/2775	5	0	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 1029.5

Residential Indoor: 5,066,550; Residential Outdoor: 1,688,850; Non-Residential Indoor: 10,591,667; Non-Residential Outdoor: 3,530,556; Striped Parking Area: 2,690,695 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42

Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	135,181.00	52,719.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	27,036.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.3 Site Preparation - 2056

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.4 Grading - 2079

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.5 Building Construction - 2139

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.6 Paving - 2733

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Paving	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.7 Architectural Coating - 2775

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	40.2554	75.0704	352.2783	0.6713	56.5246	1.0695	57.5940	15.1339	1.0125	16.1464	0.0000	62,072.8969	62,072.8969	4.3208	3.8617	63,331.7086

Unmitigated	40.2554	75.0704	352.2783	0.6713	56.5246	1.0695	57.5940	15.1339	1.0125	16.1464	0.0000	62,072.8969	62,072.8969	4.3208	3.8617	63,331.7086

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	4,813.93	12,096.55	13516.04	15,152,046	15,152,046
Elementary School	24,482.37	0.00	0.00	38,558,675	38,558,675
Government (Civic Center)	7,940.11	0.00	0.00	10,841,858	10,841,858
Industrial Park	18,473.94	13,923.98	6797.53	42,357,953	42,357,953
Other Non-Asphalt Surfaces	0.00	0.00	0.00		
Parking Lot	0.00	0.00	0.00		
Single Family Housing	13,121.60	13,260.60	11884.50	37,982,369	37,982,369
Strip Mall	4,048.19	3,839.93	1866.08	5,708,452	5,708,452
Total	72,880.14	43,121.06	34,064.15	150,601,353	150,601,353

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6
Elementary School	9.50	7.30	7.30	65.00	30.00	5.00	63	25	12
Government (Civic Center)	9.50	7.30	7.30	75.00	20.00	5.00	50	34	16

Industrial Park	9.50	7.30	7.30	59.00	28.00	13.00	79	19	2
Other Non-Asphalt Surfaces	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Single Family Housing	10.80	7.30	7.50	48.40	15.90	35.70	86	11	3
Strip Mall	9.50	7.30	7.30	16.60	64.40	19.00	45	40	15

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Elementary School	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Government (Civic Center)	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Industrial Park	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Other Non-Asphalt Surfaces	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Parking Lot	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Single Family Housing	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625
Strip Mall	0.482772	0.053013	0.177201	0.181386	0.030694	0.007689	0.014311	0.021176	0.000804	0.000296	0.025348	0.001685	0.003625

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated	Appendix B					0.0000	0.0000		0.0000	0.0000	0.0000	7,312.7066	7,312.7066	1.1831	0.1434	7,385.0162

Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	7,312.7066	7,312.7066	1.1831	0.1434	7,385.0162
NaturalGas Mitigated	0.7518	6.7366	5.0206	0.0410		0.5195	0.5195		0.5195	0.5195	0.0000	7,440.5804	7,440.5804	0.1426	0.1364	7,484.7961
NaturalGas Unmitigated	0.7518	6.7366	5.0206	0.0410		0.5195	0.5195		0.5195	0.5195	0.0000	7,440.5804	7,440.5804	0.1426	0.1364	7,484.7961

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	3.1205e+007	0.1683	1.5297	1.2849	9.1800e-003		0.1163	0.1163		0.1163	0.1163	0.0000	1,665.2173	1,665.2173	0.0319	0.0305	1,675.1129
Government (Civic Center)	3.01902e+006	0.0163	0.1480	0.1243	8.9000e-004		0.0113	0.0113		0.0113	0.0113	0.0000	161.1062	161.1062	3.0900e-003	2.9500e-003	162.0636
Industrial Park	7.08259e+007	0.3819	3.4719	2.9164	0.0208		0.2639	0.2639		0.2639	0.2639	0.0000	3,779.5392	3,779.5392	0.0724	0.0693	3,801.9991
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.34122e+007	0.1802	1.5396	0.6551	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	1,783.0019	1,783.0019	0.0342	0.0327	1,793.5974
Strip Mall	969117	5.2300e-003	0.0475	0.0399	2.9000e-004		3.6100e-003	3.6100e-003		3.6100e-003	3.6100e-003	0.0000	51.7158	51.7158	9.9000e-004	9.5000e-004	52.0231
Total		**0.7518**	**6.7366**	**5.0206**	**0.0410**		**0.5195**	**0.5195**		**0.5195**	**0.5195**	**0.0000**	**7,440.5804**	**7,440.5804**	**0.1426**	**0.1364**	**7,484.7961**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Elementary School	3.1205e+007	0.1683	1.5297	1.2849	9.1800e-003		0.1163	0.1163		0.1163	0.1163	0.0000	1,665.2173	1,665.2173	0.0319	0.0305	1,675.1129
Government (Civic Center)	3.01902e+006	0.0163	0.1480	0.1243	8.9000e-004		0.0113	0.0113		0.0113	0.0113	0.0000	161.1062	161.1062	3.0900e-003	2.9500e-003	162.0636
Industrial Park	7.08259e+007	0.3819	3.4719	2.9164	0.0208		0.2639	0.2639		0.2639	0.2639	0.0000	3,779.5392	3,779.5392	0.0724	0.0693	3,801.9991
Other Non-Asphalt Surfaces	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	3.34122e+007	0.1802	1.5396	0.6551	9.8300e-003		0.1245	0.1245		0.1245	0.1245	0.0000	1,783.0019	1,783.0019	0.0342	0.0327	1,793.5974
Strip Mall	969117	5.2300e-003	0.0475	0.0399	2.9000e-004		3.6100e-003	3.6100e-003		3.6100e-003	3.6100e-003	0.0000	51.7158	51.7158	9.9000e-004	9.5000e-004	52.0231
Total		**0.7518**	**6.7366**	**5.0206**	**0.0410**		**0.5195**	**0.5195**		**0.5195**	**0.5195**	**0.0000**	**7,440.5804**	**7,440.5804**	**0.1426**	**0.1364**	**7,484.7961**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use		Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	tons/yr	MT/yr			
City Park	0		0.0000	0.0000	0.0000	0.0000
Elementary School	8.5287e+006		789.1071	0.1277	0.0155	796.9100
Government (Civic Center)	2.06564e+006		191.1211	0.0309	3.7500e-003	193.0109
Industrial Park	4.84598e+007		4,483.6853	0.7254	0.0879	4,528.0209
Other Non-Asphalt Surfaces	0		0.0000	0.0000	0.0000	0.0000
Parking Lot	8.1746e+006		756.3449	0.1224	0.0148	763.8238
Single Family Housing	1.10838e+007		1,025.5154	0.1659	0.0201	1,035.6559
Strip Mall	723413		66.9329	0.0108	1.3100e-003	67.5947
Total			**7,312.7066**	**1.1831**	**0.1434**	**7,385.0162**

Mitigated

	Electricity Use		Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	tons/yr	MT/yr			
City Park	0		0.0000	0.0000	0.0000	0.0000
Elementary School	8.5287e+006		789.1071	0.1277	0.0155	796.9100
Government (Civic Center)	2.06564e+006		191.1211	0.0309	3.7500e-003	193.0109
Industrial Park	4.84598e+007		4,483.6853	0.7254	0.0879	4,528.0209
Other Non-Asphalt Surfaces	0		0.0000	0.0000	0.0000	0.0000
Parking Lot	8.1746e+006		756.3449	0.1224	0.0148	763.8238
Single Family Housing	1.10838e+007		1,025.5154	0.1659	0.0201	1,035.6559
Strip Mall	723413		66.9329	0.0108	1.3100e-003	67.5947
Total			**7,312.7066**	**1.1831**	**0.1434**	**7,385.0162**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	137.1176	1.6166	105.4965	0.1537		13.0547	13.0547		13.0547	13.0547	1,154.8420	619.6473	1,774.4893	0.0298	0.1129	1,808.8896
Unmitigated	137.1176	1.6166	105.4965	0.1537		13.0547	13.0547		13.0547	13.0547	1,154.8420	619.6473	1,774.4893	0.0298	0.1129	1,808.8896

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	8.1929					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	42.7753					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	85.8008	1.4934	94.7973	0.1531		12.9966	12.9966		12.9966	12.9966	1,154.8420	602.1583	1,757.0002	0.0115	0.1129	1,790.9441
Landscaping	0.3485	0.1232	10.6992	5.7000e-004		0.0580	0.0580		0.0580	0.0580	0.0000	17.4890	17.4890	0.0183	0.0000	17.9454
Total	**137.1176**	**1.6166**	**105.4965**	**0.1537**		**13.0547**	**13.0547**		**13.0547**	**13.0547**	**1,154.8420**	**619.6473**	**1,774.4893**	**0.0298**	**0.1129**	**1,808.8896**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	8.1929					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	42.7753					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	85.8008	1.4934	94.7973	0.1531		12.9966	12.9966		12.9966	12.9966	1,154.8420	602.1583	1,757.0002	0.0115	0.1129	1,790.9441
Landscaping	0.3485	0.1232	10.6992	5.7000e-004		0.0580	0.0580		0.0580	0.0580	0.0000	17.4890	17.4890	0.0183	0.0000	17.9454
Total	**137.1176**	**1.6166**	**105.4965**	**0.1537**		**13.0547**	**13.0547**		**13.0547**	**13.0547**	**1,154.8420**	**619.6473**	**1,774.4893**	**0.0298**	**0.1129**	**1,808.8896**

7.0 Water Detail

7.1 Mitigation Measures Water

		Total CO2	CH4	N2O	CO2e
Category	tons/yr	MT/yr			
Mitigated		3,624.7891	47.6888	1.1760	5,167.4632

Unmitigated		3,624.7891	47.6888	1.1760	5,167.4632

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use		Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr	MT/yr			
City Park	0 / 7353.48		2,381.3001	0.3853	0.0467	2,404.8469
Elementary School	36.3685 / 93.519		60.0304	1.1929	0.0289	98.4752
Government (Civic Center)	46.4208 / 28.4515		47.1811	1.5179	0.0364	95.9610
Industrial Park	1267.68 / 0		1,036.8394	41.4102	0.9878	2,366.4605
Other Non-Asphalt Surfaces	0 / 0		0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0		0.0000	0.0000	0.0000	0.0000
Single Family Housing	90.5641 / 57.0948		92.5616	2.9614	0.0709	187.7332
Strip Mall	6.76578 / 4.14677		6.8766	0.2212	5.3000e-003	13.9862
Total			**3,624.7891**	**47.6888**	**1.1760**	**5,167.4632**

Mitigated

	Indoor/Outdoor Use		Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr	MT/yr			
City Park	0 / 7353.48		2,381.3001	0.3853	0.0467	2,404.8469
Elementary School	36.3685 / 93.519		60.0304	1.1929	0.0289	98.4752
Government (Civic Center)	46.4208 / 28.4515		47.1811	1.5179	0.0364	95.9610
Industrial Park	1267.68 / 0		1,036.8394	41.4102	0.9878	2,366.4605
Other Non-Asphalt Surfaces	0 / 0		0.0000	0.0000	0.0000	0.0000
Parking Lot	0 / 0		0.0000	0.0000	0.0000	0.0000
Single Family Housing	90.5641 / 57.0948		92.5616	2.9614	0.0709	187.7332
Strip Mall	6.76578 / 4.14677		6.8766	0.2212	5.3000e-003	13.9862
Total			**3,624.7891**	**47.6888**	**1.1760**	**5,167.4632**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

		Total CO2	CH4	N2O	CO2e
	tons/yr	MT/yr			
Mitigated		2,398.8701	141.7692	0.0000	5,943.0990
Unmitigated		2,398.8701	141.7692	0.0000	5,943.0990

8.2 Waste by Land Use

Unmitigated

	Waste Disposed		Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr	MT/yr			
City Park	530.77		107.7415	6.3673	0.0000	266.9250
Elementary School	1630.49		330.9747	19.5601	0.0000	819.9759
Government (Civic Center)	1331.92		270.3677	15.9783	0.0000	669.8246
Industrial Park	6797.53		1,379.8372	81.5460	0.0000	3,418.4882
Other Non-Asphalt Surfaces	0		0.0000	0.0000	0.0000	0.0000
Parking Lot	0		0.0000	0.0000	0.0000	0.0000
Single Family Housing	1431		290.4801	17.1669	0.0000	719.6521
Strip Mall	95.91		19.4689	1.1506	0.0000	48.2333
Total			**2,398.8701**	**141.7692**	**0.0000**	**5,943.0990**

Mitigated

	Waste Disposed		Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr	MT/yr			
City Park	530.77		107.7415	6.3673	0.0000	266.9250
Elementary School	1630.49		330.9747	19.5601	0.0000	819.9759
Government (Civic Center)	1331.92		270.3677	15.9783	0.0000	669.8246
Industrial Park	6797.53		1,379.8372	81.5460	0.0000	3,418.4882
Other Non-Asphalt Surfaces	0		0.0000	0.0000	0.0000	0.0000
Parking Lot	0		0.0000	0.0000	0.0000	0.0000
Single Family Housing	1431		290.4801	17.1669	0.0000	719.6521
Strip Mall	95.91		19.4689	1.1506	0.0000	48.2333
Total			**2,398.8701**	**141.7692**	**0.0000**	**5,943.0990**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

Fresno SEDA EIR Project

Fresno County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Government Office Building	7,946.52	1000sqft	182.43	7,946,520.00	0
Office Park	4,423.32	1000sqft	101.55	4,423,320.00	0
Research & Development	2,897.96	1000sqft	66.53	2,897,960.00	0
Parking Lot	96,337.08	1000sqft	2,211.60	96,337,080.00	0
City Park	744.00	Acre	744.00	32,408,640.00	0
Condo/Townhouse	16,906.00	Dwelling Unit	2,153.96	93,826,497.60	48351
Single Family Housing	25,358.00	Dwelling Unit	3,230.94	140,739,746.40	72524
Regional Shopping Center	4,482.52	1000sqft	102.90	4,482,520.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	45
Climate Zone	3			**Operational Year**	2050
Utility Company	Pacific Gas and Electric Company				
CO2 Intensity (lb/MWhr)	203.98	**CH4 Intensity (lb/MWhr)**	0.033	**N2O Intensity (lb/MWhr)**	0.004

1.3 User Entered Comments & Non-Default Data

Project Characteristics -

Land Use - Note 1

Construction Phase - Based on CalEEMod default and normalized to an 25-year buildout. Assumes overlap of all phases.

Grading -

Vehicle Trips -

Woodstoves - Per SJVAPCD Rule 4901

Area Coating - Per SJVAPCD Rule 4601

Construction Off-road Equipment Mitigation - SJVAPCD Reg. VIII

Area Mitigation - SJVAPCD Rule 4601

Energy Mitigation -

Table Name	Column Name	Default Value	New Value
tblAreaMitigation	UseLowVOCPaintResidentialExteriorValue	150	50
tblAreaMitigation	UseLowVOCPaintResidentialInteriorValue	150	50
tblConstDustMitigation	WaterUnpavedRoadVehicleSpeed	0	15
tblConstructionPhase	NumDays	11,000.00	358.00
tblConstructionPhase	NumDays	155,000.00	5,044.00
tblConstructionPhase	NumDays	10,000.00	325.00
tblConstructionPhase	NumDays	15,500.00	504.00
tblConstructionPhase	NumDays	11,000.00	358.00
tblConstructionPhase	NumDays	6,000.00	195.00
tblConstructionPhase	PhaseEndDate	3/10/2823	5/14/2025
tblConstructionPhase	PhaseEndDate	11/11/2738	4/30/2043
tblConstructionPhase	PhaseEndDate	4/28/2062	3/28/2025
tblConstructionPhase	PhaseEndDate	9/25/2144	12/4/2025
tblConstructionPhase	PhaseEndDate	1/9/2781	5/14/2025
tblConstructionPhase	PhaseEndDate	4/27/2085	9/27/2024
tblConstructionPhase	PhaseStartDate	1/10/2781	1/1/2024
tblConstructionPhase	PhaseStartDate	9/26/2144	1/1/2024
tblConstructionPhase	PhaseStartDate	4/28/2085	1/1/2024
tblConstructionPhase	PhaseStartDate	11/12/2738	1/1/2024
tblConstructionPhase	PhaseStartDate	4/29/2062	1/1/2024
tblFireplaces	FireplaceWoodMass	3,078.40	0.00
tblFireplaces	FireplaceWoodMass	3,078.40	0.00

tblLandUse	LandUseSquareFeet	96,337,100.00	96,337,080.00
tblLandUse	LandUseSquareFeet	16,906,000.00	93,826,497.60
tblLandUse	LandUseSquareFeet	45,644,400.00	140,739,746.40
tblLandUse	LotAcreage	1,056.63	2,153.96
tblLandUse	LotAcreage	8,233.12	3,230.94
tblWoodstoves	NumberCatalytic	2,153.96	0.00
tblWoodstoves	NumberCatalytic	3,230.94	0.00
tblWoodstoves	NumberNoncatalytic	2,153.96	0.00
tblWoodstoves	NumberNoncatalytic	3,230.94	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00
tblWoodstoves	WoodstoveWoodMass	3,019.20	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2024	1,770.5964	201.5825	340.2451	1.6208	131.3088	2.1115	133.4203	36.0531	1.9855	38.0386	0.0000	151,683.7064	151,683.7064	3.2035	12.9239	155,615.1139
2025	668.3045	188.8548	285.1465	1.4749	118.0304	1.7204	119.7508	32.0289	1.6238	33.6527	0.0000	138,266.8233	138,266.8233	2.4773	12.3046	141,995.5364
2026	30.4544	180.5290	251.5594	1.3802	110.2011	1.4874	111.6886	29.8676	1.4089	31.2765	0.0000	129,564.9134	129,564.9134	1.9166	11.8712	133,150.4377
2027	28.7114	178.0170	239.1028	1.3455	110.2011	1.4600	111.6611	29.8676	1.3833	31.2509	0.0000	126,314.1201	126,314.1201	1.7689	11.5651	129,804.7546
2028	27.0101	175.3334	227.9141	1.3084	109.7790	1.4266	111.2056	29.7532	1.3522	31.1054	0.0000	122,839.6980	122,839.6980	1.6365	11.2392	126,229.8897
2029	25.5999	174.0968	219.8407	1.2838	110.2012	1.4042	111.6054	29.8677	1.3314	31.1991	0.0000	120,532.5005	120,532.5005	1.5317	11.0196	123,854.6432

2030	24.1589	171.9972	212.3085	1.2576	110.2013	1.3298	111.5311	29.8677	1.2629	31.1306	0.0000	118,074.5788	118,074.5788	1.3778	10.7859	121,323.2355
2031	22.8046	170.8218	205.8133	1.2340	110.2014	1.3075	111.5089	29.8677	1.2422	31.1099	0.0000	115,855.5534	115,855.5534	1.2921	10.5820	119,041.2833
2032	21.6999	170.5107	201.1399	1.2178	110.6236	1.2918	111.9154	29.9822	1.2277	31.2099	0.0000	114,335.9273	114,335.9273	1.2224	10.4461	117,479.4260
2033	20.4720	168.4612	195.0109	1.1902	109.7792	1.2633	111.0426	29.7533	1.2011	30.9544	0.0000	111,750.2265	111,750.2265	1.1490	10.2156	114,823.2000
2034	19.5487	167.7409	191.0233	1.1739	109.7793	1.2452	111.0245	29.7533	1.1843	30.9376	0.0000	110,224.3912	110,224.3912	1.0920	10.0823	113,256.2062
2035	18.7751	167.5912	188.3113	1.1640	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0.0000	109,299.3051	109,299.3051	1.0457	10.0046	112,306.8108
2036	18.8471	168.2333	189.0328	1.1685	110.6238	1.2300	111.8537	29.9822	1.1698	31.1520	0.0000	109,718.0764	109,718.0764	1.0497	10.0429	112,737.1051
2037	18.7751	167.5912	188.3113	1.1640	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0.0000	109,299.3051	109,299.3051	1.0457	10.0046	112,306.8108
2038	18.7751	167.5912	188.3113	1.1640	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0.0000	109,299.3051	109,299.3051	1.0457	10.0046	112,306.8108
2039	18.7032	166.9491	187.5898	1.1596	109.7793	1.2206	110.9999	29.7533	1.1609	30.9142	0.0000	108,880.5338	108,880.5338	1.0417	9.9662	111,876.5165
2040	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.3680	29.8679	1.1103	30.9782	0.0000	104,777.3701	104,777.3701	0.8787	9.6159	107,664.8600
2041	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.3680	29.8679	1.1103	30.9782	0.0000	104,777.3701	104,777.3701	0.8787	9.6159	107,664.8600
2042	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.3680	29.8679	1.1103	30.9782	0.0000	104,777.3701	104,777.3701	0.8787	9.6159	107,664.8600
2043	5.1879	54.5964	58.3767	0.3677	36.3117	0.3843	36.6960	9.8415	0.3659	10.2074	0.0000	34,524.3442	34,524.3442	0.2895	3.1684	35,475.7776
Maximum	**1,770.5964**	**201.5825**	**340.2451**	**1.6208**	**131.3088**	**2.1115**	**133.4203**	**36.0531**	**1.9855**	**38.0386**	**0.0000**	**151,683.7064**	**151,683.7064**	**3.2035**	**12.9239**	**155,615.1139**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2024	1,770.5964	201.5825	340.2451	1.6208	129.3799	2.1115	131.4914	35.2252	1.9855	37.2107	0.0000	151,683.7039	151,683.7039	3.2035	12.9239	155,615.1114
2025	668.3045	188.8548	285.1465	1.4749	117.1887	1.7204	118.9091	31.7610	1.6238	33.3848	0.0000	138,266.8219	138,266.8219	2.4773	12.3046	141,995.5350
2026	30.4544	180.5290	251.5594	1.3802	110.2011	1.4874	111.6886	29.8676	1.4089	31.2765	0.0000	129,564.9131	129,564.9131	1.9166	11.8712	133,150.4373
2027	28.7114	178.0170	239.1028	1.3455	110.2011	1.4600	111.6611	29.8676	1.3833	31.2509	0.0000	126,314.1197	126,314.1197	1.7689	11.5651	129,804.7542
2028	27.0101	175.3334	227.9141	1.3084	109.7790	1.4266	111.2056	29.7532	1.3522	31.1054	0.0000	122,839.6976	122,839.6976	1.6365	11.2392	126,229.8893
2029	25.5933	174.0968	219.8407	1.2838	110.2012	1.4042	111.6054	29.8677	1.3314	31.1991	0.0000	120,532.5002	120,532.5002	1.5317	11.0196	123,854.6428
2030	24.1589	171.9972	212.3085	1.2576	110.2013	1.3298	111.5311	29.8677	1.2629	31.1306	0.0000	118,074.5784	118,074.5784	1.3778	10.7859	121,323.2351
2031	22.8046	170.8218	205.8132	1.2340	110.2014	1.3075	111.5089	29.8677	1.2422	31.1099	0.0000	115,855.5530	115,855.5530	1.2921	10.5820	119,041.2829
2032	21.6999	170.5107	201.1399	1.2178	110.6236	1.2918	111.9154	29.9822	1.2277	31.2099	0.0000	114,335.9269	114,335.9269	1.2224	10.4461	117,479.4255
2033	20.4720	168.4612	195.0109	1.1902	109.7792	1.2633	111.0426	29.7533	1.2011	30.9544	0.0000	111,750.2261	111,750.2261	1.1490	10.2156	114,823.1996
2034	19.5487	167.7409	191.0233	1.1739	109.7793	1.2452	111.0245	29.7533	1.1843	30.9376	0.0000	110,224.3908	110,224.3908	1.0920	10.0823	113,256.2058
2035	18.7751	167.5912	188.3113	1.1640	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0.0000	109,299.3047	109,299.3047	1.0457	10.0046	112,306.8104
2036	18.8471	168.2333	189.0328	1.1685	110.6238	1.2300	111.8537	29.9822	1.1698	31.1520	0.0000	109,718.0760	109,718.0760	1.0497	10.0429	112,737.1047
2037	18.7751	167.5912	188.3113	1.1640	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0.0000	109,299.3047	109,299.3047	1.0457	10.0046	112,306.8104
2038	18.7751	167.5912	188.3113	1.1640	110.2015	1.2253	111.4268	29.8678	1.1653	31.0331	0.0000	109,299.3047	109,299.3047	1.0457	10.0046	112,306.8104
2039	18.7032	166.9491	187.5898	1.1596	109.7793	1.2206	110.9999	29.7533	1.1609	30.9142	0.0000	108,880.5334	108,880.5334	1.0417	9.9662	111,876.5161

2040	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.3680	29.8679	1.1103	30.9782	0.0000	104,777.3697	104,777.3697	0.8787	9.6159	107,664.8596
2041	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.3680	29.8679	1.1103	30.9782	0.0000	104,777.3697	104,777.3697	0.8787	9.6159	107,664.8596
2042	15.7446	165.6936	177.1666	1.1159	110.2018	1.1662	111.3680	29.8679	1.1103	30.9782	0.0000	104,777.3697	104,777.3697	0.8787	9.6159	107,664.8596
2043	5.1879	54.5964	58.3767	0.3677	36.3117	0.3843	36.6960	9.8415	0.3659	10.2074	0.0000	34,524.3440	34,524.3440	0.2895	3.1684	35,475.7775
Maximum	**1,770.5964**	**201.5825**	**340.2451**	**1.6208**	**129.3799**	**2.1115**	**131.4914**	**35.2252**	**1.9855**	**37.2107**	**0.0000**	**151,683.7039**	**151,683.7039**	**3.2035**	**12.9239**	**155,615.1114**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.13	0.00	0.13	0.19	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00

Quarter	Start Date	End Date	Maximum Unmitigated ROG + NOX (tons/quarter)	Maximum Mitigated ROG + NOX (tons/quarter)
1	1-1-2024	3-31-2024	491.2599	491.2599
2	4-1-2024	6-30-2024	488.8237	488.8237
3	7-1-2024	9-30-2024	494.1633	494.1633
4	10-1-2024	12-31-2024	495.6751	495.6751
5	1-1-2025	3-31-2025	483.0868	483.0868
6	4-1-2025	6-30-2025	262.4402	262.4402
7	7-1-2025	9-30-2025	54.3448	54.3448
8	10-1-2025	12-31-2025	56.5432	56.5432
9	1-1-2026	3-31-2026	53.4410	53.4410
10	4-1-2026	6-30-2026	51.5708	51.5708
11	7-1-2026	9-30-2026	52.1376	52.1376
12	10-1-2026	12-31-2026	54.6286	54.6286
13	1-1-2027	3-31-2027	52.3503	52.3503
14	4-1-2027	6-30-2027	50.4753	50.4753
15	7-1-2027	9-30-2027	51.0299	51.0299
16	10-1-2027	12-31-2027	53.5136	53.5136
17	1-1-2028	3-31-2028	51.9960	51.9960
18	4-1-2028	6-30-2028	49.5423	49.5423
19	7-1-2028	9-30-2028	50.0867	50.0867
20	10-1-2028	12-31-2028	52.5674	52.5674
21	1-1-2029	3-31-2029	50.5457	50.5457
22	4-1-2029	6-30-2029	48.6536	48.6536

23	**7-1-2029**	**9-30-2029**	49.1883	49.1883
24	**10-1-2029**	**12-31-2029**	51.6690	51.6690
25	**1-1-2030**	**3-31-2030**	49.6464	49.6464
26	**4-1-2030**	**6-30-2030**	47.7370	47.7370
27	**7-1-2030**	**9-30-2030**	48.2616	48.2616
28	**10-1-2030**	**12-31-2030**	50.7497	50.7497
29	**1-1-2031**	**3-31-2031**	48.9981	48.9981
30	**4-1-2031**	**6-30-2031**	47.0698	47.0698
31	**7-1-2031**	**9-30-2031**	47.5870	47.5870
32	**10-1-2031**	**12-31-2031**	50.0869	50.0869
33	**1-1-2032**	**3-31-2032**	48.9870	48.9870
34	**4-1-2032**	**6-30-2032**	46.4996	46.4996
35	**7-1-2032**	**9-30-2032**	47.0105	47.0105
36	**10-1-2032**	**12-31-2032**	49.5253	49.5253
37	**1-1-2033**	**3-31-2033**	47.9853	47.9853
38	**4-1-2033**	**6-30-2033**	46.0132	46.0132
39	**7-1-2033**	**9-30-2033**	46.5188	46.5188
40	**10-1-2033**	**12-31-2033**	49.0517	49.0517
41	**1-1-2034**	**3-31-2034**	47.5674	47.5674
42	**4-1-2034**	**6-30-2034**	45.5705	45.5705
43	**7-1-2034**	**9-30-2034**	46.0713	46.0713
44	**10-1-2034**	**12-31-2034**	48.6244	48.6244
45	**1-1-2035**	**3-31-2035**	47.1531	47.1531
46	**4-1-2035**	**6-30-2035**	45.1325	45.1325
47	**7-1-2035**	**9-30-2035**	45.6284	45.6284
48	**10-1-2035**	**12-31-2035**	48.2009	48.2009
49	**1-1-2036**	**3-31-2036**	47.6770	47.6770

50	**4-1-2036**	**6-30-2036**	45.1325	45.1325
51	**7-1-2036**	**9-30-2036**	45.6284	45.6284
52	**10-1-2036**	**12-31-2036**	48.2009	48.2009
53	**1-1-2037**	**3-31-2037**	47.1531	47.1531
54	**4-1-2037**	**6-30-2037**	45.1325	45.1325
55	**7-1-2037**	**9-30-2037**	45.6284	45.6284
56	**10-1-2037**	**12-31-2037**	48.2009	48.2009
57	**1-1-2038**	**3-31-2038**	47.1531	47.1531
58	**4-1-2038**	**6-30-2038**	45.1325	45.1325
59	**7-1-2038**	**9-30-2038**	45.6284	45.6284
60	**10-1-2038**	**12-31-2038**	48.2009	48.2009
61	**1-1-2039**	**3-31-2039**	47.1531	47.1531
62	**4-1-2039**	**6-30-2039**	45.1325	45.1325
63	**7-1-2039**	**9-30-2039**	45.6284	45.6284
64	**10-1-2039**	**12-31-2039**	48.2009	48.2009
65	**1-1-2040**	**3-31-2040**	46.4266	46.4266
66	**4-1-2040**	**6-30-2040**	43.7844	43.7844
67	**7-1-2040**	**9-30-2040**	44.2656	44.2656
68	**10-1-2040**	**12-31-2040**	46.9368	46.9368
69	**1-1-2041**	**3-31-2041**	45.9164	45.9164
70	**4-1-2041**	**6-30-2041**	43.7844	43.7844
71	**7-1-2041**	**9-30-2041**	44.2656	44.2656
72	**10-1-2041**	**12-31-2041**	46.9368	46.9368
73	**1-1-2042**	**3-31-2042**	45.9164	45.9164
74	**4-1-2042**	**6-30-2042**	43.7844	43.7844
75	**7-1-2042**	**9-30-2042**	44.2656	44.2656
76	**10-1-2042**	**12-31-2042**	46.9368	46.9368

77	**1-1-2043**	**3-31-2043**	45.9164	45.9164
78	**4-1-2043**	**6-30-2043**	14.4344	14.4344
		Highest	495.6751	495.6751

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1,246.9598	19.4254	320.2306	0.1176		3.0223	3.0223		3.0223	3.0223	0.0000	18,823.7763	18,823.7763	0.8442	0.3357	18,944.9105
Energy	6.4741	56.2355	30.2284	0.3531		4.4730	4.4730		4.4730	4.4730	0.0000	110,340.4866	110,340.4866	8.7136	2.0820	111,178.7521
Mobile	166.6343	311.0334	1,798.7081	4.5891	641.6998	2.5977	644.2976	171.4312	2.4477	173.8789	0.0000	424,680.7633	424,680.7633	18.8916	23.7121	432,219.2426
Waste						0.0000	0.0000		0.0000	0.0000	10,226.7253	0.0000	10,226.7253	604.3822	0.0000	25,336.2791
Water						0.0000	0.0000		0.0000	0.0000	2,181.2590	4,826.6723	7,007.9313	224.8171	5.3846	14,232.9781
Total	**1,420.0681**	**386.6943**	**2,149.1672**	**5.0598**	**641.6998**	**10.0930**	**651.7928**	**171.4312**	**9.9429**	**181.3741**	**12,407.9843**	**558,671.6985**	**571,079.6828**	**857.6486**	**31.5143**	**601,912.1624**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	1,100.1856	19.4254	320.2306	0.1176		3.0223	3.0223		3.0223	3.0223	0.0000	18,823.7763	18,823.7763	0.8442	0.3357	18,944.9105
Energy	6.4741	56.2355	30.2284	0.3531		4.4730	4.4730		4.4730	4.4730	0.0000	110,340.4866	110,340.4866	8.7136	2.0820	111,178.7521
Mobile	166.6343	311.0334	1,798.7081	4.5891	641.6998	2.5977	644.2976	171.4312	2.4477	173.8789	0.0000	424,680.7633	424,680.7633	18.8916	23.7121	432,219.2426
Waste						0.0000	0.0000		0.0000	0.0000	10,226.7253	0.0000	10,226.7253	604.3822	0.0000	25,336.2791
Water						0.0000	0.0000		0.0000	0.0000	2,181.2590	4,826.6723	7,007.9313	224.8171	5.3846	14,232.9781
Total	**1,273.2940**	**386.6943**	**2,149.1672**	**5.0598**	**641.6998**	**10.0930**	**651.7928**	**171.4312**	**9.9429**	**181.3741**	**12,407.9843**	**558,671.6985**	**571,079.6828**	**857.6486**	**31.5143**	**601,912.1624**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**10.34**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2024	3/28/2025	5	325	
2	Site Preparation	Site Preparation	1/1/2024	9/27/2024	5	195	
3	Grading	Grading	1/1/2024	12/4/2025	5	504	

4	Building Construction	Building Construction	1/1/2024	4/30/2043	5	5044	
5	Paving	Paving	1/1/2024	5/14/2025	5	358	
6	Architectural Coating	Architectural Coating	1/1/2024	5/14/2025	5	358	

Acres of Grading (Site Preparation Phase): 292.5

Acres of Grading (Grading Phase): 1512

Acres of Paving: 2211.6

Residential Indoor: 474,996,644; Residential Outdoor: 158,332,215; Non-Residential Indoor: 29,625,482; Non-Residential Outdoor: 9,875,161; Striped Parking Area: 5,780,225 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	1	8.00	81	0.73
Demolition	Excavators	3	8.00	158	0.38
Demolition	Rubber Tired Dozers	2	8.00	247	0.40
Site Preparation	Rubber Tired Dozers	3	8.00	247	0.40
Site Preparation	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading	Excavators	2	8.00	158	0.38
Grading	Graders	1	8.00	187	0.41
Grading	Rubber Tired Dozers	1	8.00	247	0.40
Grading	Scrapers	2	8.00	367	0.48
Grading	Tractors/Loaders/Backhoes	2	8.00	97	0.37
Building Construction	Cranes	1	7.00	231	0.29
Building Construction	Forklifts	3	8.00	89	0.20
Building Construction	Generator Sets	1	8.00	84	0.74
Building Construction	Tractors/Loaders/Backhoes	3	7.00	97	0.37
Building Construction	Welders	1	8.00	46	0.45
Paving	Pavers	2	8.00	130	0.42

Paving	Paving Equipment	2	8.00	132	0.36
Paving	Rollers	2	8.00	80	0.38
Architectural Coating	Air Compressors	1	6.00	78	0.48

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation	7	18.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Grading	8	20.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction	9	81,695.00	28,857.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Paving	6	15.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating	1	16,339.00	0.00	0.00	10.80	7.30	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

Reduce Vehicle Speed on Unpaved Roads

3.2 Demolition - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2939	2.7350	2.5817	5.0900e-003		0.1258	0.1258		0.1169	0.1169	0.0000	445.3482	445.3482	0.1246	0.0000	448.4633
Total	**0.2939**	**2.7350**	**2.5817**	**5.0900e-003**		**0.1258**	**0.1258**		**0.1169**	**0.1169**	**0.0000**	**445.3482**	**445.3482**	**0.1246**	**0.0000**	**448.4633**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6200e-003	3.4700e-003	0.0427	1.3000e-004	0.0157	7.0000e-005	0.0158	4.1800e-003	7.0000e-005	4.2400e-003	0.0000	11.9476	11.9476	3.4000e-004	3.3000e-004	12.0547
Total	**5.6200e-003**	**3.4700e-003**	**0.0427**	**1.3000e-004**	**0.0157**	**7.0000e-005**	**0.0158**	**4.1800e-003**	**7.0000e-005**	**4.2400e-003**	**0.0000**	**11.9476**	**11.9476**	**3.4000e-004**	**3.3000e-004**	**12.0547**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.2939	2.7350	2.5817	5.0900e-003		0.1258	0.1258		0.1169	0.1169	0.0000	445.3477	445.3477	0.1246	0.0000	448.4627
Total	**0.2939**	**2.7350**	**2.5817**	**5.0900e-003**		**0.1258**	**0.1258**		**0.1169**	**0.1169**	**0.0000**	**445.3477**	**445.3477**	**0.1246**	**0.0000**	**448.4627**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6200e-003	3.4700e-003	0.0427	1.3000e-004	0.0157	7.0000e-005	0.0158	4.1800e-003	7.0000e-005	4.2400e-003	0.0000	11.9476	11.9476	3.4000e-004	3.3000e-004	12.0547
Total	**5.6200e-003**	**3.4700e-003**	**0.0427**	**1.3000e-004**	**0.0157**	**7.0000e-005**	**0.0158**	**4.1800e-003**	**7.0000e-005**	**4.2400e-003**	**0.0000**	**11.9476**	**11.9476**	**3.4000e-004**	**3.3000e-004**	**12.0547**

3.2 Demolition - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0659	0.6047	0.6117	1.2200e-003		0.0269	0.0269		0.0250	0.0250	0.0000	107.0926	107.0926	0.0299	0.0000	107.8402
Total	**0.0659**	**0.6047**	**0.6117**	**1.2200e-003**		**0.0269**	**0.0269**		**0.0250**	**0.0250**	**0.0000**	**107.0926**	**107.0926**	**0.0299**	**0.0000**	**107.8402**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2600e-003	7.4000e-004	9.5300e-003	3.0000e-005	3.7800e-003	2.0000e-005	3.7900e-003	1.0000e-003	2.0000e-005	1.0200e-003	0.0000	2.7761	2.7761	7.0000e-005	7.0000e-005	2.8000
Total	**1.2600e-003**	**7.4000e-004**	**9.5300e-003**	**3.0000e-005**	**3.7800e-003**	**2.0000e-005**	**3.7900e-003**	**1.0000e-003**	**2.0000e-005**	**1.0200e-003**	**0.0000**	**2.7761**	**2.7761**	**7.0000e-005**	**7.0000e-005**	**2.8000**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0659	0.6047	0.6117	1.2200e-003		0.0269	0.0269		0.0250	0.0250	0.0000	107.0925	107.0925	0.0299	0.0000	107.8401
Total	**0.0659**	**0.6047**	**0.6117**	**1.2200e-003**		**0.0269**	**0.0269**		**0.0250**	**0.0250**	**0.0000**	**107.0925**	**107.0925**	**0.0299**	**0.0000**	**107.8401**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.2600e-003	7.4000e-004	9.5300e-003	3.0000e-005	3.7800e-003	2.0000e-005	3.7900e-003	1.0000e-003	2.0000e-005	1.0200e-003	0.0000	2.7761	2.7761	7.0000e-005	7.0000e-005	2.8000
Total	**1.2600e-003**	**7.4000e-004**	**9.5300e-003**	**3.0000e-005**	**3.7800e-003**	**2.0000e-005**	**3.7900e-003**	**1.0000e-003**	**2.0000e-005**	**1.0200e-003**	**0.0000**	**2.7761**	**2.7761**	**7.0000e-005**	**7.0000e-005**	**2.8000**

3.3 Site Preparation - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.9166	0.0000	1.9166	0.9850	0.0000	0.9850	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2594	2.6497	1.7877	3.7100e-003		0.1199	0.1199		0.1103	0.1103	0.0000	326.2064	326.2064	0.1055	0.0000	328.8439
Total	**0.2594**	**2.6497**	**1.7877**	**3.7100e-003**	**1.9166**	**0.1199**	**2.0364**	**0.9850**	**0.1103**	**1.0953**	**0.0000**	**326.2064**	**326.2064**	**0.1055**	**0.0000**	**328.8439**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0200e-003	3.1000e-003	0.0382	1.2000e-004	0.0140	6.0000e-005	0.0141	3.7300e-003	6.0000e-005	3.7900e-003	0.0000	10.6707	10.6707	3.0000e-004	3.0000e-004	10.7664
Total	**5.0200e-003**	**3.1000e-003**	**0.0382**	**1.2000e-004**	**0.0140**	**6.0000e-005**	**0.0141**	**3.7300e-003**	**6.0000e-005**	**3.7900e-003**	**0.0000**	**10.6707**	**10.6707**	**3.0000e-004**	**3.0000e-004**	**10.7664**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.8625	0.0000	0.8625	0.4432	0.0000	0.4432	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.2594	2.6497	1.7877	3.7100e-003		0.1199	0.1199		0.1103	0.1103	0.0000	326.2060	326.2060	0.1055	0.0000	328.8435
Total	**0.2594**	**2.6497**	**1.7877**	**3.7100e-003**	**0.8625**	**0.1199**	**0.9823**	**0.4432**	**0.1103**	**0.5535**	**0.0000**	**326.2060**	**326.2060**	**0.1055**	**0.0000**	**328.8435**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.0200e-003	3.1000e-003	0.0382	1.2000e-004	0.0140	6.0000e-005	0.0141	3.7300e-003	6.0000e-005	3.7900e-003	0.0000	10.6707	10.6707	3.0000e-004	3.0000e-004	10.7664
Total	**5.0200e-003**	**3.1000e-003**	**0.0382**	**1.2000e-004**	**0.0140**	**6.0000e-005**	**0.0141**	**3.7300e-003**	**6.0000e-005**	**3.7900e-003**	**0.0000**	**10.6707**	**10.6707**	**3.0000e-004**	**3.0000e-004**	**10.7664**

3.4 Grading - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.5906	0.0000	1.5906	0.5202	0.0000	0.5202	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4216	4.2414	3.6317	8.1300e-003		0.1749	0.1749		0.1609	0.1609	0.0000	714.2058	714.2058	0.2310	0.0000	719.9805
Total	**0.4216**	**4.2414**	**3.6317**	**8.1300e-003**	**1.5906**	**0.1749**	**1.7656**	**0.5202**	**0.1609**	**0.6812**	**0.0000**	**714.2058**	**714.2058**	**0.2310**	**0.0000**	**719.9805**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-003	4.6300e-003	0.0570	1.7000e-004	0.0210	1.0000e-004	0.0210	5.5700e-003	9.0000e-005	5.6600e-003	0.0000	15.9301	15.9301	4.5000e-004	4.4000e-004	16.0730
Total	**7.5000e-003**	**4.6300e-003**	**0.0570**	**1.7000e-004**	**0.0210**	**1.0000e-004**	**0.0210**	**5.5700e-003**	**9.0000e-005**	**5.6600e-003**	**0.0000**	**15.9301**	**15.9301**	**4.5000e-004**	**4.4000e-004**	**16.0730**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.7158	0.0000	0.7158	0.2341	0.0000	0.2341	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.4216	4.2414	3.6317	8.1300e-003		0.1749	0.1749		0.1609	0.1609	0.0000	714.2049	714.2049	0.2310	0.0000	719.9796
Total	**0.4216**	**4.2414**	**3.6317**	**8.1300e-003**	**0.7158**	**0.1749**	**0.8907**	**0.2341**	**0.1609**	**0.3950**	**0.0000**	**714.2049**	**714.2049**	**0.2310**	**0.0000**	**719.9796**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	7.5000e-003	4.6300e-003	0.0570	1.7000e-004	0.0210	1.0000e-004	0.0210	5.5700e-003	9.0000e-005	5.6600e-003	0.0000	15.9301	15.9301	4.5000e-004	4.4000e-004	16.0730
Total	**7.5000e-003**	**4.6300e-003**	**0.0570**	**1.7000e-004**	**0.0210**	**1.0000e-004**	**0.0210**	**5.5700e-003**	**9.0000e-005**	**5.6600e-003**	**0.0000**	**15.9301**	**15.9301**	**4.5000e-004**	**4.4000e-004**	**16.0730**

3.4 Grading - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					1.5304	0.0000	1.5304	0.4871	0.0000	0.4871	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3511	3.3811	3.1861	7.5100e-003		0.1368	0.1368		0.1259	0.1259	0.0000	659.5252	659.5252	0.2133	0.0000	664.8578
Total	**0.3511**	**3.3811**	**3.1861**	**7.5100e-003**	**1.5304**	**0.1368**	**1.6673**	**0.4871**	**0.1259**	**0.6130**	**0.0000**	**659.5252**	**659.5252**	**0.2133**	**0.0000**	**664.8578**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4400e-003	3.8000e-003	0.0488	1.6000e-004	0.0194	8.0000e-005	0.0194	5.1400e-003	8.0000e-005	5.2200e-003	0.0000	14.2183	14.2183	3.8000e-004	3.8000e-004	14.3408
Total	**6.4400e-003**	**3.8000e-003**	**0.0488**	**1.6000e-004**	**0.0194**	**8.0000e-005**	**0.0194**	**5.1400e-003**	**8.0000e-005**	**5.2200e-003**	**0.0000**	**14.2183**	**14.2183**	**3.8000e-004**	**3.8000e-004**	**14.3408**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Fugitive Dust					0.6887	0.0000	0.6887	0.2192	0.0000	0.2192	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.3511	3.3811	3.1861	7.5100e-003		0.1368	0.1368		0.1259	0.1259	0.0000	659.5244	659.5244	0.2133	0.0000	664.8570
Total	**0.3511**	**3.3811**	**3.1861**	**7.5100e-003**	**0.6887**	**0.1368**	**0.8255**	**0.2192**	**0.1259**	**0.3451**	**0.0000**	**659.5244**	**659.5244**	**0.2133**	**0.0000**	**664.8570**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.4400e-003	3.8000e-003	0.0488	1.6000e-004	0.0194	8.0000e-005	0.0194	5.1400e-003	8.0000e-005	5.2200e-003	0.0000	14.2183	14.2183	3.8000e-004	3.8000e-004	14.3408
Total	**6.4400e-003**	**3.8000e-003**	**0.0488**	**1.6000e-004**	**0.0194**	**8.0000e-005**	**0.0194**	**5.1400e-003**	**8.0000e-005**	**5.2200e-003**	**0.0000**	**14.2183**	**14.2183**	**3.8000e-004**	**3.8000e-004**	**14.3408**

3.5 Building Construction - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1928	1.7611	2.1179	3.5300e-003		0.0803	0.0803		0.0756	0.0756	0.0000	303.7223	303.7223	0.0718	0.0000	305.5179
Total	**0.1928**	**1.7611**	**2.1179**	**3.5300e-003**		**0.0803**	**0.0803**		**0.0756**	**0.0756**	**0.0000**	**303.7223**	**303.7223**	**0.0718**	**0.0000**	**305.5179**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.9500	166.0794	48.5925	0.7449	25.0635	1.0725	26.1360	7.2410	1.0260	8.2670	0.0000	71,463.4805	71,463.4805	0.3720	10.7574	74,678.4899
Worker	30.6250	18.9115	232.6667	0.7097	85.5598	0.3903	85.9501	22.7411	0.3593	23.1003	0.0000	65,070.3768	65,070.3768	1.8421	1.8042	65,654.0885
Total	**34.5750**	**184.9909**	**281.2592**	**1.4545**	**110.6233**	**1.4629**	**112.0861**	**29.9820**	**1.3852**	**31.3673**	**0.0000**	**136,533.8573**	**136,533.8573**	**2.2140**	**12.5617**	**140,332.5784**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1928	1.7611	2.1179	3.5300e-003		0.0803	0.0803		0.0756	0.0756	0.0000	303.7220	303.7220	0.0718	0.0000	305.5175
Total	**0.1928**	**1.7611**	**2.1179**	**3.5300e-003**		**0.0803**	**0.0803**		**0.0756**	**0.0756**	**0.0000**	**303.7220**	**303.7220**	**0.0718**	**0.0000**	**305.5175**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.9500	166.0794	48.5925	0.7449	25.0635	1.0725	26.1360	7.2410	1.0260	8.2670	0.0000	71,463.4805	71,463.4805	0.3720	10.7574	74,678.4899
Worker	30.6250	18.9115	232.6667	0.7097	85.5598	0.3903	85.9501	22.7411	0.3593	23.1003	0.0000	65,070.3768	65,070.3768	1.8421	1.8042	65,654.0885
Total	**34.5750**	**184.9909**	**281.2592**	**1.4545**	**110.6233**	**1.4629**	**112.0861**	**29.9820**	**1.3852**	**31.3673**	**0.0000**	**136,533.8573**	**136,533.8573**	**2.2140**	**12.5617**	**140,332.5784**

3.5 Building Construction - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1785	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6549	302.6549	0.0711	0.0000	304.4335
Total	**0.1785**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6549**	**302.6549**	**0.0711**	**0.0000**	**304.4335**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.8393	164.7822	47.4255	0.7278	24.9679	1.0679	26.0358	7.2133	1.0216	8.2349	0.0000	69,822.2277	69,822.2277	0.3519	10.5083	72,962.5070
Worker	28.3593	16.7545	215.1385	0.6831	85.2332	0.3701	85.6033	22.6543	0.3406	22.9948	0.0000	62,637.9045	62,637.9045	1.6568	1.6727	63,177.7873
Total	**32.1986**	**181.5367**	**262.5640**	**1.4109**	**110.2011**	**1.4379**	**111.6390**	**29.8676**	**1.3621**	**31.2297**	**0.0000**	**132,460.1322**	**132,460.1322**	**2.0087**	**12.1810**	**136,140.2944**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1784	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6545	302.6545	0.0711	0.0000	304.4331
Total	**0.1784**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6545**	**302.6545**	**0.0711**	**0.0000**	**304.4331**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.8393	164.7822	47.4255	0.7278	24.9679	1.0679	26.0358	7.2133	1.0216	8.2349	0.0000	69,822.2277	69,822.2277	0.3519	10.5083	72,962.5070
Worker	28.3593	16.7545	215.1385	0.6831	85.2332	0.3701	85.6033	22.6543	0.3406	22.9948	0.0000	62,637.9045	62,637.9045	1.6568	1.6727	63,177.7873
Total	**32.1986**	**181.5367**	**262.5640**	**1.4109**	**110.2011**	**1.4379**	**111.6390**	**29.8676**	**1.3621**	**31.2297**	**0.0000**	**132,460.1322**	**132,460.1322**	**2.0087**	**12.1810**	**136,140.2944**

3.5 Building Construction - 2026

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1785	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6549	302.6549	0.0711	0.0000	304.4335
Total	**0.1785**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6549**	**302.6549**	**0.0711**	**0.0000**	**304.4335**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7545	163.8154	46.6086	0.7135	24.9679	1.0624	26.0303	7.2134	1.0164	8.2297	0.0000	68,446.9992	68,446.9992	0.3355	10.2985	71,524.3366
Worker	26.5215	15.0864	202.8518	0.6632	85.2332	0.3562	85.5894	22.6543	0.3278	22.9820	0.0000	60,815.2593	60,815.2593	1.5100	1.5727	61,321.6677
Total	**30.2760**	**178.9017**	**249.4604**	**1.3767**	**110.2011**	**1.4186**	**111.6197**	**29.8676**	**1.3441**	**31.2117**	**0.0000**	**129,262.2586**	**129,262.2586**	**1.8454**	**11.8712**	**132,846.0042**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1784	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6545	302.6545	0.0711	0.0000	304.4331
Total	**0.1784**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6545**	**302.6545**	**0.0711**	**0.0000**	**304.4331**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.7545	163.8154	46.6086	0.7135	24.9679	1.0624	26.0303	7.2134	1.0164	8.2297	0.0000	68,446.9992	68,446.9992	0.3355	10.2985	71,524.3366
Worker	26.5215	15.0864	202.8518	0.6632	85.2332	0.3562	85.5894	22.6543	0.3278	22.9820	0.0000	60,815.2593	60,815.2593	1.5100	1.5727	61,321.6677
Total	**30.2760**	**178.9017**	**249.4604**	**1.3767**	**110.2011**	**1.4186**	**111.6197**	**29.8676**	**1.3441**	**31.2117**	**0.0000**	**129,262.2586**	**129,262.2586**	**1.8454**	**11.8712**	**132,846.0042**

3.5 Building Construction - 2027

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1785	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6549	302.6549	0.0711	0.0000	304.4335
Total	**0.1785**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6549**	**302.6549**	**0.0711**	**0.0000**	**304.4335**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6853	162.7129	45.9602	0.6983	24.9679	1.0551	26.0231	7.2134	1.0094	8.2227	0.0000	66,993.1235	66,993.1235	0.3199	10.0778	70,004.3095
Worker	24.8476	13.6769	191.0436	0.6436	85.2332	0.3360	85.5692	22.6543	0.3092	22.9634	0.0000	59,018.3417	59,018.3417	1.3778	1.4873	59,496.0115
Total	**28.5329**	**176.3897**	**237.0038**	**1.3420**	**110.2011**	**1.3911**	**111.5923**	**29.8676**	**1.3186**	**31.1862**	**0.0000**	**126,011.4652**	**126,011.4652**	**1.6978**	**11.5651**	**129,500.3211**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1784	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6545	302.6545	0.0711	0.0000	304.4331
Total	**0.1784**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6545**	**302.6545**	**0.0711**	**0.0000**	**304.4331**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6853	162.7129	45.9602	0.6983	24.9679	1.0551	26.0231	7.2134	1.0094	8.2227	0.0000	66,993.1235	66,993.1235	0.3199	10.0778	70,004.3095
Worker	24.8476	13.6769	191.0436	0.6436	85.2332	0.3360	85.5692	22.6543	0.3092	22.9634	0.0000	59,018.3417	59,018.3417	1.3778	1.4873	59,496.0115
Total	**28.5329**	**176.3897**	**237.0038**	**1.3420**	**110.2011**	**1.3911**	**111.5923**	**29.8676**	**1.3186**	**31.1862**	**0.0000**	**126,011.4652**	**126,011.4652**	**1.6978**	**11.5651**	**129,500.3211**

3.5 Building Construction - 2028

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1778	1.6211	2.0910	3.5000e-003		0.0686	0.0686		0.0645	0.0645	0.0000	301.4953	301.4953	0.0709	0.0000	303.2671
Total	**0.1778**	**1.6211**	**2.0910**	**3.5000e-003**		**0.0686**	**0.0686**		**0.0645**	**0.0645**	**0.0000**	**301.4953**	**301.4953**	**0.0709**	**0.0000**	**303.2671**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6129	161.2529	45.2681	0.6813	24.8723	1.0444	25.9167	7.1857	0.9991	8.1849	0.0000	65,354.4978	65,354.4978	0.3059	9.8281	68,290.9123
Worker	23.2194	12.4594	180.5550	0.6236	84.9067	0.3136	85.2203	22.5675	0.2886	22.8560	0.0000	57,183.7048	57,183.7048	1.2597	1.4111	57,635.7103
Total	**26.8323**	**173.7123**	**225.8231**	**1.3049**	**109.7790**	**1.3581**	**111.1370**	**29.7532**	**1.2877**	**31.0409**	**0.0000**	**122,538.2027**	**122,538.2027**	**1.5656**	**11.2392**	**125,926.6226**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1778	1.6211	2.0910	3.5000e-003		0.0686	0.0686		0.0645	0.0645	0.0000	301.4949	301.4949	0.0709	0.0000	303.2667
Total	**0.1778**	**1.6211**	**2.0910**	**3.5000e-003**		**0.0686**	**0.0686**		**0.0645**	**0.0645**	**0.0000**	**301.4949**	**301.4949**	**0.0709**	**0.0000**	**303.2667**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.6129	161.2529	45.2681	0.6813	24.8723	1.0444	25.9167	7.1857	0.9991	8.1849	0.0000	65,354.4978	65,354.4978	0.3059	9.8281	68,290.9123
Worker	23.2194	12.4594	180.5550	0.6236	84.9067	0.3136	85.2203	22.5675	0.2886	22.8560	0.0000	57,183.7048	57,183.7048	1.2597	1.4111	57,635.7103
Total	**26.8323**	**173.7123**	**225.8231**	**1.3049**	**109.7790**	**1.3581**	**111.1370**	**29.7532**	**1.2877**	**31.0409**	**0.0000**	**122,538.2027**	**122,538.2027**	**1.5656**	**11.2392**	**125,926.6226**

3.5 Building Construction - 2029

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1785	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6549	302.6549	0.0711	0.0000	304.4335
Total	**0.1785**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6549**	**302.6549**	**0.0711**	**0.0000**	**304.4335**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.5742	160.9532	44.9886	0.6700	24.9680	1.0407	26.0087	7.2134	0.9955	8.2089	0.0000	64,274.9644	64,274.9644	0.2956	9.6625	67,161.7911
Worker	21.8407	11.5164	172.7531	0.6102	85.2332	0.2947	85.5279	22.6543	0.2711	22.9254	0.0000	55,954.8812	55,954.8812	1.1650	1.3571	56,388.4186
Total	**25.4149**	**172.4695**	**217.7417**	**1.2802**	**110.2012**	**1.3354**	**111.5366**	**29.8677**	**1.2667**	**31.1343**	**0.0000**	**120,229.8456**	**120,229.8456**	**1.4606**	**11.0196**	**123,550.2097**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1784	1.6273	2.0991	3.5200e-003		0.0689	0.0689		0.0648	0.0648	0.0000	302.6545	302.6545	0.0711	0.0000	304.4331
Total	**0.1784**	**1.6273**	**2.0991**	**3.5200e-003**		**0.0689**	**0.0689**		**0.0648**	**0.0648**	**0.0000**	**302.6545**	**302.6545**	**0.0711**	**0.0000**	**304.4331**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.5742	160.9532	44.9886	0.6700	24.9680	1.0407	26.0087	7.2134	0.9955	8.2089	0.0000	64,274.9644	64,274.9644	0.2956	9.6625	67,161.7911
Worker	21.8407	11.5164	172.7531	0.6102	85.2332	0.2947	85.5279	22.6543	0.2711	22.9254	0.0000	55,954.8812	55,954.8812	1.1650	1.3571	56,388.4186
Total	**25.4149**	**172.4695**	**217.7417**	**1.2802**	**110.2012**	**1.3354**	**111.5366**	**29.8677**	**1.2667**	**31.1343**	**0.0000**	**120,229.8456**	**120,229.8456**	**1.4606**	**11.0196**	**123,550.2097**

3.5 Building Construction - 2030

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1708	1.0355	2.1085	4.0400e-003		0.0193	0.0193		0.0193	0.0193	0.0000	343.0336	343.0336	0.0138	0.0000	343.3777
Total	**0.1708**	**1.0355**	**2.1085**	**4.0400e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**343.0336**	**343.0336**	**0.0138**	**0.0000**	**343.3777**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.5313	160.2861	44.6387	0.6575	24.9681	1.0348	26.0028	7.2134	0.9899	8.2033	0.0000	63,070.7659	63,070.7659	0.2866	9.4787	65,902.5666
Worker	20.4567	10.6756	165.5613	0.5961	85.2332	0.2757	85.5090	22.6543	0.2537	22.9080	0.0000	54,660.7793	54,660.7793	1.0775	1.3073	55,077.2912
Total	**23.9881**	**170.9618**	**210.2000**	**1.2536**	**110.2013**	**1.3105**	**111.5118**	**29.8677**	**1.2436**	**31.1113**	**0.0000**	**117,731.5452**	**117,731.5452**	**1.3641**	**10.7860**	**120,979.8579**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1708	1.0355	2.1085	4.0400e-003		0.0193	0.0193		0.0193	0.0193	0.0000	343.0332	343.0332	0.0138	0.0000	343.3773
Total	**0.1708**	**1.0355**	**2.1085**	**4.0400e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**343.0332**	**343.0332**	**0.0138**	**0.0000**	**343.3773**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.5313	160.2861	44.6387	0.6575	24.9681	1.0348	26.0028	7.2134	0.9899	8.2033	0.0000	63,070.7659	63,070.7659	0.2866	9.4787	65,902.5666
Worker	20.4567	10.6756	165.5613	0.5961	85.2332	0.2757	85.5090	22.6543	0.2537	22.9080	0.0000	54,660.7793	54,660.7793	1.0775	1.3073	55,077.2912
Total	**23.9881**	**170.9618**	**210.2000**	**1.2536**	**110.2013**	**1.3105**	**111.5118**	**29.8677**	**1.2436**	**31.1113**	**0.0000**	**117,731.5452**	**117,731.5452**	**1.3641**	**10.7860**	**120,979.8579**

3.5 Building Construction - 2031

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1708	1.0355	2.1085	4.0400e-003		0.0193	0.0193		0.0193	0.0193	0.0000	343.0336	343.0336	0.0138	0.0000	343.3777
Total	**0.1708**	**1.0355**	**2.1085**	**4.0400e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**343.0336**	**343.0336**	**0.0138**	**0.0000**	**343.3777**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4980	159.8363	44.4144	0.6464	24.9682	1.0301	25.9983	7.2134	0.9855	8.1989	0.0000	62,004.1921	62,004.1921	0.2783	9.3168	64,787.5638
Worker	19.1358	9.9500	159.2904	0.5835	85.2332	0.2580	85.4913	22.6543	0.2374	22.8917	0.0000	53,508.3277	53,508.3277	1.0000	1.2652	53,910.3418
Total	**22.6338**	**169.7863**	**203.7048**	**1.2299**	**110.2014**	**1.2882**	**111.4895**	**29.8677**	**1.2229**	**31.0906**	**0.0000**	**115,512.5197**	**115,512.5197**	**1.2783**	**10.5820**	**118,697.9056**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1708	1.0355	2.1085	4.0400e-003		0.0193	0.0193		0.0193	0.0193	0.0000	343.0332	343.0332	0.0138	0.0000	343.3773
Total	**0.1708**	**1.0355**	**2.1085**	**4.0400e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**343.0332**	**343.0332**	**0.0138**	**0.0000**	**343.3773**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4980	159.8363	44.4144	0.6464	24.9682	1.0301	25.9983	7.2134	0.9855	8.1989	0.0000	62,004.1921	62,004.1921	0.2783	9.3168	64,787.5638
Worker	19.1358	9.9500	159.2904	0.5835	85.2332	0.2580	85.4913	22.6543	0.2374	22.8917	0.0000	53,508.3277	53,508.3277	1.0000	1.2652	53,910.3418
Total	**22.6338**	**169.7863**	**203.7048**	**1.2299**	**110.2014**	**1.2882**	**111.4895**	**29.8677**	**1.2229**	**31.0906**	**0.0000**	**115,512.5197**	**115,512.5197**	**1.2783**	**10.5820**	**118,697.9056**

3.5 Building Construction - 2032

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1715	1.0394	2.1166	4.0600e-003		0.0194	0.0194		0.0194	0.0194	0.0000	344.3479	344.3479	0.0138	0.0000	344.6933
Total	**0.1715**	**1.0394**	**2.1166**	**4.0600e-003**		**0.0194**	**0.0194**		**0.0194**	**0.0194**	**0.0000**	**344.3479**	**344.3479**	**0.0138**	**0.0000**	**344.6933**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4868	160.0737	44.4687	0.6391	25.0639	1.0297	26.0936	7.2411	0.9850	8.2261	0.0000	61,302.5417	61,302.5417	0.2724	9.2104	64,054.0555
Worker	18.0416	9.3977	154.5546	0.5746	85.5598	0.2427	85.8025	22.7411	0.2233	22.9643	0.0000	52,689.0377	52,689.0377	0.9362	1.2357	53,080.6772
Total	**21.5284**	**169.4713**	**199.0233**	**1.2137**	**110.6236**	**1.2724**	**111.8960**	**29.9822**	**1.2083**	**31.1905**	**0.0000**	**113,991.5794**	**113,991.5794**	**1.2086**	**10.4461**	**117,134.7327**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1715	1.0394	2.1166	4.0600e-003		0.0194	0.0194		0.0194	0.0194	0.0000	344.3475	344.3475	0.0138	0.0000	344.6929
Total	**0.1715**	**1.0394**	**2.1166**	**4.0600e-003**		**0.0194**	**0.0194**		**0.0194**	**0.0194**	**0.0000**	**344.3475**	**344.3475**	**0.0138**	**0.0000**	**344.6929**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4868	160.0737	44.4687	0.6391	25.0639	1.0297	26.0936	7.2411	0.9850	8.2261	0.0000	61,302.5417	61,302.5417	0.2724	9.2104	64,054.0555
Worker	18.0416	9.3977	154.5546	0.5746	85.5598	0.2427	85.8025	22.7411	0.2233	22.9643	0.0000	52,689.0377	52,689.0377	0.9362	1.2357	53,080.6772
Total	**21.5284**	**169.4713**	**199.0233**	**1.2137**	**110.6236**	**1.2724**	**111.8960**	**29.9822**	**1.2083**	**31.1905**	**0.0000**	**113,991.5794**	**113,991.5794**	**1.2086**	**10.4461**	**117,134.7327**

3.5 Building Construction - 2033

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7193	341.7193	0.0137	0.0000	342.0621
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7193**	**341.7193**	**0.0137**	**0.0000**	**342.0621**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4444	158.5842	44.1058	0.6258	24.8726	1.0181	25.8907	7.1858	0.9740	8.1598	0.0000	60,019.8794	60,019.8794	0.2652	9.0171	62,713.5988
Worker	16.8575	8.8455	148.8047	0.5604	84.9067	0.2259	85.1326	22.5675	0.2079	22.7754	0.0000	51,388.6278	51,388.6278	0.8701	1.1985	51,767.5391
Total	**20.3019**	**167.4297**	**192.9105**	**1.1862**	**109.7792**	**1.2441**	**111.0233**	**29.7533**	**1.1819**	**30.9352**	**0.0000**	**111,408.5072**	**111,408.5072**	**1.1353**	**10.2156**	**114,481.1380**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7189	341.7189	0.0137	0.0000	342.0617
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7189**	**341.7189**	**0.0137**	**0.0000**	**342.0617**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4444	158.5842	44.1058	0.6258	24.8726	1.0181	25.8907	7.1858	0.9740	8.1598	0.0000	60,019.8794	60,019.8794	0.2652	9.0171	62,713.5988
Worker	16.8575	8.8455	148.8047	0.5604	84.9067	0.2259	85.1326	22.5675	0.2079	22.7754	0.0000	51,388.6278	51,388.6278	0.8701	1.1985	51,767.5391
Total	**20.3019**	**167.4297**	**192.9105**	**1.1862**	**109.7792**	**1.2441**	**111.0233**	**29.7533**	**1.1819**	**30.9352**	**0.0000**	**111,408.5072**	**111,408.5072**	**1.1353**	**10.2156**	**114,481.1380**

3.5 Building Construction - 2034

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7193	341.7193	0.0137	0.0000	342.0621
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7193**	**341.7193**	**0.0137**	**0.0000**	**342.0621**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4328	158.2470	44.1146	0.6181	24.8726	1.0137	25.8863	7.1858	0.9697	8.1556	0.0000	59,283.5084	59,283.5084	0.2604	8.9060	61,944.0047
Worker	15.9458	8.4624	144.8083	0.5518	84.9067	0.2123	85.1189	22.5675	0.1953	22.7628	0.0000	50,599.1635	50,599.1635	0.8179	1.1763	50,970.1394
Total	**19.3785**	**166.7094**	**188.9229**	**1.1699**	**109.7793**	**1.2260**	**111.0052**	**29.7533**	**1.1650**	**30.9184**	**0.0000**	**109,882.6719**	**109,882.6719**	**1.0783**	**10.0823**	**112,914.1441**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1702	1.0315	2.1004	4.0200e-003		0.0193	0.0193		0.0193	0.0193	0.0000	341.7189	341.7189	0.0137	0.0000	342.0617
Total	**0.1702**	**1.0315**	**2.1004**	**4.0200e-003**		**0.0193**	**0.0193**		**0.0193**	**0.0193**	**0.0000**	**341.7189**	**341.7189**	**0.0137**	**0.0000**	**342.0617**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4328	158.2470	44.1146	0.6181	24.8726	1.0137	25.8863	7.1858	0.9697	8.1556	0.0000	59,283.5084	59,283.5084	0.2604	8.9060	61,944.0047
Worker	15.9458	8.4624	144.8083	0.5518	84.9067	0.2123	85.1189	22.5675	0.1953	22.7628	0.0000	50,599.1635	50,599.1635	0.8179	1.1763	50,970.1394
Total	**19.3785**	**166.7094**	**188.9229**	**1.1699**	**109.7793**	**1.2260**	**111.0052**	**29.7533**	**1.1650**	**30.9184**	**0.0000**	**109,882.6719**	**109,882.6719**	**1.0783**	**10.0823**	**112,914.1441**

3.5 Building Construction - 2035

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0336	343.0336	0.0128	0.0000	343.3530
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0336**	**343.0336**	**0.0128**	**0.0000**	**343.3530**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4331	158.4613	44.2931	0.6136	24.9683	1.0129	25.9812	7.2135	0.9689	8.1824	0.0000	58,855.1294	58,855.1294	0.2576	8.8413	61,496.2722
Worker	15.1833	8.1954	141.9149	0.5464	85.2332	0.2007	85.4339	22.6543	0.1846	22.8389	0.0000	50,101.1421	50,101.1421	0.7753	1.1633	50,467.1856
Total	**18.6163**	**166.6567**	**186.2080**	**1.1600**	**110.2015**	**1.2135**	**111.4150**	**29.8678**	**1.1535**	**31.0213**	**0.0000**	**108,956.2715**	**108,956.2715**	**1.0330**	**10.0046**	**111,963.4577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0332	343.0332	0.0128	0.0000	343.3526
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0332**	**343.0332**	**0.0128**	**0.0000**	**343.3526**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4331	158.4613	44.2931	0.6136	24.9683	1.0129	25.9812	7.2135	0.9689	8.1824	0.0000	58,855.1294	58,855.1294	0.2576	8.8413	61,496.2722
Worker	15.1833	8.1954	141.9149	0.5464	85.2332	0.2007	85.4339	22.6543	0.1846	22.8389	0.0000	50,101.1421	50,101.1421	0.7753	1.1633	50,467.1856
Total	**18.6163**	**166.6567**	**186.2080**	**1.1600**	**110.2015**	**1.2135**	**111.4150**	**29.8678**	**1.1535**	**31.0213**	**0.0000**	**108,956.2715**	**108,956.2715**	**1.0330**	**10.0046**	**111,963.4577**

3.5 Building Construction - 2036

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1594	0.9381	2.1114	4.0600e-003		0.0118	0.0118		0.0118	0.0118	0.0000	344.3479	344.3479	0.0128	0.0000	344.6686
Total	**0.1594**	**0.9381**	**2.1114**	**4.0600e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**344.3479**	**344.3479**	**0.0128**	**0.0000**	**344.6686**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4462	159.0684	44.4628	0.6160	25.0640	1.0167	26.0807	7.2411	0.9726	8.2138	0.0000	59,080.6280	59,080.6280	0.2586	8.8752	61,731.8901
Worker	15.2414	8.2268	142.4586	0.5485	85.5598	0.2014	85.7612	22.7411	0.1853	22.9264	0.0000	50,293.1005	50,293.1005	0.7783	1.1678	50,660.5464
Total	**18.6876**	**167.2952**	**186.9214**	**1.1644**	**110.6238**	**1.2182**	**111.8419**	**29.9822**	**1.1580**	**31.1402**	**0.0000**	**109,373.7285**	**109,373.7285**	**1.0369**	**10.0429**	**112,392.4365**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1594	0.9381	2.1114	4.0600e-003		0.0118	0.0118		0.0118	0.0118	0.0000	344.3475	344.3475	0.0128	0.0000	344.6682
Total	**0.1594**	**0.9381**	**2.1114**	**4.0600e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**344.3475**	**344.3475**	**0.0128**	**0.0000**	**344.6682**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4462	159.0684	44.4628	0.6160	25.0640	1.0167	26.0807	7.2411	0.9726	8.2138	0.0000	59,080.6280	59,080.6280	0.2586	8.8752	61,731.8901
Worker	15.2414	8.2268	142.4586	0.5485	85.5598	0.2014	85.7612	22.7411	0.1853	22.9264	0.0000	50,293.1005	50,293.1005	0.7783	1.1678	50,660.5464
Total	**18.6876**	**167.2952**	**186.9214**	**1.1644**	**110.6238**	**1.2182**	**111.8419**	**29.9822**	**1.1580**	**31.1402**	**0.0000**	**109,373.7285**	**109,373.7285**	**1.0369**	**10.0429**	**112,392.4365**

3.5 Building Construction - 2037

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0336	343.0336	0.0128	0.0000	343.3530
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0336**	**343.0336**	**0.0128**	**0.0000**	**343.3530**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4331	158.4613	44.2931	0.6136	24.9683	1.0129	25.9812	7.2135	0.9689	8.1824	0.0000	58,855.1294	58,855.1294	0.2576	8.8413	61,496.2722
Worker	15.1833	8.1954	141.9149	0.5464	85.2332	0.2007	85.4339	22.6543	0.1846	22.8389	0.0000	50,101.1421	50,101.1421	0.7753	1.1633	50,467.1856
Total	**18.6163**	**166.6567**	**186.2080**	**1.1600**	**110.2015**	**1.2135**	**111.4150**	**29.8678**	**1.1535**	**31.0213**	**0.0000**	**108,956.2715**	**108,956.2715**	**1.0330**	**10.0046**	**111,963.4577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0332	343.0332	0.0128	0.0000	343.3526
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0332**	**343.0332**	**0.0128**	**0.0000**	**343.3526**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4331	158.4613	44.2931	0.6136	24.9683	1.0129	25.9812	7.2135	0.9689	8.1824	0.0000	58,855.1294	58,855.1294	0.2576	8.8413	61,496.2722
Worker	15.1833	8.1954	141.9149	0.5464	85.2332	0.2007	85.4339	22.6543	0.1846	22.8389	0.0000	50,101.1421	50,101.1421	0.7753	1.1633	50,467.1856
Total	**18.6163**	**166.6567**	**186.2080**	**1.1600**	**110.2015**	**1.2135**	**111.4150**	**29.8678**	**1.1535**	**31.0213**	**0.0000**	**108,956.2715**	**108,956.2715**	**1.0330**	**10.0046**	**111,963.4577**

3.5 Building Construction - 2038

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0336	343.0336	0.0128	0.0000	343.3530
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0336**	**343.0336**	**0.0128**	**0.0000**	**343.3530**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4331	158.4613	44.2931	0.6136	24.9683	1.0129	25.9812	7.2135	0.9689	8.1824	0.0000	58,855.1294	58,855.1294	0.2576	8.8413	61,496.2722
Worker	15.1833	8.1954	141.9149	0.5464	85.2332	0.2007	85.4339	22.6543	0.1846	22.8389	0.0000	50,101.1421	50,101.1421	0.7753	1.1633	50,467.1856
Total	**18.6163**	**166.6567**	**186.2080**	**1.1600**	**110.2015**	**1.2135**	**111.4150**	**29.8678**	**1.1535**	**31.0213**	**0.0000**	**108,956.2715**	**108,956.2715**	**1.0330**	**10.0046**	**111,963.4577**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1588	0.9346	2.1034	4.0400e-003		0.0118	0.0118		0.0118	0.0118	0.0000	343.0332	343.0332	0.0128	0.0000	343.3526
Total	**0.1588**	**0.9346**	**2.1034**	**4.0400e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**343.0332**	**343.0332**	**0.0128**	**0.0000**	**343.3526**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4331	158.4613	44.2931	0.6136	24.9683	1.0129	25.9812	7.2135	0.9689	8.1824	0.0000	58,855.1294	58,855.1294	0.2576	8.8413	61,496.2722
Worker	15.1833	8.1954	141.9149	0.5464	85.2332	0.2007	85.4339	22.6543	0.1846	22.8389	0.0000	50,101.1421	50,101.1421	0.7753	1.1633	50,467.1856
Total	**18.6163**	**166.6567**	**186.2080**	**1.1600**	**110.2015**	**1.2135**	**111.4150**	**29.8678**	**1.1535**	**31.0213**	**0.0000**	**108,956.2715**	**108,956.2715**	**1.0330**	**10.0046**	**111,963.4577**

3.5 Building Construction - 2039

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1582	0.9310	2.0953	4.0200e-003		0.0118	0.0118		0.0118	0.0118	0.0000	341.7193	341.7193	0.0127	0.0000	342.0375
Total	**0.1582**	**0.9310**	**2.0953**	**4.0200e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**341.7193**	**341.7193**	**0.0127**	**0.0000**	**342.0375**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4199	157.8542	44.1234	0.6113	24.8727	1.0090	25.8816	7.1859	0.9652	8.1511	0.0000	58,629.6308	58,629.6308	0.2567	8.8074	61,260.6543
Worker	15.1251	8.1640	141.3712	0.5443	84.9067	0.1999	85.1065	22.5675	0.1839	22.7514	0.0000	49,909.1837	49,909.1837	0.7724	1.1588	50,273.8247
Total	**18.5450**	**166.0181**	**185.4945**	**1.1556**	**109.7793**	**1.2088**	**110.9881**	**29.7533**	**1.1491**	**30.9024**	**0.0000**	**108,538.8145**	**108,538.8145**	**1.0290**	**9.9662**	**111,534.4790**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1582	0.9310	2.0953	4.0200e-003		0.0118	0.0118		0.0118	0.0118	0.0000	341.7189	341.7189	0.0127	0.0000	342.0371
Total	**0.1582**	**0.9310**	**2.0953**	**4.0200e-003**		**0.0118**	**0.0118**		**0.0118**	**0.0118**	**0.0000**	**341.7189**	**341.7189**	**0.0127**	**0.0000**	**342.0371**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4199	157.8542	44.1234	0.6113	24.8727	1.0090	25.8816	7.1859	0.9652	8.1511	0.0000	58,629.6308	58,629.6308	0.2567	8.8074	61,260.6543
Worker	15.1251	8.1640	141.3712	0.5443	84.9067	0.1999	85.1065	22.5675	0.1839	22.7514	0.0000	49,909.1837	49,909.1837	0.7724	1.1588	50,273.8247
Total	**18.5450**	**166.0181**	**185.4945**	**1.1556**	**109.7793**	**1.2088**	**110.9881**	**29.7533**	**1.1491**	**30.9024**	**0.0000**	**108,538.8145**	**108,538.8145**	**1.0290**	**9.9662**	**111,534.4790**

3.5 Building Construction - 2040

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0337	343.0337	0.0123	0.0000	343.3419
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0337**	**343.0337**	**0.0123**	**0.0000**	**343.3419**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4194	157.4569	44.5626	0.5900	24.9686	0.9993	25.9679	7.2136	0.9560	8.1696	0.0000	56,582.5291	56,582.5291	0.2463	8.4999	59,121.6414
Worker	12.1690	7.3376	130.5006	0.5218	85.2332	0.1572	85.3905	22.6543	0.1447	22.7990	0.0000	47,851.8073	47,851.8073	0.6200	1.1160	48,199.8767
Total	**15.5884**	**164.7944**	**175.0632**	**1.1118**	**110.2018**	**1.1566**	**111.3584**	**29.8679**	**1.1007**	**30.9685**	**0.0000**	**104,434.3364**	**104,434.3364**	**0.8663**	**9.6159**	**107,321.5182**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0333	343.0333	0.0123	0.0000	343.3415
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0333**	**343.0333**	**0.0123**	**0.0000**	**343.3415**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4194	157.4569	44.5626	0.5900	24.9686	0.9993	25.9679	7.2136	0.9560	8.1696	0.0000	56,582.5291	56,582.5291	0.2463	8.4999	59,121.6414
Worker	12.1690	7.3376	130.5006	0.5218	85.2332	0.1572	85.3905	22.6543	0.1447	22.7990	0.0000	47,851.8073	47,851.8073	0.6200	1.1160	48,199.8767
Total	**15.5884**	**164.7944**	**175.0632**	**1.1118**	**110.2018**	**1.1566**	**111.3584**	**29.8679**	**1.1007**	**30.9685**	**0.0000**	**104,434.3364**	**104,434.3364**	**0.8663**	**9.6159**	**107,321.5182**

3.5 Building Construction - 2041

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0337	343.0337	0.0123	0.0000	343.3419
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0337**	**343.0337**	**0.0123**	**0.0000**	**343.3419**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4194	157.4569	44.5626	0.5900	24.9686	0.9993	25.9679	7.2136	0.9560	8.1696	0.0000	56,582.5291	56,582.5291	0.2463	8.4999	59,121.6414
Worker	12.1690	7.3376	130.5006	0.5218	85.2332	0.1572	85.3905	22.6543	0.1447	22.7990	0.0000	47,851.8073	47,851.8073	0.6200	1.1160	48,199.8767
Total	**15.5884**	**164.7944**	**175.0632**	**1.1118**	**110.2018**	**1.1566**	**111.3584**	**29.8679**	**1.1007**	**30.9685**	**0.0000**	**104,434.3364**	**104,434.3364**	**0.8663**	**9.6159**	**107,321.5182**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0333	343.0333	0.0123	0.0000	343.3415
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0333**	**343.0333**	**0.0123**	**0.0000**	**343.3415**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4194	157.4569	44.5626	0.5900	24.9686	0.9993	25.9679	7.2136	0.9560	8.1696	0.0000	56,582.5291	56,582.5291	0.2463	8.4999	59,121.6414
Worker	12.1690	7.3376	130.5006	0.5218	85.2332	0.1572	85.3905	22.6543	0.1447	22.7990	0.0000	47,851.8073	47,851.8073	0.6200	1.1160	48,199.8767
Total	**15.5884**	**164.7944**	**175.0632**	**1.1118**	**110.2018**	**1.1566**	**111.3584**	**29.8679**	**1.1007**	**30.9685**	**0.0000**	**104,434.3364**	**104,434.3364**	**0.8663**	**9.6159**	**107,321.5182**

3.5 Building Construction - 2042

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0337	343.0337	0.0123	0.0000	343.3419
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0337**	**343.0337**	**0.0123**	**0.0000**	**343.3419**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4194	157.4569	44.5626	0.5900	24.9686	0.9993	25.9679	7.2136	0.9560	8.1696	0.0000	56,582.5291	56,582.5291	0.2463	8.4999	59,121.6414
Worker	12.1690	7.3376	130.5006	0.5218	85.2332	0.1572	85.3905	22.6543	0.1447	22.7990	0.0000	47,851.8073	47,851.8073	0.6200	1.1160	48,199.8767
Total	**15.5884**	**164.7944**	**175.0632**	**1.1118**	**110.2018**	**1.1566**	**111.3584**	**29.8679**	**1.1007**	**30.9685**	**0.0000**	**104,434.3364**	**104,434.3364**	**0.8663**	**9.6159**	**107,321.5182**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1562	0.8992	2.1035	4.0400e-003		9.6200e-003	9.6200e-003		9.6200e-003	9.6200e-003	0.0000	343.0333	343.0333	0.0123	0.0000	343.3415
Total	**0.1562**	**0.8992**	**2.1035**	**4.0400e-003**		**9.6200e-003**	**9.6200e-003**		**9.6200e-003**	**9.6200e-003**	**0.0000**	**343.0333**	**343.0333**	**0.0123**	**0.0000**	**343.3415**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	3.4194	157.4569	44.5626	0.5900	24.9686	0.9993	25.9679	7.2136	0.9560	8.1696	0.0000	56,582.5291	56,582.5291	0.2463	8.4999	59,121.6414
Worker	12.1690	7.3376	130.5006	0.5218	85.2332	0.1572	85.3905	22.6543	0.1447	22.7990	0.0000	47,851.8073	47,851.8073	0.6200	1.1160	48,199.8767
Total	**15.5884**	**164.7944**	**175.0632**	**1.1118**	**110.2018**	**1.1566**	**111.3584**	**29.8679**	**1.1007**	**30.9685**	**0.0000**	**104,434.3364**	**104,434.3364**	**0.8663**	**9.6159**	**107,321.5182**

3.5 Building Construction - 2043

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0515	0.2963	0.6931	1.3300e-003		3.1700e-003	3.1700e-003		3.1700e-003	3.1700e-003	0.0000	113.0303	113.0303	4.0600e-003	0.0000	113.1318
Total	**0.0515**	**0.2963**	**0.6931**	**1.3300e-003**		**3.1700e-003**	**3.1700e-003**		**3.1700e-003**	**3.1700e-003**	**0.0000**	**113.0303**	**113.0303**	**4.0600e-003**	**0.0000**	**113.1318**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1267	51.8823	14.6835	0.1944	8.2272	0.3293	8.5565	2.3769	0.3150	2.6919	0.0000	18,644.0517	18,644.0517	0.0812	2.8007	19,480.6941
Worker	4.0097	2.4177	43.0002	0.1719	28.0845	0.0518	28.1363	7.4646	0.0477	7.5123	0.0000	15,767.2622	15,767.2622	0.2043	0.3677	15,881.9517
Total	**5.1364**	**54.3001**	**57.6837**	**0.3663**	**36.3117**	**0.3811**	**36.6928**	**9.8415**	**0.3627**	**10.2042**	**0.0000**	**34,411.3139**	**34,411.3139**	**0.2855**	**3.1685**	**35,362.6458**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0515	0.2963	0.6931	1.3300e-003		3.1700e-003	3.1700e-003		3.1700e-003	3.1700e-003	0.0000	113.0301	113.0301	4.0600e-003	0.0000	113.1317
Total	**0.0515**	**0.2963**	**0.6931**	**1.3300e-003**		**3.1700e-003**	**3.1700e-003**		**3.1700e-003**	**3.1700e-003**	**0.0000**	**113.0301**	**113.0301**	**4.0600e-003**	**0.0000**	**113.1317**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	1.1267	51.8823	14.6835	0.1944	8.2272	0.3293	8.5565	2.3769	0.3150	2.6919	0.0000	18,644.0517	18,644.0517	0.0812	2.8007	19,480.6941
Worker	4.0097	2.4177	43.0002	0.1719	28.0845	0.0518	28.1363	7.4646	0.0477	7.5123	0.0000	15,767.2622	15,767.2622	0.2043	0.3677	15,881.9517
Total	**5.1364**	**54.3001**	**57.6837**	**0.3663**	**36.3117**	**0.3811**	**36.6928**	**9.8415**	**0.3627**	**10.2042**	**0.0000**	**34,411.3139**	**34,411.3139**	**0.2855**	**3.1685**	**35,362.6458**

3.6 Paving - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1295	1.2477	1.9160	2.9900e-003		0.0614	0.0614		0.0565	0.0565	0.0000	262.3476	262.3476	0.0849	0.0000	264.4688
Paving	2.1203					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.2497**	**1.2477**	**1.9160**	**2.9900e-003**		**0.0614**	**0.0614**		**0.0565**	**0.0565**	**0.0000**	**262.3476**	**262.3476**	**0.0849**	**0.0000**	**264.4688**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6200e-003	3.4700e-003	0.0427	1.3000e-004	0.0157	7.0000e-005	0.0158	4.1800e-003	7.0000e-005	4.2400e-003	0.0000	11.9476	11.9476	3.4000e-004	3.3000e-004	12.0547
Total	**5.6200e-003**	**3.4700e-003**	**0.0427**	**1.3000e-004**	**0.0157**	**7.0000e-005**	**0.0158**	**4.1800e-003**	**7.0000e-005**	**4.2400e-003**	**0.0000**	**11.9476**	**11.9476**	**3.4000e-004**	**3.3000e-004**	**12.0547**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.1295	1.2477	1.9160	2.9900e-003		0.0614	0.0614		0.0565	0.0565	0.0000	262.3473	262.3473	0.0849	0.0000	264.4685
Paving	2.1203					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**2.2497**	**1.2477**	**1.9160**	**2.9900e-003**		**0.0614**	**0.0614**		**0.0565**	**0.0565**	**0.0000**	**262.3473**	**262.3473**	**0.0849**	**0.0000**	**264.4685**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	5.6200e-003	3.4700e-003	0.0427	1.3000e-004	0.0157	7.0000e-005	0.0158	4.1800e-003	7.0000e-005	4.2400e-003	0.0000	11.9476	11.9476	3.4000e-004	3.3000e-004	12.0547
Total	**5.6200e-003**	**3.4700e-003**	**0.0427**	**1.3000e-004**	**0.0157**	**7.0000e-005**	**0.0158**	**4.1800e-003**	**7.0000e-005**	**4.2400e-003**	**0.0000**	**11.9476**	**11.9476**	**3.4000e-004**	**3.3000e-004**	**12.0547**

3.6 Paving - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0439	0.4119	0.6997	1.0900e-003		0.0201	0.0201		0.0185	0.0185	0.0000	96.0924	96.0924	0.0311	0.0000	96.8694
Paving	0.7769					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.8208**	**0.4119**	**0.6997**	**1.0900e-003**		**0.0201**	**0.0201**		**0.0185**	**0.0185**	**0.0000**	**96.0924**	**96.0924**	**0.0311**	**0.0000**	**96.8694**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9200e-003	1.1300e-003	0.0145	5.0000e-005	5.7600e-003	2.0000e-005	5.7800e-003	1.5300e-003	2.0000e-005	1.5500e-003	0.0000	4.2302	4.2302	1.1000e-004	1.1000e-004	4.2667
Total	**1.9200e-003**	**1.1300e-003**	**0.0145**	**5.0000e-005**	**5.7600e-003**	**2.0000e-005**	**5.7800e-003**	**1.5300e-003**	**2.0000e-005**	**1.5500e-003**	**0.0000**	**4.2302**	**4.2302**	**1.1000e-004**	**1.1000e-004**	**4.2667**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0439	0.4119	0.6997	1.0900e-003		0.0201	0.0201		0.0185	0.0185	0.0000	96.0923	96.0923	0.0311	0.0000	96.8693
Paving	0.7769					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.8208**	**0.4119**	**0.6997**	**1.0900e-003**		**0.0201**	**0.0201**		**0.0185**	**0.0185**	**0.0000**	**96.0923**	**96.0923**	**0.0311**	**0.0000**	**96.8693**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	1.9200e-003	1.1300e-003	0.0145	5.0000e-005	5.7600e-003	2.0000e-005	5.7800e-003	1.5300e-003	2.0000e-005	1.5500e-003	0.0000	4.2302	4.2302	1.1000e-004	1.1000e-004	4.2667
Total	**1.9200e-003**	**1.1300e-003**	**0.0145**	**5.0000e-005**	**5.7600e-003**	**2.0000e-005**	**5.7800e-003**	**1.5300e-003**	**2.0000e-005**	**1.5500e-003**	**0.0000**	**4.2302**	**4.2302**	**1.1000e-004**	**1.1000e-004**	**4.2667**

3.7 Architectural Coating - 2024

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1,726.4315					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**1,726.4552**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.1250	3.7823	46.5333	0.1419	17.1120	0.0781	17.1900	4.5482	0.0719	4.6201	0.0000	13,014.0754	13,014.0754	0.3684	0.3609	13,130.8177
Total	**6.1250**	**3.7823**	**46.5333**	**0.1419**	**17.1120**	**0.0781**	**17.1900**	**4.5482**	**0.0719**	**4.6201**	**0.0000**	**13,014.0754**	**13,014.0754**	**0.3684**	**0.3609**	**13,130.8177**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	1,726.4315					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	0.0237	0.1597	0.2371	3.9000e-004		7.9800e-003	7.9800e-003		7.9800e-003	7.9800e-003	0.0000	33.4476	33.4476	1.8800e-003	0.0000	33.4947
Total	**1,726.4552**	**0.1597**	**0.2371**	**3.9000e-004**		**7.9800e-003**	**7.9800e-003**		**7.9800e-003**	**7.9800e-003**	**0.0000**	**33.4476**	**33.4476**	**1.8800e-003**	**0.0000**	**33.4947**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	6.1250	3.7823	46.5333	0.1419	17.1120	0.0781	17.1900	4.5482	0.0719	4.6201	0.0000	13,014.0754	13,014.0754	0.3684	0.3609	13,130.8177
Total	**6.1250**	**3.7823**	**46.5333**	**0.1419**	**17.1120**	**0.0781**	**17.1900**	**4.5482**	**0.0719**	**4.6201**	**0.0000**	**13,014.0754**	**13,014.0754**	**0.3684**	**0.3609**	**13,130.8177**

3.7 Architectural Coating - 2025

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	632.5856					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.2000e-003	0.0550	0.0868	1.4000e-004		2.4700e-003	2.4700e-003		2.4700e-003	2.4700e-003	0.0000	12.2556	12.2556	6.7000e-004	0.0000	12.2723
Total	**632.5938**	**0.0550**	**0.0868**	**1.4000e-004**		**2.4700e-003**	**2.4700e-003**		**2.4700e-003**	**2.4700e-003**	**0.0000**	**12.2556**	**12.2556**	**6.7000e-004**	**0.0000**	**12.2723**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0862	1.2325	15.8263	0.0503	6.2700	0.0272	6.2973	1.6665	0.0251	1.6916	0.0000	4,607.8459	4,607.8459	0.1219	0.1231	4,647.5614
Total	**2.0862**	**1.2325**	**15.8263**	**0.0503**	**6.2700**	**0.0272**	**6.2973**	**1.6665**	**0.0251**	**1.6916**	**0.0000**	**4,607.8459**	**4,607.8459**	**0.1219**	**0.1231**	**4,647.5614**

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Archit. Coating	632.5856					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Off-Road	8.2000e-003	0.0550	0.0868	1.4000e-004		2.4700e-003	2.4700e-003		2.4700e-003	2.4700e-003	0.0000	12.2556	12.2556	6.7000e-004	0.0000	12.2723
Total	**632.5938**	**0.0550**	**0.0868**	**1.4000e-004**		**2.4700e-003**	**2.4700e-003**		**2.4700e-003**	**2.4700e-003**	**0.0000**	**12.2556**	**12.2556**	**6.7000e-004**	**0.0000**	**12.2723**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	2.0862	1.2325	15.8263	0.0503	6.2700	0.0272	6.2973	1.6665	0.0251	1.6916	0.0000	4,607.8459	4,607.8459	0.1219	0.1231	4,647.5614
Total	**2.0862**	**1.2325**	**15.8263**	**0.0503**	**6.2700**	**0.0272**	**6.2973**	**1.6665**	**0.0251**	**1.6916**	**0.0000**	**4,607.8459**	**4,607.8459**	**0.1219**	**0.1231**	**4,647.5614**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	166.6343	311.0334	1,798.7081	4.5891	641.6998	2.5977	644.2976	171.4312	2.4477	173.8789	0.0000	424,680.7633	424,680.7633	18.8916	23.7121	432,219.2426
Unmitigated	166.6343	311.0334	1,798.7081	4.5891	641.6998	2.5977	644.2976	171.4312	2.4477	173.8789	0.0000	424,680.7633	424,680.7633	18.8916	23.7121	432,219.2426

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	580.32	1,458.24	1629.36	1,826,580	1,826,580
Condo/Townhouse	123,751.92	137,614.84	106169.68	360,995,596	360,995,596
Government Office Building	179,511.89	0.00	0.00	219,886,731	219,886,731
Office Park	48,966.15	7,254.24	3361.72	91,458,957	91,458,957
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	169,215.13	206,733.82	94581.17	287,389,365	287,389,365
Research & Development	32,631.03	5,506.12	3216.74	61,538,401	61,538,401
Single Family Housing	239,379.52	241,915.32	216810.90	692,918,651	692,918,651
Total	794,035.96	600,482.59	425,769.57	1,716,014,281	1,716,014,281

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
City Park	9.50	7.30	7.30	33.00	48.00	19.00	66	28	6
Condo/Townhouse	10.80	7.30	7.50	48.40	15.90	35.70	86	11	3
Government Office Building	9.50	7.30	7.30	33.00	62.00	5.00	50	34	16
Office Park	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Parking Lot	9.50	7.30	7.30	0.00	0.00	0.00	0	0	0
Regional Shopping Center	9.50	7.30	7.30	16.30	64.70	19.00	54	35	11
Research & Development	9.50	7.30	7.30	33.00	48.00	19.00	82	15	3
Single Family Housing	10.80	7.30	7.50	48.40	15.90	35.70	86	11	3

4.4 Fleet Mix

Land Use	LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
City Park	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Condo/Townhouse	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Government Office Building	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Office Park	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Parking Lot	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Regional Shopping Center	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Research & Development	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069
Single Family Housing	0.561872	0.058143	0.178411	0.118389	0.017812	0.004953	0.015017	0.021690	0.000617	0.000260	0.019980	0.000788	0.002069

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	46,269.6137	46,269.6137	7.4855	0.9073	46,727.1381
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	46,269.6137	46,269.6137	7.4855	0.9073	46,727.1381
NaturalGas Mitigated	6.4741	56.2355	30.2284	0.3531		4.4730	4.4730		4.4730	4.4730	0.0000	64,070.8729	64,070.8729	1.2280	1.1746	64,451.6140
NaturalGas Unmitigated	6.4741	56.2355	30.2284	0.3531		4.4730	4.4730		4.4730	4.4730	0.0000	64,070.8729	64,070.8729	1.2280	1.1746	64,451.6140

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	2.81092e+008	1.5157	12.9523	5.5116	0.0827		1.0472	1.0472		1.0472	1.0472	0.0000	15,000.1489	15,000.1489	0.2875	0.2750	15,089.2872
Government Office Building	1.02669e+008	0.5536	5.0328	4.2276	0.0302		0.3825	0.3825		0.3825	0.3825	0.0000	5,478.8109	5,478.8109	0.1050	0.1004	5,511.3687
Office Park	9.97901e+007	0.5381	4.8917	4.1090	0.0294		0.3718	0.3718		0.3718	0.3718	0.0000	5,325.1797	5,325.1797	0.1021	0.0976	5,356.8246
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	4.75595e+007	0.2565	2.3314	1.9583	0.0140		0.1772	0.1772		0.1772	0.1772	0.0000	2,537.9580	2,537.9580	0.0486	0.0465	2,553.0398
Research & Development	5.99878e+007	0.3235	2.9406	2.4701	0.0176		0.2235	0.2235		0.2235	0.2235	0.0000	3,201.1760	3,201.1760	0.0614	0.0587	3,220.1990
Single Family Housing	6.09544e+008	3.2868	28.0868	11.9519	0.1793		2.2709	2.2709		2.2709	2.2709	0.0000	32,527.5994	32,527.5994	0.6235	0.5963	32,720.8947
Total		**6.4741**	**56.2355**	**30.2284**	**0.3531**		**4.4730**	**4.4730**		**4.4730**	**4.4730**	**0.0000**	**64,070.8729**	**64,070.8729**	**1.2280**	**1.1746**	**64,451.6140**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
City Park	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	2.81092e+008	1.5157	12.9523	5.5116	0.0827		1.0472	1.0472		1.0472	1.0472	0.0000	15,000.1489	15,000.1489	0.2875	0.2750	15,089.2872
Government Office Building	1.02669e+008	0.5536	5.0328	4.2276	0.0302		0.3825	0.3825		0.3825	0.3825	0.0000	5,478.8109	5,478.8109	0.1050	0.1004	5,511.3687
Office Park	9.97901e+007	0.5381	4.8917	4.1090	0.0294		0.3718	0.3718		0.3718	0.3718	0.0000	5,325.1797	5,325.1797	0.1021	0.0976	5,356.8246
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	4.75595e+007	0.2565	2.3314	1.9583	0.0140		0.1772	0.1772		0.1772	0.1772	0.0000	2,537.9580	2,537.9580	0.0486	0.0465	2,553.0398
Research & Development	5.99878e+007	0.3235	2.9406	2.4701	0.0176		0.2235	0.2235		0.2235	0.2235	0.0000	3,201.1760	3,201.1760	0.0614	0.0587	3,220.1990
Single Family Housing	6.09544e+008	3.2868	28.0868	11.9519	0.1793		2.2709	2.2709		2.2709	2.2709	0.0000	32,527.5994	32,527.5994	0.6235	0.5963	32,720.8947
Total		**6.4741**	**56.2355**	**30.2284**	**0.3531**		**4.4730**	**4.4730**		**4.4730**	**4.4730**	**0.0000**	**64,070.8729**	**64,070.8729**	**1.2280**	**1.1746**	**64,451.6140**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use		Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	tons/yr	MT/yr			
City Park	0		0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	8.36108e+007		7,735.9885	1.2515	0.1517	7,812.4837
Government Office Building	7.02472e+007		6,499.5393	1.0515	0.1275	6,563.8082
Office Park	4.98508e+007		4,612.3856	0.7462	0.0905	4,657.9939
Parking Lot	3.3718e+007		3,119.7145	0.5047	0.0612	3,150.5629
Regional Shopping Center	3.55016e+007		3,284.7381	0.5314	0.0644	3,317.2183
Research & Development	2.49514e+007		2,308.6009	0.3735	0.0453	2,331.4289
Single Family Housing	2.02204e+008		18,708.6469	3.0267	0.3669	18,893.6422
Total			**46,269.6138**	**7.4855**	**0.9073**	**46,727.1381**

Mitigated

	Electricity Use		Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	tons/yr	MT/yr			
City Park	0		0.0000	0.0000	0.0000	0.0000
Condo/Townhouse	8.36108e+007		7,735.9885	1.2515	0.1517	7,812.4837
Government Office Building	7.02472e+007		6,499.5393	1.0515	0.1275	6,563.8082
Office Park	4.98508e+007		4,612.3856	0.7462	0.0905	4,657.9939
Parking Lot	3.3718e+007		3,119.7145	0.5047	0.0612	3,150.5629
Regional Shopping Center	3.55016e+007		3,284.7381	0.5314	0.0644	3,317.2183
Research & Development	2.49514e+007		2,308.6009	0.3735	0.0453	2,331.4289
Single Family Housing	2.02204e+008		18,708.6469	3.0267	0.3669	18,893.6422
Total			**46,269.6138**	**7.4855**	**0.9073**	**46,727.1381**

6.0 Area Detail

6.1 Mitigation Measures Area

Use Low VOC Paint - Residential Interior

Use Low VOC Paint - Residential Exterior

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	1,100.1856	19.4254	320.2306	0.1176		3.0223	3.0223		3.0223	3.0223	0.0000	18,823.7763	18,823.7763	0.8442	0.3357	18,944.9105
Unmitigated	1,246.9598	19.4254	320.2306	0.1176		3.0223	3.0223		3.0223	3.0223	0.0000	18,823.7763	18,823.7763	0.8442	0.3357	18,944.9105

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	235.9020					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	999.7654					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.8500	15.8095	6.7274	0.1009		1.2782	1.2782		1.2782	1.2782	0.0000	18,309.0774	18,309.0774	0.3509	0.3357	18,417.8791
Landscaping	9.4423	3.6159	313.5032	0.0167		1.7441	1.7441		1.7441	1.7441	0.0000	514.6990	514.6990	0.4933	0.0000	527.0315
Total	**1,246.9598**	**19.4254**	**320.2306**	**0.1176**		**3.0223**	**3.0223**		**3.0223**	**3.0223**	**0.0000**	**18,823.7763**	**18,823.7763**	**0.8442**	**0.3357**	**18,944.9105**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	89.1278					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	999.7654					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	1.8500	15.8095	6.7274	0.1009		1.2782	1.2782		1.2782	1.2782	0.0000	18,309.0774	18,309.0774	0.3509	0.3357	18,417.8791
Landscaping	9.4423	3.6159	313.5032	0.0167		1.7441	1.7441		1.7441	1.7441	0.0000	514.6990	514.6990	0.4933	0.0000	527.0315
Total	**1,100.1856**	**19.4254**	**320.2306**	**0.1176**		**3.0223**	**3.0223**		**3.0223**	**3.0223**	**0.0000**	**18,823.7763**	**18,823.7763**	**0.8442**	**0.3357**	**18,944.9105**

7.0 Water Detail

7.1 Mitigation Measures Water

		Total CO2	CH4	N2O	CO2e
Category	tons/yr	MT/yr			
Mitigated		7,007.9313	224.8171	5.3846	14,232.9781

Unmitigated		7,007.9313	224.8171	5.3846	14,232.9781

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use		Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr	MT/yr			
City Park	0 / 886.462		287.0659	0.0464	5.6300e-003	289.9044
Condo/Townhouse	1101.49 / 694.42		1,125.7882	36.0178	0.8627	2,283.3224
Government Office Building	1578.65 / 967.562		1,604.5090	51.6190	1.2363	3,263.3901
Office Park	786.173 / 481.848		799.0495	25.7064	0.6157	1,625.1765
Parking Lot	0 / 0		0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	332.032 / 203.503		337.4697	10.8568	0.2600	686.3753
Research & Development	1424.91 / 0		1,165.4334	46.5461	1.1103	2,659.9608
Single Family Housing	1652.18 / 1041.59		1,688.6157	54.0246	1.2940	3,424.8486
Total			**7,007.9313**	**224.8171**	**5.3846**	**14,232.9781**

Mitigated

	Indoor/Outdoor Use		Total CO2	CH4	N2O	CO2e
Land Use	Mgal	tons/yr	MT/yr			
City Park	0 / 886.462		287.0659	0.0464	5.6300e-003	289.9044
Condo/Townhouse	1101.49 / 694.42		1,125.7882	36.0178	0.8627	2,283.3224
Government Office Building	1578.65 / 967.562		1,604.5090	51.6190	1.2363	3,263.3901
Office Park	786.173 / 481.848		799.0495	25.7064	0.6157	1,625.1765
Parking Lot	0 / 0		0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	332.032 / 203.503		337.4697	10.8568	0.2600	686.3753
Research & Development	1424.91 / 0		1,165.4334	46.5461	1.1103	2,659.9608
Single Family Housing	1652.18 / 1041.59		1,688.6157	54.0246	1.2940	3,424.8486
Total			**7,007.9313**	**224.8171**	**5.3846**	**14,232.9781**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

		Total CO2	CH4	N2O	CO2e
	tons/yr	MT/yr			
Mitigated		10,226.7253	604.3822	0.0000	25,336.2791
Unmitigated		10,226.7253	604.3822	0.0000	25,336.2791

8.2 Waste by Land Use

Unmitigated

	Waste Disposed		Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr	MT/yr			
City Park	63.98		12.9874	0.7675	0.0000	32.1756
Condo/Townhouse	7776.76		1,578.6120	93.2933	0.0000	3,910.9444
Government Office Building	7390.26		1,500.1560	88.6567	0.0000	3,716.5730
Office Park	4113.69		835.0419	49.3496	0.0000	2,068.7810
Parking Lot	0		0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	4706.65		955.4074	56.4630	0.0000	2,366.9814
Research & Development	220.22		44.7027	2.6419	0.0000	110.7490
Single Family Housing	26108.6		5,299.8180	313.2103	0.0000	13,130.0747
Total			**10,226.7253**	**604.3822**	**0.0000**	**25,336.2791**

Mitigated

	Waste Disposed		Total CO2	CH4	N2O	CO2e
Land Use	tons	tons/yr	MT/yr			
City Park	63.98		12.9874	0.7675	0.0000	32.1756
Condo/Townhouse	7776.76		1,578.6120	93.2933	0.0000	3,910.9444
Government Office Building	7390.26		1,500.1560	88.6567	0.0000	3,716.5730
Office Park	4113.69		835.0419	49.3496	0.0000	2,068.7810
Parking Lot	0		0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	4706.65		955.4074	56.4630	0.0000	2,366.9814
Research & Development	220.22		44.7027	2.6419	0.0000	110.7490
Single Family Housing	26108.6		5,299.8180	313.2103	0.0000	13,130.0747
Total			**10,226.7253**	**604.3822**	**0.0000**	**25,336.2791**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Stationary Equipment

Fire Pumps and Emergency Generators

Equipment Type	Number	Hours/Day	Hours/Year	Horse Power	Load Factor	Fuel Type

Boilers

Equipment Type	Number	Heat Input/Day	Heat Input/Year	Boiler Rating	Fuel Type

User Defined Equipment

Equipment Type	Number

11.0 Vegetation

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Appendix C:
Biological Resources Supporting Information

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C.1 - California Natural Diversity Database Results

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Selected Elements by Scientific Name

California Department of Fish and Wildlife

California Natural Diversity Database

Query Criteria: Quad IS (Malaga (3611966) OR Sanger (3611965) OR Round Mountain (3611975) OR Clovis (3611976))

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Agelaius tricolor tricolored blackbird	ABPBXB0020	None	Threatened	G1G2	S1S2	SSC
Ambystoma californiense pop. 1 California tiger salamander - central California DPS	AAAAA01181	Threatened	Threatened	G2G3T3	S3	WL
Anniella pulchra Northern California legless lizard	ARACC01020	None	None	G3	S3	SSC
Arizona elegans occidentalis California glossy snake	ARADB01017	None	None	G5T2	S2	SSC
Athene cunicularia burrowing owl	ABNSB10010	None	None	G4	S3	SSC
Bombus crotchii Crotch bumble bee	IIHYM24480	None	None	G2	S1S2	
Branchinecta lynchi vernal pool fairy shrimp	ICBRA03030	Threatened	None	G3	S3	
Branchinecta mesovallensis midvalley fairy shrimp	ICBRA03150	None	None	G2	S2S3	
Buteo swainsoni Swainson's hawk	ABNKC19070	None	Threatened	G5	S3	
Carex comosa bristly sedge	PMCYP032Y0	None	None	G5	S2	2B.1
Castilleja campestris var. succulenta succulent owl's-clover	PDSCR0D3Z1	Threatened	Endangered	G4?T2T3	S2S3	1B.2
Caulanthus californicus California jewelflower	PDBRA31010	Endangered	Endangered	G1	S1	1B.1
Coccyzus americanus occidentalis western yellow-billed cuckoo	ABNRB02022	Threatened	Endangered	G5T2T3	S1	
Desmocerus californicus dimorphus valley elderberry longhorn beetle	IICOL48011	Threatened	None	G3T2T3	S3	
Efferia antiochi Antioch efferian robberfly	IIDIP07010	None	None	G1G2	S1S2	
Emys marmorata western pond turtle	ARAAD02030	None	None	G3G4	S3	SSC
Eryngium spinosepalum spiny-sepaled button-celery	PDAPI0Z0Y0	None	None	G2	S2	1B.2
Imperata brevifolia California satintail	PMPOA3D020	None	None	G4	S3	2B.1
Lagophylla dichotoma forked hare-leaf	PDAST5J070	None	None	G2	S2	1B.1

Species	Element Code	Federal Status	State Status	Global Rank	State Rank	Rare Plant Rank/CDFW SSC or FP
Leptosiphon serrulatus Madera leptosiphon	PDPLM09130	None	None	G3	S3	1B.2
Linderiella occidentalis California linderiella	ICBRA06010	None	None	G2G3	S2S3	
Lytta molesta molestan blister beetle	IICOL4C030	None	None	G2	S2	
Metapogon hurdi Hurd's metapogon robberfly	IIDIP08010	None	None	G1G2	S1S2	
Nannopterum auritum double-crested cormorant	ABNFD01020	None	None	G5	S4	WL
Northern Hardpan Vernal Pool Northern Hardpan Vernal Pool	CTT44110CA	None	None	G3	S3.1	
Phrynosoma blainvillii coast horned lizard	ARACF12100	None	None	G3G4	S3S4	SSC
Pseudobahia peirsonii San Joaquin adobe sunburst	PDAST7P030	Threatened	Endangered	G1	S1	1B.1
Sagittaria sanfordii Sanford's arrowhead	PMALI040Q0	None	None	G3	S3	1B.2
Spea hammondii western spadefoot	AAABF02020	None	None	G2G3	S3	SSC
Taxidea taxus American badger	AMAJF04010	None	None	G5	S3	SSC
Tuctoria greenei Greene's tuctoria	PMPOA6N010	Endangered	Rare	G1	S1	1B.1
Vireo bellii pusillus least Bell's vireo	ABPBW01114	Endangered	Endangered	G5T2	S2	
Vulpes macrotis mutica San Joaquin kit fox	AMAJA03041	Endangered	Threatened	G4T2	S2	

Record Count: 33

C.2 - California Native Plant Society Inventory Results

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CNPS Rare Plant Inventory

California Native Plant Society

Search Results

4 matches found. Click on scientific name for details

Search Criteria: CRPR is one of [**1A:1B:2A:2B**] Fed List is one of [**FE:FT:FC**] **or** State List is one of [**CE:CT:CR:CE:CT**] , Quad is one of [**3611965:3611966:3611976:3611975**]

▲ SCIENTIFIC NAME	COMMON NAME	FAMILY	LIFEFORM	BLOOMING PERIOD	FED LIST	STATE LIST	GLOBAL RANK	STATE RANK	CA RARE PLANT RANK	PHOTO
Castilleja campestris var. *succulenta*	succulent owl's-clover	Orobanchaceae	annual herb (hemiparasitic)	(Mar)Apr-May	FT	CE	G4?T2T3	S2S3	1B.2	No Photo Available
Caulanthus californicus	California jewelflower	Brassicaceae	annual herb	Feb-May	FE	CE	G1	S1	1B.1	No Photo Available
Pseudobahia peirsonii	San Joaquin adobe sunburst	Asteraceae	annual herb	Feb-Apr	FT	CE	G1	S1	1B.1	No Photo Available
Tuctoria greenei	Greene's tuctoria	Poaceae	annual herb	May-Jul(Sep)	FE	CR	G1	S1	1B.1	 ©2008 F. Gauna

Showing 1 to 4 of 4 entries

Suggested Citation:
California Native Plant Society, Rare Plant Program. 2022. Rare Plant Inventory (online edition, v9-01 1.5). Website https://www.rareplants.cnps.org [accessed 5 May 2022].

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C.3 - Project Species List

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Scientific Name	Common Name	Taxonomy Group	Elm Code	Total Occurances	Federal Listing	California Listing	G Rank	S Rank	Rare Plant Rank	Other Status	Habitats	General Habitat	Micro Habitat	Return Occurances
Agelaius tricolor	tricolored blackbird	Birds	ABPBXB0020	955	None	Threatened	G1G2	S1S2		BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_EN-Endangered | NABCI_RWL-Red Watch List | USFWS_BCC-Birds of Conservation Concern	Freshwater marsh | Marsh & swamp | Swamp | Wetland	Highly colonial species, most numerous in Central Valley and vicinity. Largely endemic to California.	Requires open water, protected nesting substrate, and foraging area with insect prey within a few km of the colony.	6
Ambystoma californiense pop. 1	California tiger salamander - central California DPS	Amphibians	AAAAA01181	1265	Threatened	Threatened	G2G3T3	S3		CDFW_WL-Watch List | IUCN_VU-Vulnerable	Cismontane woodland | Meadow & seep | Riparian woodland | Valley & foothill grassland | Vernal pool | Wetland	Lives in vacant or mammal-occupied burrows throughout most of the year; in grassland, savanna, or open woodland habitats.	Need underground refuges, especially ground squirrel burrows, and vernal pools or other seasonal water sources for breeding.	12
Anniella pulchra	Northern California legless lizard	Reptiles	ARACC01020	383	None	None	G3	S3		CDFW_SSC-Species of Special Concern | USFS_S-Sensitive	Chaparral | Coastal dunes | Coastal scrub	Sandy or loose loamy soils under sparse vegetation.	Soil moisture is essential. They prefer soils with a high moisture content.	1
Arizona elegans occidentalis	California glossy snake	Reptiles	ARADB01017	260	None	None	G5T2	S2		CDFW_SSC-Species of Special Concern		Patchily distributed from the eastern portion of San Francisco Bay, southern San Joaquin Valley, and the Coast, Transverse, and Peninsular ranges, south to Baja California.	Generalist reported from a range of scrub and grassland habitats, often with loose or sandy soils.	1
Athene cunicularia	burrowing owl	Birds	ABNSB10010	2011	None	None	G4	S3		BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern | USFWS_BCC-Birds of Conservation Concern	Coastal prairie | Coastal scrub | Great Basin grassland | Great Basin scrub | Mojavean desert scrub | Sonoran desert scrub | Valley & foothill grassland	Open, dry annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation.	Subterranean nester, dependent upon burrowing mammals, most notably, the California ground squirrel.	3
Branchinecta lynchi	vernal pool fairy shrimp	Crustaceans	ICBRA03030	795	Threatened	None	G3	S3		IUCN_VU-Vulnerable	Valley & foothill grassland | Vernal pool | Wetland	Endemic to the grasslands of the Central Valley, Central Coast mountains, and South Coast mountains, in astatic rain-filled pools.	Inhabit small, clear-water sandstone-depression pools and grassed swale, earth slump, or basalt-flow depression pools.	9
Buteo swainsoni	Swainson's hawk	Birds	ABNKC19070	2547	None	Threatened	G5	S3		BLM_S-Sensitive | IUCN_LC-Least Concern	Great Basin grassland | Riparian forest | Riparian woodland | Valley & foothill grassland	Breeds in grasslands with scattered trees, juniper-sage flats, riparian areas, savannahs, and agricultural or ranch lands with groves or lines of trees.	Requires adjacent suitable foraging areas such as grasslands, or alfalfa or grain fields supporting rodent populations.	2
Carex comosa	bristly sedge	Monocots	PMCYP032Y0	31	None	None	G5	S2	2B.1	IUCN_LC-Least Concern	Coastal prairie | Freshwater marsh | Marsh & swamp | Valley & foothill grassland | Wetland	Marshes and swamps, coastal prairie, valley and foothill grassland.	Lake margins, wet places; site below sea level is on a Delta island. -5-1010 m.	1
Castilleja campestris var. succulenta	succulent owl's-clover	Dicots	PDSCR0D3Z1	99	Threatened	Endangered	G4?T2T3	S2S3	1B.2		Vernal pool | Wetland	Vernal pools.	Moist places, often in acidic soils. 20-705 m.	2
Caulanthus californicus	California jewelflower	Dicots	PDBRA31010	67	Endangered	Endangered	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden | SB_SBBG-Santa Barbara Botanic Garden | SB_UCBG-UC Botanical Garden at Berkeley	Chenopod scrub | Pinon & juniper woodlands | Valley & foothill grassland	Chenopod scrub, valley and foothill grassland, pinyon and juniper woodland.	Sandy soils. 65-1860 m.	1
Coccyzus americanus occidentalis	western yellow-billed cuckoo	Birds	ABNRB02022	165	Threatened	Endangered	G5T2T3	S1		BLM_S-Sensitive | NABCI_RWL-Red Watch List | USFS_S-Sensitive	Riparian forest	Riparian forest nester, along the broad, lower flood-bottoms of larger river systems.	Nests in riparian jungles of willow, often mixed with cottonwoods, with lower story of blackberry, nettles, or wild grape.	1
Desmocerus californicus dimorphus	valley elderberry longhorn beetle	Insects	IICOL48011	271	Threatened	None	G3T2T3	S3			Riparian scrub	Occurs only in the Central Valley of California, in association with blue elderberry (Sambucus mexicana).	Prefers to lay eggs in elderberries 2-8 inches in diameter; some preference shown for "stressed" elderberries.	8

Emys marmorata	western pond turtle	Reptiles	ARAAD02030	1404	None	None	G3G4	S3		BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_VU-Vulnerable | USFS_S-Sensitive	Aquatic | Artificial flowing waters | Klamath/North coast flowing waters | Klamath/North coast standing waters | Marsh & swamp | Sacramento/San Joaquin flowing waters | Sacramento/San Joaquin standing waters | South coast flowing waters | South coast standing waters | Wetland	A thoroughly aquatic turtle of ponds, marshes, rivers, streams and irrigation ditches, usually with aquatic vegetation, below 6000 ft elevation.	Needs basking sites and suitable (sandy banks or grassy open fields) upland habitat up to 0.5 km from water for egg-laying.	1
Eryngium spinosepalum	spiny-sepaled button-celery	Dicots	PDAPI0Z0Y0	108	None	None	G2	S2	1B.2	BLM_S-Sensitive	Valley & foothill grassland | Vernal pool | Wetland	Vernal pools, valley and foothill grassland.	Some sites on clay soil of granitic origin; vernal pools, within grassland. 15-1270 m.	1
Imperata brevifolia	California satintail	Monocots	PMPOA3D020	32	None	None	G4	S3	2B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden | SB_SBBG-Santa Barbara Botanic Garden | USFS_S-Sensitive	Chaparral | Coastal scrub | Meadow & seep | Mojavean desert scrub | Riparian scrub | Wetland	Coastal scrub, chaparral, riparian scrub, mojavean desert scrub, meadows and seeps (alkali), riparian scrub.	Mesic sites, alkali seeps, riparian areas. 3-1495 m.	1
Lagophylla dichotoma	forked hare-leaf	Dicots	PDAST5J070	7	None	None	G2	S2	1B.1		Cismontane woodland | Valley & foothill grassland	Cismontane woodland, valley and foothill grassland.	Sometimes clay. 190-335 m.	1
Leptosiphon serrulatus	Madera leptosiphon	Dicots	PDPLM09130	27	None	None	G3	S3	1B.2	BLM_S-Sensitive | USFS_S-Sensitive	Cismontane woodland | Lower montane coniferous forest	Cismontane woodland, lower montane coniferous forest.	Dry slopes; often on decomposed granite in woodland. 80-1645 m.	1
Nannopterum auritum	double-crested cormorant	Birds	ABNFD01020	39	None	None	G5	S4		CDFW_WL-Watch List | IUCN_LC-Least Concern	Riparian forest | Riparian scrub | Riparian woodland	Colonial nester on coastal cliffs, offshore islands, and along lake margins in the interior of the state.	Nests along coast on sequestered islets, usually on ground with sloping surface, or in tall trees along lake margins.	1
Northern Hardpan Vernal Pool	Northern Hardpan Vernal Pool	Herbaceous	CTT44110CA	126	None	None	G3	S3.1			Vernal pool | Wetland			1
Phrynosoma blainvillii	coast horned lizard	Reptiles	ARACF12100	784	None	None	G3G4	S3S4		BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Chaparral | Cismontane woodland | Coastal bluff scrub | Coastal scrub | Desert wash | Pinon & juniper woodlands | Riparian scrub | Riparian woodland | Valley & foothill grassland	Frequents a wide variety of habitats, most common in lowlands along sandy washes with scattered low bushes.	Open areas for sunning, bushes for cover, patches of loose soil for burial, and abundant supply of ants and other insects.	1
Pseudobahia peirsonii	San Joaquin adobe sunburst	Dicots	PDAST7P030	51	Threatened	Endangered	G1	S1	1B.1	SB_CalBG/RSABG-California/Rancho Santa Ana Botanic Garden	Cismontane woodland | Valley & foothill grassland	Valley and foothill grassland, cismontane woodland.	Grassy valley floors and rolling foothills in heavy clay soil. 115-795 m.	5
Sagittaria sanfordii	Sanford's arrowhead	Monocots	PMALI040Q0	143	None	None	G3	S3	1B.2	BLM_S-Sensitive	Marsh & swamp | Wetland	Marshes and swamps.	In standing or slow-moving freshwater ponds, marshes, and ditches. 0-605 m.	4
Spea hammondii	western spadefoot	Amphibians	AAABF02020	1422	None	None	G2G3	S3		BLM_S-Sensitive | CDFW_SSC-Species of Special Concern | IUCN_NT-Near Threatened	Cismontane woodland | Coastal scrub | Valley & foothill grassland | Vernal pool | Wetland	Occurs primarily in grassland habitats, but can be found in valley-foothill hardwood woodlands.	Vernal pools are essential for breeding and egg-laying.	10
Taxidea taxus	American badger	Mammals	AMAJF04010	594	None	None	G5	S3		CDFW_SSC-Species of Special Concern | IUCN_LC-Least Concern	Alkali marsh | Alkali playa | Alpine | Alpine dwarf scrub | Bog & fen | Brackish marsh | Broadleaved upland forest | Chaparral | Chenopod scrub | Cismontane woodland | Closed-cone coniferous forest | Coastal bluff scrub | Coastal dunes | Coastal prairie | Coastal scrub | Desert dunes | Desert wash | Freshwater marsh | Great Basin grassland | Great Basin scrub | Interior dunes | Ione formation | Joshua tree woodland | Limestone | Lower montane coniferous forest | Marsh & swamp | Meadow & seep | Mojavean desert scrub | Montane dwarf scrub | North coast coniferous forest | Oldgrowth | Pavement plain | Redwood | Riparian forest | Riparian scrub | Riparian woodland | Salt marsh | Sonoran desert scrub | Sonoran thorn woodland | Ultramafic | Upper montane coniferous forest | Upper Sonoran scrub | Valley & foothill grassland	Most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	Needs sufficient food, friable soils and open, uncultivated ground. Preys on burrowing rodents. Digs burrows.	1
Tuctoria greenei	Greene's tuctoria	Monocots	PMPOA6N010	50	Endangered	Rare	G1	S1	1B.1		Vernal pool | Wetland	Vernal pools.	Vernal pools in open grasslands. 25-1325 m.	3

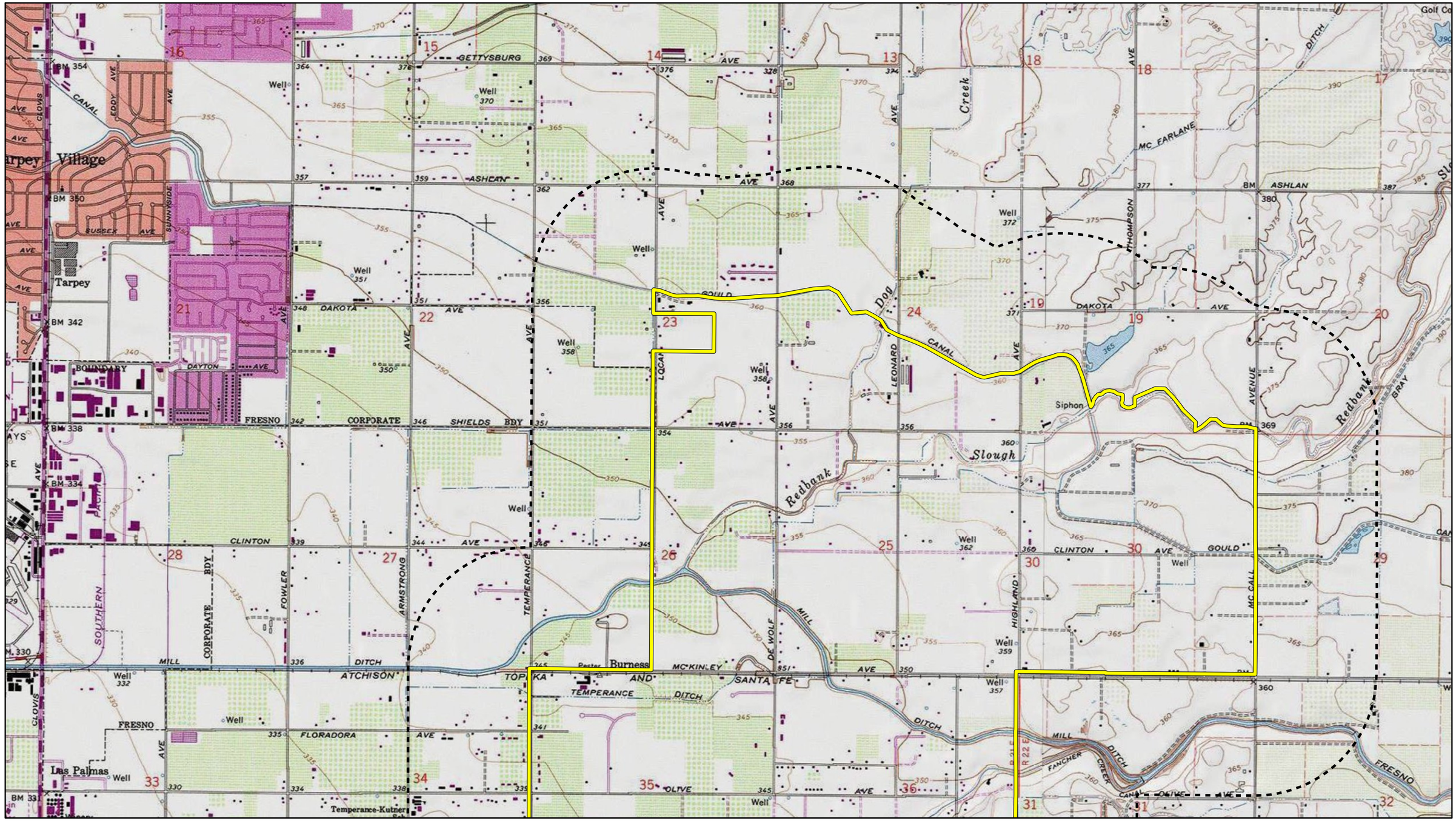
Vireo bellii pusillus	least Bell's vireo	Birds	ABPBW01114	S04	Endangered	Endangered	G5T2	S2		IUCN_NT-Near Threatened | NABCI_YWL-Yellow Watch List	Riparian forest | Riparian scrub | Riparian woodland	Summer resident of Southern California in low riparian in vicinity of water or in dry river bottoms; below 2000 ft.	Nests placed along margins of bushes or on twigs projecting into pathways, usually willow, Baccharis, mesquite.	2
Vulpes macrotis mutica	San Joaquin kit fox	Mammals	AMAJA03041	1020	Endangered	Threatened	G4T2	S2			Chenopod scrub | Valley & foothill grassland	Annual grasslands or grassy open stages with scattered shrubby vegetation.	Need loose-textured sandy soils for burrowing, and suitable prey base.	1

Appendix D:
Cultural and Tribal Cultural Resources Supporting Information

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D.1 - Record Search Maps

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Source: USGS Clovis & Round Mountain 7.5' Quadrangles / T13S, R21E, sections: 22, 23, 24, 25, 26, 27, 34, 35, 36 / T13S, R22E, sections: 19, 20, 29, 30, 31, 32

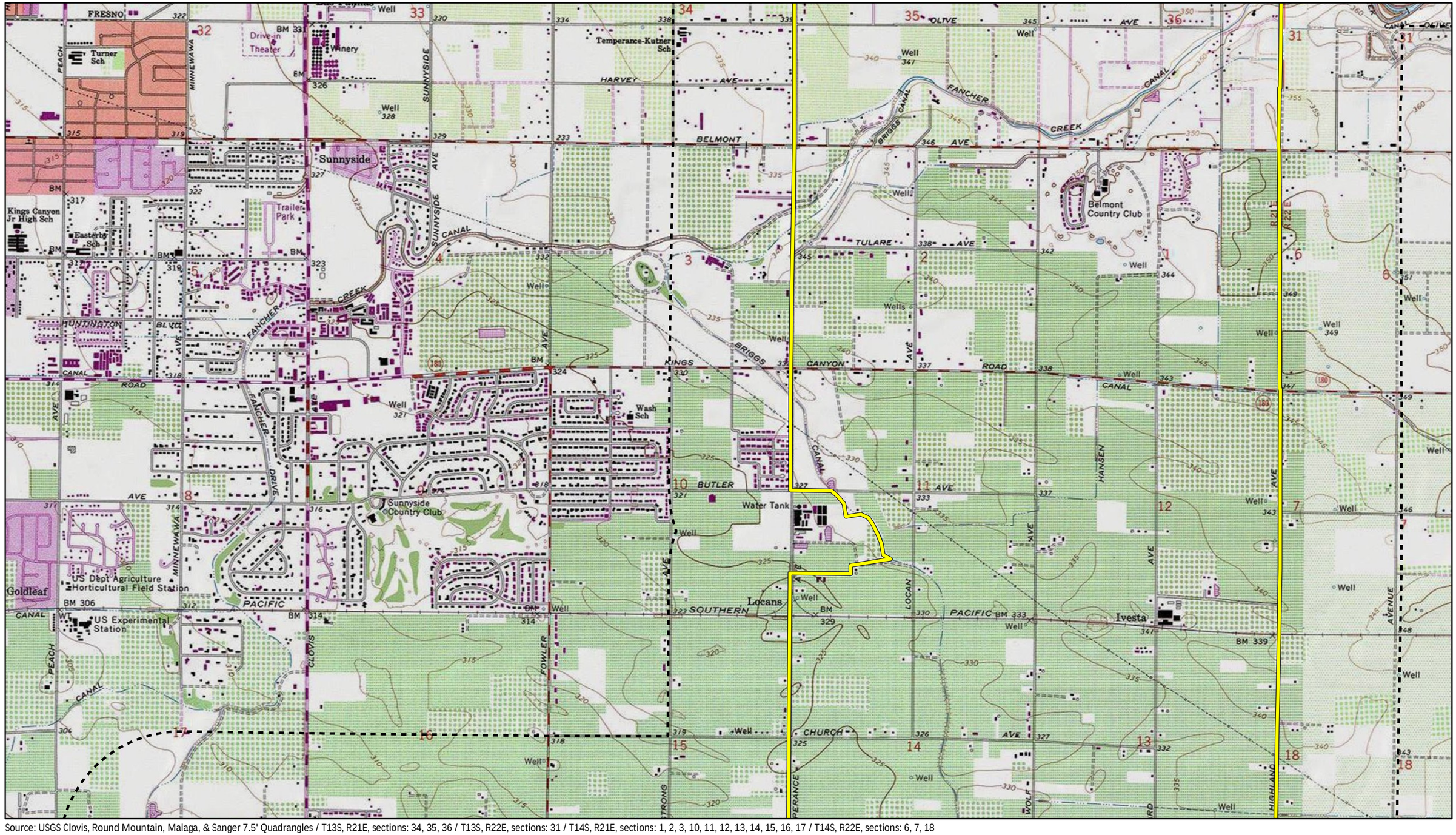
FIRSTCARBON SOLUTIONS™

2,000 1,000 0 2,000 Feet

Record Search Map (1 of 3)

31680033 • 04/2022 | 31680033_record_search_map_1of3.mxd

CITY OF FRESNO
FRESNO SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN PROJECT



Source: USGS Clovis, Round Mountain, Malaga, & Sanger 7.5' Quadrangles / T13S, R21E, sections: 34, 35, 36 / T13S, R22E, sections: 31 / T14S, R21E, sections: 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 17 / T14S, R22E, sections: 6, 7, 18

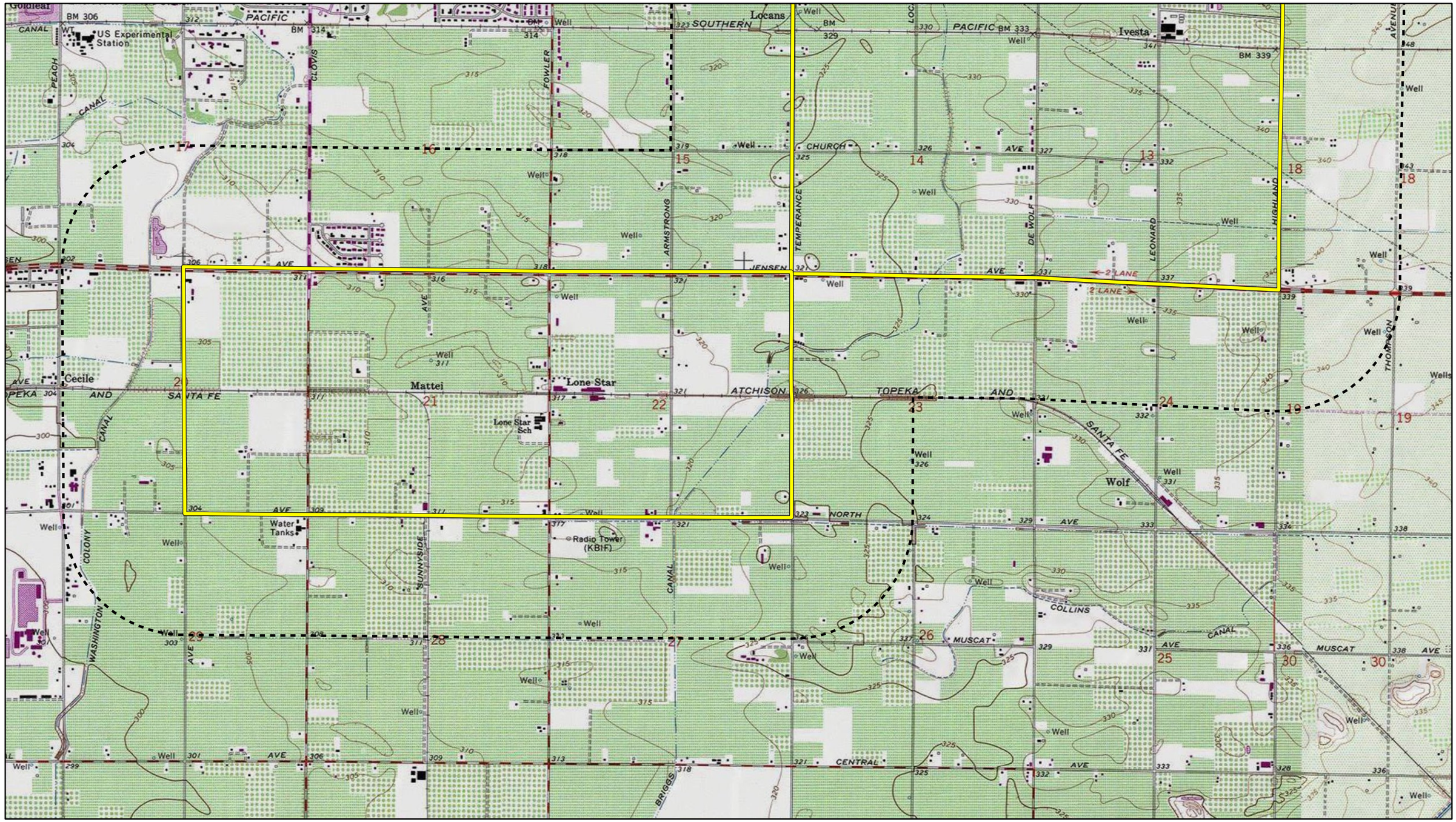
FIRSTCARBON SOLUTIONS™

2,000 1,000 0 2,000 Feet

Record Search Map (2 of 3)

31680033 • 04/2022 | 31680033_record_search_map_2of3.mxd

CITY OF FRESNO
FRESNO SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN PROJECT



Source: USGS Malaga, & Sanger 7.5' Quadrangles / T14S, R21E, sections: 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 26, 27, 28, 29 / T14S, R22E, sections: 18, 19

FIRSTCARBON SOLUTIONS™

2,000 1,000 0 2,000 Feet

Record Search Map (3 of 3)

31680033 • 04/2022 | 31680033_record_search_map_3of3.mxd

CITY OF FRESNO
FRESNO SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN PROJECT

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D.2 - California Historical Resources Information System Requests and Results

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CHRIS Data Request Form

ACCESS AND USE AGREEMENT NO.: 37 **IC FILE NO.:** _____

To: Southern San Joaquin Valley Information Center

Print Name: Dr. Dana DePietro Date: 4/13/2022

Affiliation: FirstCarbon Solutions

Address: 1350 Treat Boulevard, Suite 380

City: Walnut Creek State: CA Zip: 94597

Phone: 530.219.1432 Fax: _____ Email: ddepietro@fcs-intl.com, mdolan@fcs-

Billing Address (if different than above): _____

Billing Email: ap@fcs-intl.com Billing Phone: _____

Project Name / Reference: Fresno Southeast Development Area Specific Plan Project

Project Street Address: in the southeast portion of the City bounded on the north by the Gould Ca

County or Counties: Fresno

Township/Range/UTMs: T13S, R21E, sections: 22, 23, 24, 25, 26, 27, 34, 35, 36 / T13S, R22E, s

USGS 7.5' Quad(s): Clovis, Round Mountain, Malaga, & Sanger

PRIORITY RESPONSE (Additional Fee): yes ☒ / no ☐

TOTAL FEE NOT TO EXCEED: $_____
(If blank, the Information Center will contact you if the fee is expected to exceed $1,000.00)

Special Instructions:

Information Center Use Only

Date of CHRIS Data Provided for this Request: _____

Confidential Data Included in Response: yes ☐ / no ☐

Notes: _____

CHRIS Data Request Form

Mark the request form as needed. Attach a PDF of your project area (with the radius if applicable) mapped on a 7.5' USGS topographic quadrangle to scale 1:24000 ratio 1:1 neither enlarged nor reduced and include a shapefile of your project area, if available. Shapefiles are the current CHRIS standard for submitting digital spatial data for your project area or radius. **Check with the appropriate IC for current availability of digital data products.**

- Documents will be provided in PDF format. Paper copies will only be provided if PDFs are not available at the time of the request or under specially arranged circumstances.
- Location information will be provided as a digital map product (Custom Maps or GIS data) unless the area has not yet been digitized. In such circumstances, the IC may provide hand drawn maps.
- In addition to the $150/hr. staff time fee, client will be charged the Custom Map fee when GIS is required to complete the request [e.g., a map printout or map image/PDF is requested and no GIS Data is requested, or an electronic product is requested (derived from GIS data) but no mapping is requested].

For product fees, see the CHRIS IC Fee Structure on the OHP website.

1. Map Format Choice:

Select One: Custom GIS Maps ☒ GIS Data ☐ Custom GIS Maps **and** GIS Data ☐ No Maps ☐

Any selection below left unmarked will be considered a "no. "

Location Information:

	Within project area	Within 1/2 mi. radius
ARCHAEOLOGICAL Resource Locations[1]	yes ☒ / no ☐	yes ☒ / no ☐
NON-ARCHAEOLOGICAL Resource Locations	yes ☒ / no ☐	yes ☒ / no ☐
Report Locations[1]	yes ☒ / no ☐	yes ☒ / no ☐
"Other" Report Locations[2]	yes ☐ / no ☒	yes ☐ / no ☒

3. Database Information:
(contact the IC for product examples, or visit the SSJVIC website for examples)

	Within project area	Within 1/2 mi. radius
ARCHAEOLOGICAL Resource Database[1]		
List (PDF format)	yes ☒ / no ☐	yes ☒ / no ☐
Detail (PDF format)	yes ☒ / no ☐	yes ☒ / no ☐
Excel Spreadsheet	yes ☐ / no ☒	yes ☐ / no ☒
NON-ARCHAEOLOGICAL Resource Database		
List (PDF format)	yes ☒ / no ☐	yes ☒ / no ☐
Detail (PDF format)	yes ☒ / no ☐	yes ☒ / no ☐
Excel Spreadsheet	yes ☐ / no ☒	yes ☐ / no ☒
Report Database[1]		
List (PDF format)	yes ☒ / no ☐	yes ☒ / no ☐
Detail (PDF format)	yes ☒ / no ☐	yes ☒ / no ☐
Excel Spreadsheet	yes ☐ / no ☒	yes ☐ / no ☒
Include "Other" Reports [2]	yes ☐ / no ☒	yes ☐ / no ☒

4. Document PDFs (paper copy only upon request)**:**

	Within project area	Within 1/2 mi. radius
ARCHAEOLOGICAL Resource Records[1]	yes ☒ / no ☐	yes ☒ / no ☐
NON-ARCHAEOLOGICAL Resource Records	yes ☒ / no ☐	yes ☒ / no ☐
Reports[1]	yes ☒ / no ☐	yes ☒ / no ☐
"Other" Reports[2]	yes ☐ / no ☒	yes ☐ / no ☒

CHRIS Data Request Form

5. Eligibility Listings and Documentation:

	Within project area	Within 1/2 mi. radius
OHP Built Environment Resources Directory[3]:		
Directory listing only (Excel format)	yes ■ / no ☐	yes ☐ / no ■
Associated documentation[4]	yes ■ / no ☐	yes ☐ / no ■
OHP Archaeological Resources Directory[1,5]:		
Directory listing only (Excel format)	yes ■ / no ☐	yes ☐ / no ■
Associated documentation[4]	yes ■ / no ☐	yes ☐ / no ■
***California Inventory of Historic Resources* (1976):**		
Directory listing only (PDF format)	yes ■ / no ☐	yes ☐ / no ■
Associated documentation[4]	yes ■ / no ☐	yes ☐ / no ■

6. Additional Information:

The following sources of information may be available through the Information Center. However, several of these sources are now available on the OHP website and can be accessed directly. The Office of Historic Preservation makes no guarantees about the availability, completeness, or accuracy of the information provided through these sources. Indicate below if the Information Center should review and provide documentation (if available) of any of the following sources as part of this request.

Caltrans Bridge Survey	yes ■ / no ☐
Ethnographic Information	yes ☐ / no ■
Historical Literature	yes ☐ / no ■
Historical Maps	yes ■ / no ☐
Local Inventories	yes ■ / no ☐
GLO and/or Rancho Plat Maps	yes ■ / no ☐
Shipwreck Inventory	yes ☐ / no ■
Soil Survey Maps	yes ☐ / no ■

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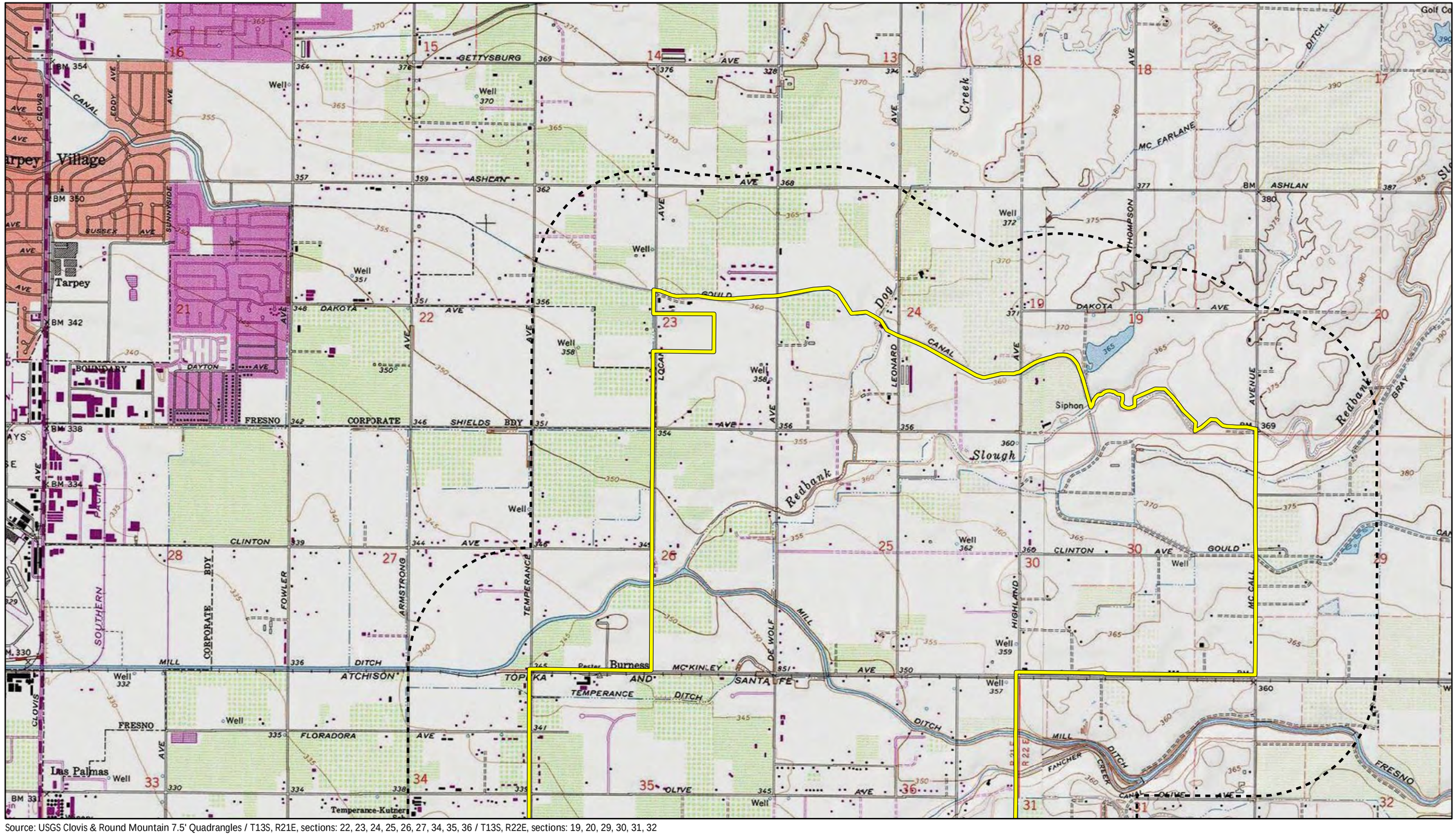
[1] In order to receive archaeological information, requestor must meet qualifications as specified in Section III of the current version of the California Historical Resources Information System Information Center Rules of Operation Manual and be identified as an Authorized User or Conditional User under an active CHRIS Access and Use Agreement.

[2] "Other" Reports GIS layer consists of report study areas for which the report content is almost entirely non-fieldwork related (e.g., local/regional history, or overview) and/or for which the presentation of the study area boundary may or may not add value to a record search.

[3] Provided as Excel spreadsheets with no cost for the rows; the only cost for this component is IC staff time. Includes, but not limited to, information regarding National Register of Historic Places, California Register of Historical Resources, California State Historical Landmarks, California State Points of Historical Interest, and historic building surveys. Previously known as the HRI and then as the HPD, it is now known as the Built Environment Resources Directory (BERD). The Office of Historic Preservation compiles this documentation and it is the source of the official status codes for evaluated resources.

[4] Associated documentation will vary by resource. Contact the IC for further details.

[5] Provided as Excel spreadsheets with no cost for the rows; the only cost for this component is IC staff time. Previously known as the Archaeological Determinations of Eligibility, now it is known as the Archaeological Resources Directory (ARD). The Office of Historic Preservation compiles this documentation and it is the source of the official status codes for evaluated resources.

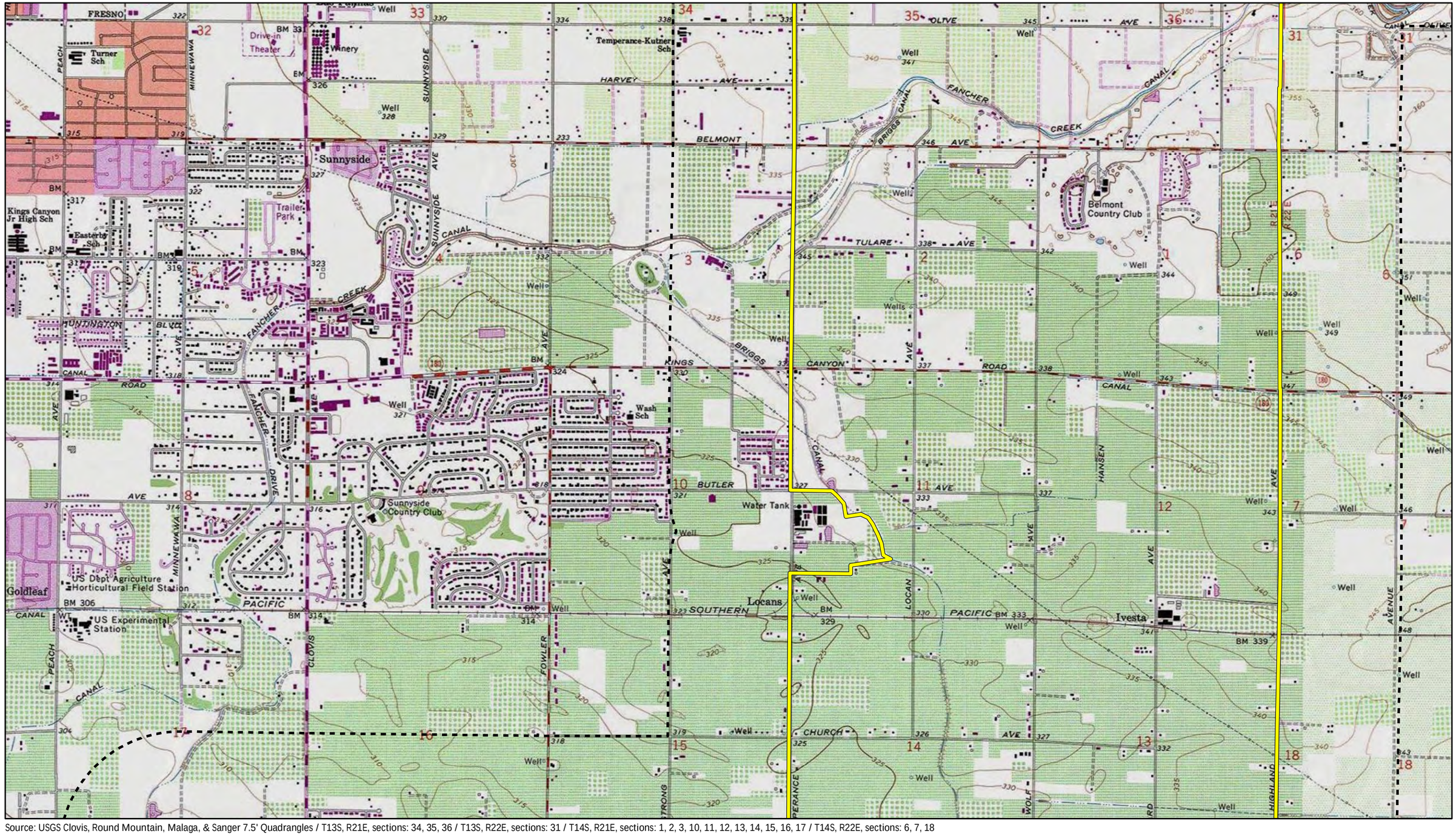


Source: USGS Clovis & Round Mountain 7.5' Quadrangles / T13S, R21E, sections: 22, 23, 24, 25, 26, 27, 34, 35, 36 / T13S, R22E, sections: 19, 20, 29, 30, 31, 32

FIRSTCARBON SOLUTIONS™

2,000 1,000 0 2,000 Feet

Record Search Map (1 of 3)

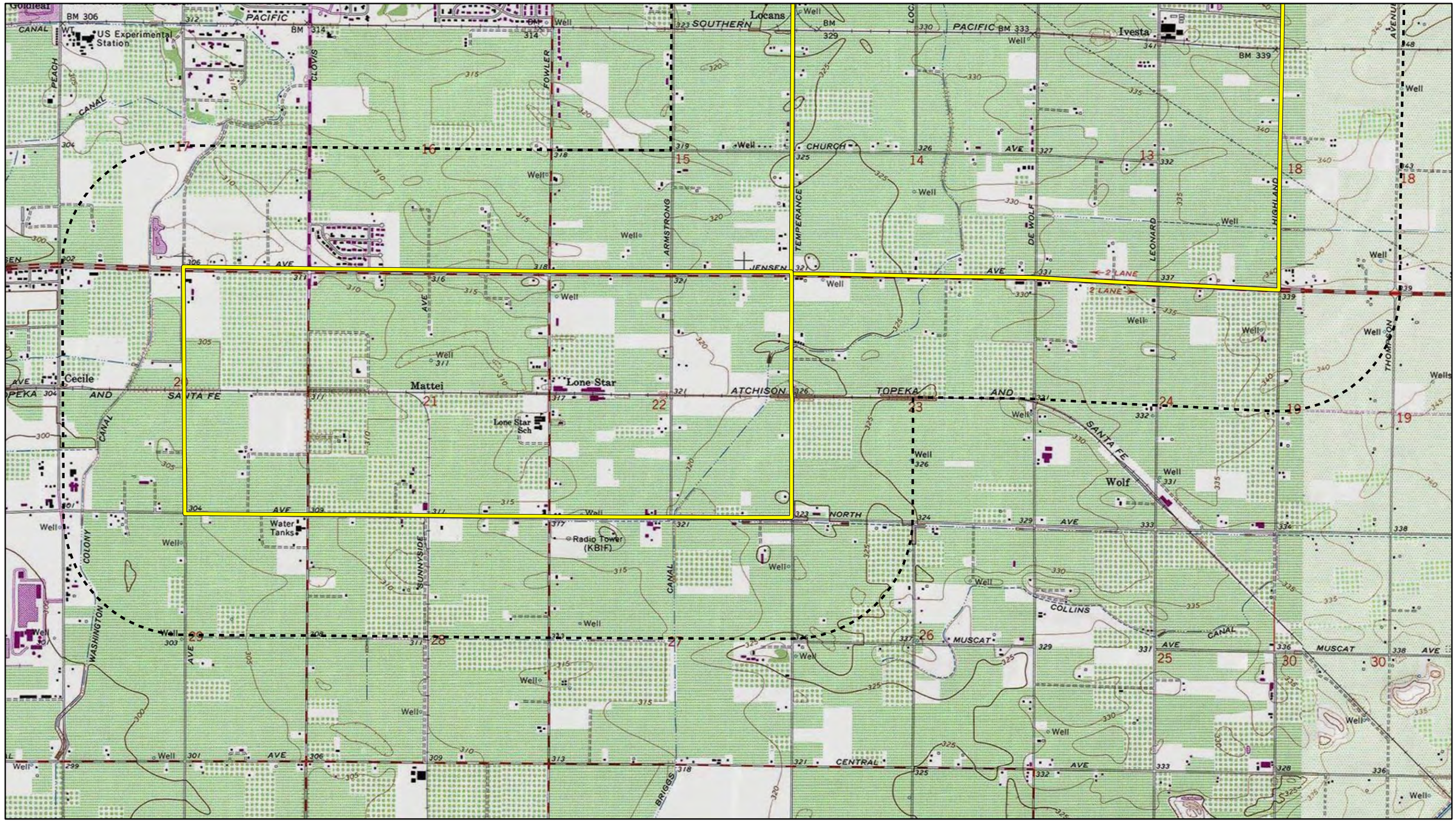


Source: USGS Clovis, Round Mountain, Malaga, & Sanger 7.5' Quadrangles / T13S, R21E, sections: 34, 35, 36 / T13S, R22E, sections: 31 / T14S, R21E, sections: 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 17 / T14S, R22E, sections: 6, 7, 18

FIRSTCARBON SOLUTIONS™

2,000 1,000 0 2,000 Feet

Record Search Map (2 of 3)



Source: USGS Malaga, & Sanger 7.5' Quadrangles / T14S, R21E, sections: 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 26, 27, 28, 29 / T14S, R22E, sections: 18, 19

FIRSTCARBON SOLUTIONS™

2,000 1,000 0 2,000 Feet

Record Search Map (3 of 3)

31680033 • 04/2022 | 31680033_record_search_map_3of3.mxd

CITY OF FRESNO
FRESNO SOUTHEAST DEVELOPMENT AREA SPECIFIC PLAN PROJECT

California Historical Resources Information System



Fresno
Kern
Kings
Madera
Tulare

Southern San Joaquin Valley Information Center
California State University, Bakersfield
Mail Stop: 72 DOB
9001 Stockdale Highway
Bakersfield, California 93311-1022
(661) 654-2289
E-mail: ssjvic@csub.edu
Website: www.csub.edu/ssjvic

4/18/2022

Dana DePietro
FirstCarbon Solutions
1350 Treat Blvd., Suite 380
Walnut Creek, CA 94597

Re: Fresno Southeast Development Area Specific Plan Project
Records Search File No.: 22-160

The Southern San Joaquin Valley Information Center received your record search request for the project area referenced above, located on the Clovis, Round Mountain, Malaga, & Sanger USGS 7.5' quad. The following reflects the results of the records search for the project area and the 0.5 mile radius:

As indicated on the data request form, the locations of resources & reports are provided in the following format: ☒ custom GIS maps ☐ GIS data

Resources within project area:	11 Resources – See list
Resources within 0.5 mile radius:	12 Resources – See list
Reports within project area:	26 Reports – See List
Reports within 0.5 mile radius:	23 Reports – See list

Resource Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Resource Database Printout (details):	☒ enclosed	☐ not requested	☐ nothing listed
Resource Digital Database Records:	☐ enclosed	☒ not requested	☐ nothing listed
Report Database Printout (list):	☒ enclosed	☐ not requested	☐ nothing listed
Report Database Printout (details):	☒ enclosed	☐ not requested	☐ nothing listed
Report Digital Database Records:	☐ enclosed	☒ not requested	☐ nothing listed
Resource Record Copies:	☒ enclosed	☐ not requested	☐ nothing listed
Report Copies:	☒ enclosed	☐ not requested	☐ nothing listed
OHP Built Environment Resources Directory:	☒ enclosed	☐ not requested	☐ nothing listed
Archaeological Determinations of Eligibility:	☒ enclosed	☐ not requested	☐ nothing listed
CA Inventory of Historic Resources (1976):	☐ enclosed	☐ not requested	☒ nothing listed

Caltrans Bridge Survey: Not available at SSJVIC; please see https://dot.ca.gov/programs/environmental-analysis/cultural-studies/california-historical-bridges-tunnels

Ethnographic Information: Not available at SSJVIC

Historical Literature: Not available at SSJVIC

Historical Maps: Not available at SSJVIC; please see http://historicalmaps.arcgis.com/usgs/

Local Inventories: Not available at SSJVIC

GLO and/or Rancho Plat Maps: Not available at SSJVIC; please see http://www.glorecords.blm.gov/search/default.aspx#searchTabIndex=0&searchByTypeIndex=1 and/or http://www.oac.cdlib.org/view?docId=hb8489p15p;developer=local;style=oac4;doc.view=items

Shipwreck Inventory: Not available at SSJVIC; please see https://www.slc.ca.gov/shipwrecks/

Soil Survey Maps: Not available at SSJVIC; please see http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

Please forward a copy of any resulting reports from this project to the office as soon as possible. Due to the sensitive nature of archaeological site location data, we ask that you do not include resource location maps and resource location descriptions in your report if the report is for public distribution. If you have any questions regarding the results presented herein, please contact the office at the phone number listed above.

The provision of CHRIS Data via this records search response does not in any way constitute public disclosure of records otherwise exempt from disclosure under the California Public Records Act or any other law, including, but not limited to, records related to archeological site information maintained by or on behalf of, or in the possession of, the State of California, Department of Parks and Recreation, State Historic Preservation Officer, Office of Historic Preservation, or the State Historical Resources Commission.

Due to processing delays and other factors, not all of the historical resource reports and resource records that have been submitted to the Office of Historic Preservation are available via this records search. Additional information may be available through the federal, state, and local agencies that produced or paid for historical resource management work in the search area. Additionally, Native American tribes have historical resource information not in the CHRIS Inventory, and you should contact the California Native American Heritage Commission for information on local/regional tribal contacts.

Should you require any additional information for the above referenced project, reference the record search number listed above when making inquiries. Invoices for Information Center services will be sent under separate cover from the California State University, Bakersfield Accounting Office.

Thank you for using the California Historical Resources Information System (CHRIS).

Sincerely,

Jeremy E David
Assistant Coordinator

SSJVIC Record Search 22-160

Reports in PA:	Reports in 0.5 mile:	Resources in PA:	Resources in 0.5 mile:
FR-00118	FR-00297	P-10-003930	P-10-002189
FR-00257	FR-01122	P-10-004675	P-10-004678
FR-00448	FR-01619	P-10-004724	P-10-004761
FR-00501	FR-01904	P-10-005464	P-10-005363
FR-00535	FR-01994	P-10-006048	P-10-006095
FR-00548	FR-02042	P-10-006091	P-10-006096
FR-00578	FR-02043	P-10-006092	P-10-006097
FR-01114	FR-02099	P-10-006093	P-10-006517
FR-01115	FR-02127	P-10-006094	P-10-006518
FR-01130	FR-02202	P-10-006126	P-10-006519
FR-01608	FR-02260	P-10-007030	P-10-006520
FR-01627	FR-02357		P-10-006976
FR-01661	FR-02426		
FR-01748	FR-02577		
FR-01797	FR-02588		
FR-02044	FR-02714		
FR-02059	FR-02777		
FR-02223	FR-02853		
FR-02356	FR-03000		
FR-02439	FR-03008		
FR-02453	FR-03012		
FR-02507	FR-03016		
FR-02579	FR-03030		
FR-02629			
FR-02705			
FR-02751			

Report List

SSJVIC Record Search 22-160

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
FR-00118	NADB-R - 1141390	1991	Bissonnette, Linda Dick	Cultural Resources Survey for Rural Residential Development of Tract #4249 in Fresno County	Michael Paoli and Associates	
FR-00257	Caltrans - 06-FRE-180 R60.9/R67.6 06250-342400	1990		Historic Property Survey Report Route 180 Chestnut Avenue to Highland Avenue; 06-FRE-180, R60.9/R6736 06250-342400	DeLeuw, Cather and Company; David Chavez Associates	
FR-00297		1993	Bissonnette, Linda Dick	Cultural Resources Assessment Clovis Unified School District Southeast Educational Center Ashlan and De Wolf Avenues, Fresno County	Cultural Resources Consulting	
FR-00448	Submitter - CRF-91-12	1991	Sutton, Mark Q.	An Archaeological Assessment of Six Acres Southeast of Clovis, Fresno County, California	California State University, Bakersfield	
FR-00501	NADB-R - 1140666	1994	Kus, James	Negative Archaeological Survey Report for the Proposed Subdivision of a Parcel of Land on Belmont Avenue in Fresno County, California	CSU Fresno	
FR-00535		1992	McGuire, Kelly R. and Wohlgemuth, Eric	Archaeological Survey Report for a Proposed Upgrade of Rural Route 180 Between Fowler and Cove Avenues, Fresno County, California	Far Western	10-000061, 10-002124, 10-002663, 10-002664
FR-00548		1987	Meighan, Clement, Dillon, Brian, Verano, John, and Indermill, Roc	Redbank and Fancher Creeks Intensive Cultural Resources Survey, Fresno County, California	UCLA	
FR-00578	Caltrans - 06-FRE-180 PM 65.6 EA 06351-208700	1981	O'Connor, Denise	Archaeological Survey Report for Proposed Channelization on Route 180 at Temperance Avenue, Fresno County, California	California Department of Transportation	
FR-01114		1995	Wren, Donald G.	An Archaeological Survey of a Proposed Ponding Basin, Locan Avnue, Fresno County, California	Individual Consultant	
FR-01115		1995	Wren, Donald G.	An Archaeological Survey of the Qualls Property, Fresno County, California - EA 4101	Individual Consultant	
FR-01122		1996	Wren, Donald G.	An Archaeological Survey of the Alan Thomas Property 10467 E. McKinley Avenue, Sanger, California	Individual Consultant	
FR-01130		1975	Wren, Donald G. and Crist, Michael	Archaeological Reconnaissance of the Redbank and Fancher Creek Investigation Area	Individual Consultant	10-001154, 10-001155
FR-01608		1998	Roper, Kristina	A Cultural Resources Survey for the Fancher Creek Basin Fill Project, Fresno County, California	Sierra Valley Cultural Planning	

Report List

SSJVIC Record Search 22-160

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
FR-01619		1999	Wren, Donald G.	Dog Creek Cultural/Historical Resource Report	Individual Consultant	
FR-01627	IC Record Search Nbr - 99-337	1999	Wren, Donald G.	Shields/Leonard Fill Site Expansion - Redband Creek Channel Restoration Project Cultural/Historical Resource Report	Individual Consultant	
FR-01661		2000	Wren, Donald G.	A Cultural Resource Study: Stormwater Retention Basin BG Fresno County, California	Individual Consultant	
FR-01748	IC Record Search Nbr - 01-334	2001	Wren, Donald	A Cultural Resource Study Fresno Metropolitan Flood Control District Fill Site E. Shields & Leonard Avenue	Individual Consultant	
FR-01797		2002	Wren, Donald G.	A Cultural Resource Study for the Clovis Southeast Specific Plan, Clovis, California	Individual Consultant	10-004757, 10-004758, 10-004759, 10-004760, 10-004761, 10-004779, 10-004780, 10-004781, 10-004782, 10-004783
FR-01904		2002	Hilton, Steven	Cultural Resources Inventory of Three Proposed Locations for the Fresno County Juvenile Justice Campus Fresno County, California	PARSONS	
FR-01994	Submitter - Site No. CC-527-01	2003	Losee, Carolyn	Cultural Resources Analysis for Cingular CC-527-01 Site in Fresno	Archaeological Resources Technology	
FR-02042		2004	Varner, Dudley M.	A Cultural Resource Study of the Ashland-Leonard Property, Fresno County, California	Varner Associates	
FR-02043	Submitter - Temperance/CA-1753D	2004	Billat, Lorna	Proposed Cellular Tower Project in Fresno County, California (Temperance/CA-1753D)	EarthTouch, Inc.	
FR-02044		2004	Varner, Dudley M.	A Cultural Resource Study of the Mathias Property, Fresno County, California	Varner Associates	
FR-02059		2005	Billat, Scott	Request for SHPO Review of FCC Undertaking (Ivesta/CA-1663D)	EarthTouch, Inc.	
FR-02099		2005	Bonner, Wayne H.	Records Search Results and Site Visit for Cricket Telecommunications Facility Candidate FAT-034A (Ashlan/DeWolf), 7715 East Ashlan, Clovis, Fresno County, California	Michael Brandman Associates	
FR-02127		2004	Busby, Colin I.	Cultural Resources Assessment - Bennett Development, Vicinity of S. Peach and E. Church Avenues, Fresno, Fresno County	Basin Research Associates	
FR-02202		2005	Busby, Colin I.	Cultural Resources Assessment - N. Locan Avenue Project, Fresno, Fresno County	Basin Research Associates	

Report List

SSJVIC Record Search 22-160

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
FR-02223		2002	Brady, Jon L.	Second Supplemental Historical Architectural Survey Report for the State Route 180, Chestnut Avenue to Highland Avenue, Fresno County, California	California Department of Transportation	
FR-02260		2005	Bonner, Wayne H.	Records Search Results and Site Visit for Cricket Telecommunications Facility Candidate FAT-042F (Jensen/Clovis Ave.), 5537 East Jensen Avenue, Fresno, Fresno County, California	Michael Brandman Associates	
FR-02356		2010	Varner, Dudley M.	Cultural Resource Study for a Two Creeks South Project (DeWolf & Leonard) in the City of Clovis, Fresno County, California	Varner Associates	
FR-02357		2010	Varner, Dudley	Cultural Resource Study for a 5701 Enterprises, L.P. Project (Ashland and Leonard) in the City of Clovis, Fresno County, California	Varner Associates	
FR-02426		2011	Supernowicz, Dana	Cultural Resources Study of the Jensen Avenue and Clovis Avenue Project, AT&T Mobility Site No. CN2714, 5537 East Jensen Avenue, Fresno, Fresno County, California	Historic Resoruce Associates	10-006976
FR-02439		2010	Brian, Hatoff	Results of Architectural History Survey for Verizon Cellular Communications Tower Site - Clovis and Jensen, 2629 S. Clovis Avenue (APN: 316-051-02), Fresno, California 93725	URS Corporation	10-006126
FR-02453		2002	Unknown	Second Supplemental Historic Property Survey Report 180 East Rural Expressway Reevaluation - Fowler Avenue to Cove Avenue Fresno County, California	California Department of Transportation	
FR-02453A		2002	Brady, Jon L.	Supplemental Historic Architectural Survey Report for the Rural Highway 180 Project, Fowler Avenue to Cove Avenue, Fresno County, California	California Department of Transportation	
FR-02453B		2002	Unknown	Second Supplemental Historic Property Survey Report 180 East Rural Expressway Reevaluation, Folwer Avenue to Cove Avenue, Fresno County, California - Volume II: Documents and Technical Reports	California Department of Transportation	
FR-02507		1992	Mikesell, Stephen D. and Wee, Stephen R.	Historic Architectural Survey Report for the Rural Highway 180 Project Fowler Avenue to Cove Avenue, Fresno County, California	Woodward-Clyde Consultants	

Report List

SSJVIC Record Search 22-160

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
FR-02577		2013	Baloian, Randy M.	Cultural Resources Inventory for the Proposed Sonrise Village in Clovis, Fresno County, California	Applied EarthWorks, Inc.	
FR-02579		2013	Losee, Carolyn	Cultural Resources Investigation for AT&T Mobility CV2714 "Jensen and Clovis" 5608 East Jensen Avenue, Fresno, California 93725	Archaeological Resources Technology	
FR-02588		2012	Morlet, Aubrie, Monastero, Andrew P., Baloian, Mary Clark, and Smallwood, Josh	Cultural Resources Studies for Sanger Substation Expansion Project, Fresno County, California	Applied EarthWorks, Inc.	10-006132
FR-02629	Submitter - EBI Project #61114767	2012	Travers, Aniela	Archaeological Sensitivity Assessment Ensite #11227 (250035)/Temperance 7101 E. McKinley Avenue, Fresno, Fresno County, California	EBI Consulting	
FR-02705	Submitter - EBI Project #61140726	2014	Greenberg, Gregory	Cultural Resources Survey for S Armstrong / Ensite #17742 (263944) 7125 East Kings Canyon Road, Fresno City and County, California	EBI Consulting	
FR-02714		2014	Armstrong, Matthew D., Smallwood, Josh, and Baloian, Randy	Cultural Resources Survey and Eligibility Evaluation for the Sanger Unified School District Educational Center, Fresno County, California	Applied Earthworks	10-006517, 10-006518, 10-006519, 10-006520
FR-02751	Submitter - 61140726	2015	Perez, Don C.	Cultural Resources Survey S Armstrong / Ensite #17742 (263944) 7125 East Kings Canyon Road, Fresno, Fresno County, California	EBI Consulting	
FR-02777		2016	Peak, Melinda	Determination of Eligibility and Effect for the Tract 5701A Dog Creek Realignment Project, Clovis, Fresno County, California	Peak & Associates	
FR-02853		2016	Peak, Melinda	Determination of Eligibility and Effect for the Tract 6114 Dog Creek Realignment Project, Clovis, Fresno County, California	Peak & Associates	
FR-03000	Submitter - Job#17-008	2017	Peak, Melinda A.	Cultural Resource Assessment for Tract 6174, Clovis Fresno County California	Peak and Associates, Inc.	10-007191
FR-03008	Submitter - Job #19-049/50	2019	Peak, Melinda A.	Cultural Resource Assessment for the Floradora-Armstrong Reorganization-Annexation Area and Tentative Tract 6201 and Tract 6235 Developments, Fresno County California	Peak & Associates, Inc.	

Report List

SSJVIC Record Search 22-160

Report No.	Other IDs	Year	Author(s)	Title	Affiliation	Resources
FR-03012	Submitter - Job #18-036	2018	Peak, Melinda A.	Cultural Resource Assessment for Tract 6225, City of Clovis Fresno County, California	Peak & Associates, Inc.	
FR-03016	Submitter - Job #19-084	2019	Peak, Melinda A.	Cultural Resource Assessment for the Meadowood I Tract 6285 Development, Fresno County California	Peak & Asssociates, Inc.	
FR-03030		2020	Dyste, Diana T.	Cultural Resource Monitoring Report for Bonadelle Neighborhoods Tract 6191 (T-6191/P18-01235)	Applied EarthWorks, Inc.	10-007232, 10-007233, 10-007234, 10-007235
FR-03030A		2019	Dyste, Diana T.	California Register of Historical Resources Evaluation of Archaeological Site (AE-4043-01) Discovered During Construction of Bonadelle Neighborhoods Tract 6191 (T-6191/P18-01235).	Applied EarthWorks, Inc.	

Resource List

SSJVIC Record Search 22-160

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-10-002189	CA-FRE-002189	Resource Name - 2-26-1	Site	Prehistoric	AP02	1988 (Don Wren, C. Linderman)	
P-10-003930	CA-FRE-003109H	Resource Name - Southern Pacific Railroad	Structure	Historic	AH07; HP11	1998 (W.L. Norton, Jones & Stokes); 1999 (S. Hooper, S. Flint, Applied EarthWorks, Inc.); 2002 (Peggy B. Murphy, Three Girls and a Shovel); 2004 (Bryan Larson, Cindy Toffelmier, JRP Historical Consulting); 2009 (Joseph Freeman, Rebecca Flores, JRP Historical Consulting); 2009 (Joseph Freeman, Rebecca Flores, JRP Historical Consulting); 2009 (Joseph Freeman, Rebecca Flores, JRP Historical Consulting); 2010 (Michael Hibma, LSA Associates); 2013 (Randy Baloian, Applied Earthworks, Inc.); 2015 (Randy Baloian, Applied EarthWorks, Inc.); 2015 (Randy Baloian, Applied Earthworks, Inc.); 2016 (J. Tibbet, Applied EarthWorks, Inc.); 2018 (Annie McCausland, Applied EarthWorks, Inc.); 2018 (Jessica Jones, Applied EarthWorks, Inc.)	FR-00238, FR-01770, FR-01771, FR-01772, FR-02642, FR-02726, FR-02769, FR-02847, FR-02942, FR-03037
P-10-004675		Resource Name - Burlington Northern Santa Fe Railway; Other - CRM TECH 607-2H	Structure	Historic	HP19; HP37	2000 (Bai "Tom" Tang, CRM TECH); 2019 (Robert Azpitarte, ASM Affiliates, Inc.)	FR-01699, FR-03029
P-10-004678		Resource Name - CRM TECH 607-4H; Resource Name - Washington Colony Canal at the Crossing of the Burlington Northern Santa Fe Railway	District	Historic	HP20	1995 (Carrie D. Wills, Allen Estes, William Self Associates); 2000 (Bai "Tom" Tang, CRM TECH)	FR-01699
P-10-004724		Resource Name - 7E - Hansen Canal	Structure	Historic	HP20	1991 (JRP Consulting, JRP Consulting); 2001 (Lex Palmer, Applied EarthWorks, Inc.)	

Resource List

SSJVIC Record Search 22-160

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-10-004761		Resource Name - Clovis Southeast Specific Plan; Resource Name - Inouya Property	Building	Historic	HP02; HP33	2001 (Donald G. Wren)	FR-01797
P-10-005363		Resource Name - Prickett Residence; OHP Property Number - 147698	Building	Historic	AH03; HP02	2003 (Dana E. Supernowicz, Historic Resource Associates)	
P-10-005464		Resource Name - 8175 Kings Canyon Road Barn and Residence; OHP Property Number - 152960	Building	Historic	HP33	2005 (Jon Brady)	
P-10-006048		Resource Name - Map Reference #119; Resource Name - Arkelian Sahag Life Estate Property; OHP Property Number - 143769	Building	Historic	HP02; HP04	2002 (Jon L. Brady, Caltrans)	
P-10-006091		Resource Name - Map Reference #14; Resource Name - Fowler Avenue and Harvey Palm Trees	Other	Historic	HP29	2002 (Jon L. Brady, Caltrans)	
P-10-006092		Resource Name - Map Reference #53; Resource Name - James Call Property; OHP Property Number - 156986	Building	Historic	HP02; HP04	2002 (Jon L. Brady, Caltrans)	
P-10-006093		Resource Name - Map Reference #50; Resource Name - State of California Property; OHP Property Number - 156991	Building	Historic	HP02; HP04	2002 (Jon L. Brady, Caltrans)	
P-10-006094		Resource Name - Map Reference #46; Resource Name - William R. Slaton Property; OHP Property Number - 156990	Building	Historic	HP02	2002 (Jon L. Brady, Caltrans)	
P-10-006095		Resource Name - Map Reference #20; Resource Name - Bank of America NT Property; OHP Property Number - 163476	Building	Historic	HP02; HP04	2002 (Jon L. Brady, Caltrans)	

Resource List

SSJVIC Record Search 22-160

Primary No.	Trinomial	Other IDs	Type	Age	Attribute codes	Recorded by	Reports
P-10-006096		Resource Name - Map Reference #26; Resource Name - Gash Property; OHP Property Number - 156989	Building	Historic	HP02; HP04	2002 (Jon L. Brady, Caltrans)	
P-10-006097		Resource Name - Map Reference #18; Resource Name - Cutting Property; Resource Name - Roeding Estate; OHP Property Number - 156987	Building	Historic	HP02; HP04	2002 (Jon L. Brady, Caltrans)	
P-10-006126		Resource Name - 2629 S. Clovis Avenue; OHP Property Number - 180253	Building	Historic	HP06; HP33	2010 (Melanie Lytle, URS Corp.)	FR-02439
P-10-006517		Resource Name - AE-2718-1H	Building	Historic	HP02; HP33	2014 (Josh Smallwood, Applied Earthworks)	FR-02714
P-10-006518		Resource Name - AE-2718-2H	Building	Historic	HP02	2014 (Josh Smallwood, Applied Earthworks)	FR-02714
P-10-006519		Resource Name - AE-2718-3H	Building	Historic	HP02; HP33	2014 (Josh Smallwood, Applied Earthworks)	FR-02714
P-10-006520	CA-FRE-003763H	Resource Name - AE-2718-4H	Site	Historic	AH02; AH04	2014 (M. Armstrong, K. Jernigan, Applied Earthworks)	FR-02714
P-10-006976		Resource Name - 5537 East Jensen Ave	Building	Historic	HP02; HP33	2011 (Dana E. Supernowicz, Historic Resource Associates)	FR-02426
P-10-007030	CA-FRE-003825H	Resource Name - Gould Canal; OTIS Resource Number - 686325	Structure	Historic	HP20	2016 (Randy Baloian, Applied EarthWorks, Inc.)	FR-02846

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D.3 - Native American Heritage Commission Requests and Results

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Local Government Tribal Consultation List Request

Native American Heritage Commission
1550 Harbor Blvd, Suite 100
West Sacramento, CA 95691
916-373-3710
916-373-5471 – Fax
nahc@nahc.ca.gov

Type of List Requested

■ **CEQA Tribal Consultation List (AB 52)** – *Per Public Resources Code § 21080.3.1, subs. (b), (d), (e) and 21080.3.2*

☐ **General Plan (SB 18)** - *Per Government Code § 65352.3.*

Local Action Type:

☐ **General Plan** ☐ **General Plan Element** ☐ **General Plan Amendment**

☐ **Specific Plan** ☐ **Specific Plan Amendment** ☐ **Pre-planning Outreach Activity**

Required Information

Project Title: Fresno Southeast Development Area Specific Plan Project

Local Government/Lead Agency: City of Fresno

Contact Person: Dr. Dana DePietro

Street Address: 1350 Treat Blvd. Ste. 380

City: Walnut Creek **Zip:** 94597

Phone: 530.219.1432 **Fax:**

Email: ddepietro@fcs-intl.com; mdolan@fcs-intl.com

Specific Area Subject to Proposed Action

County: Fresno **City/Community:** Fresno

Project Description:

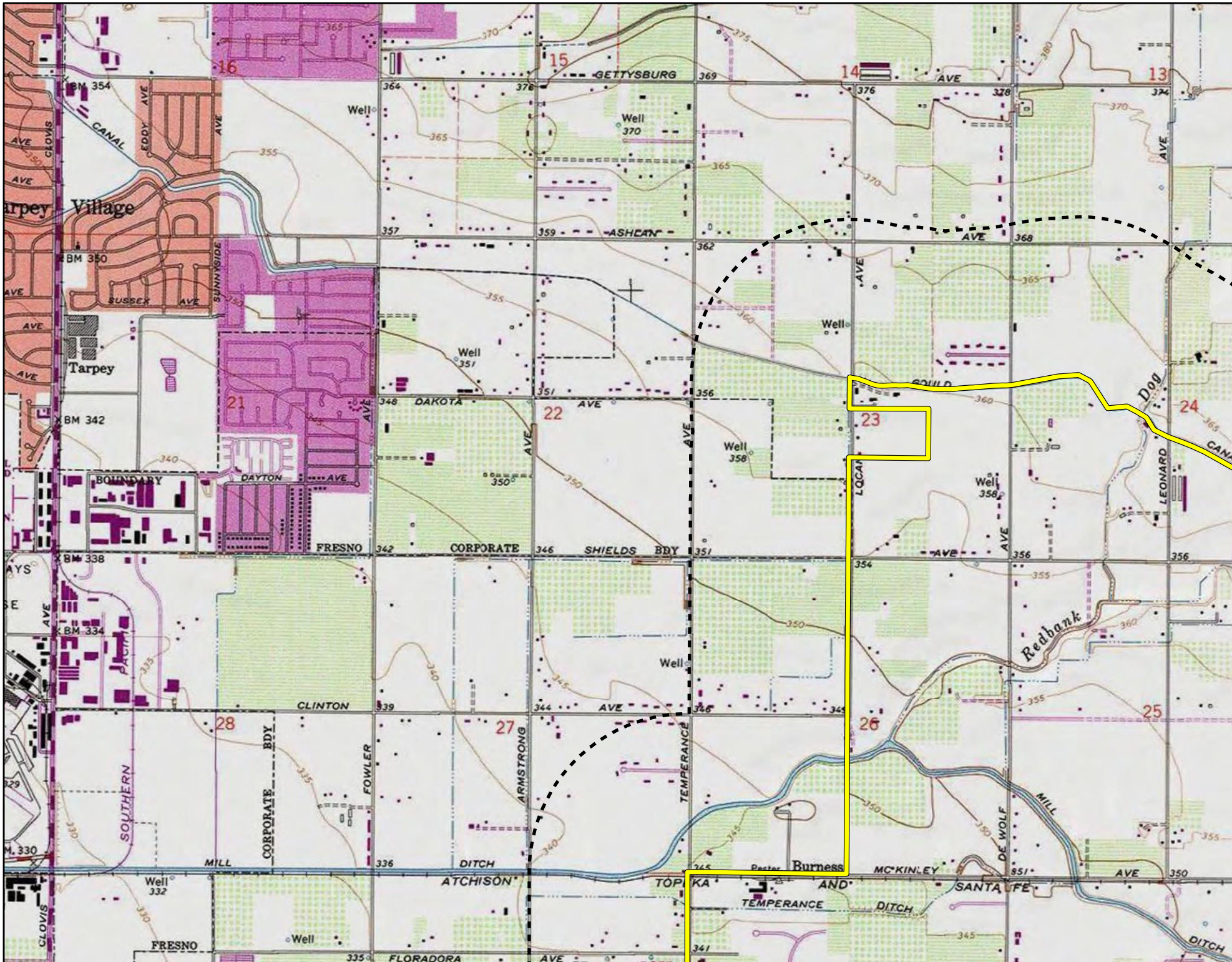
The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

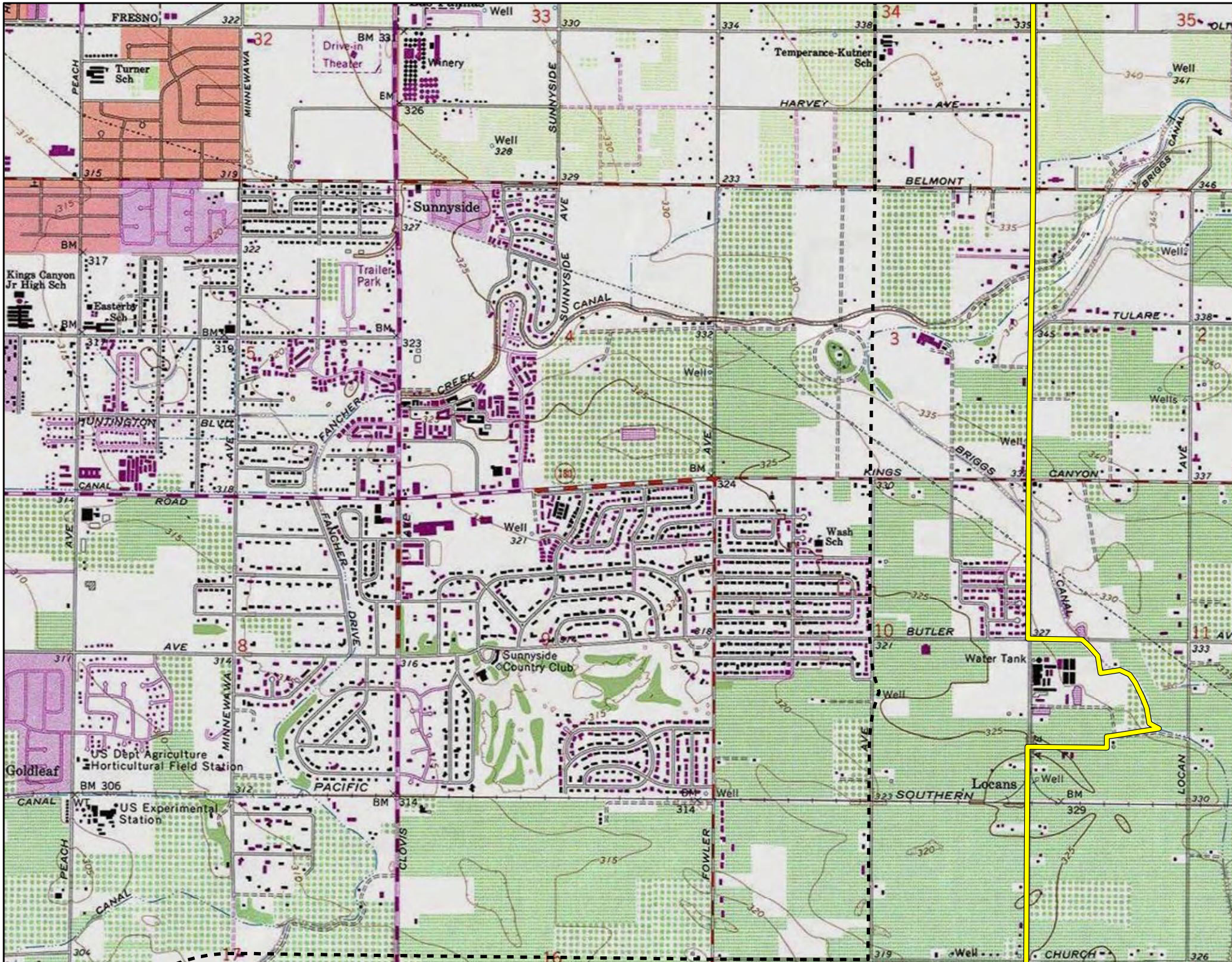
Additional Request

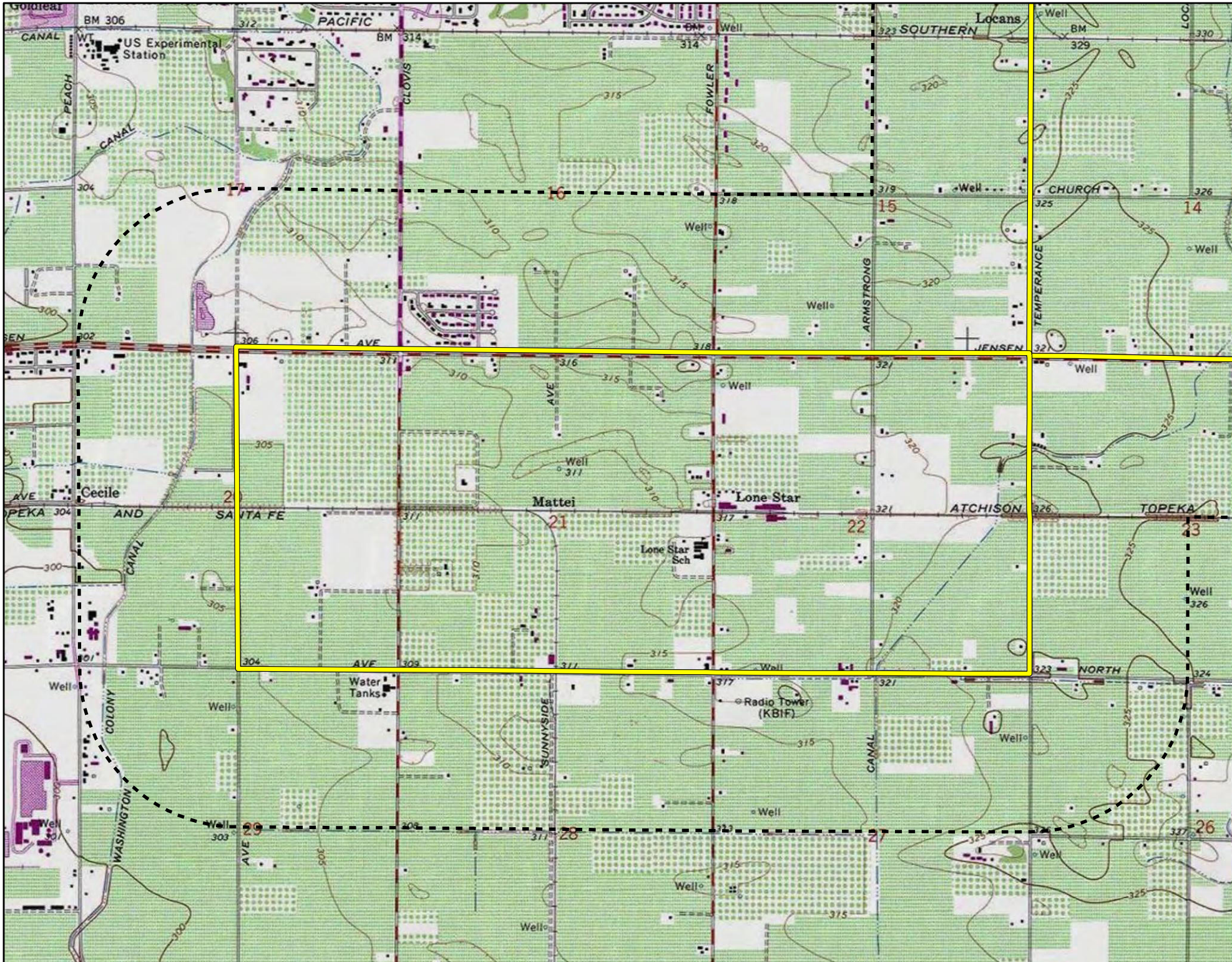
■ **Sacred Lands File Search** - ***Required Information:***

USGS Quadrangle Name(s): Clovis, Round Mountain, Malaga, and Sanger. Sections continued: 19, 20, 29, 30, 31, 32;34, 35, 36; 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 17; 6, 7, 18; 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 26, 27, 28, 29; 18, 19

Township: 13S;13S;13S;13S;14S;14S;14S;14S **Range:** 21E;22E;21E;21E;22E;21E;22E **Section(s):** 22, 23, 24, 25, 26, 27, 34, 35, 36


Tarpey Village
Tarpey
GETTYSBURG
ASHLAN
DAKOTA
CORPORATE
SHIELDS BDY
BOUNDARY
DAYTON
CLINTON
FRESNO
SOUTHERN PACIFIC
CORPORATE BDY
FOWLER
ARMSTRONG
TEMPERANCE
MILL DITCH
ATCHISON TOPEKA AND SANTA FE
TEMPERANCE DITCH
MC KINLEY
DE WOLF
MILL
Redbank
Dog
LEONARD
Burness
Well
BM 354
BM 350
BM 342
BM 338
BM 334
CANAL
SUNNYSIDE
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FRESNO
Turner Sch
PEACH
MINNEWAWA
Drive-in Theater
Winery
SUNNYSIDE
Temperance-Kutner Sch
HARVEY AVE
BELMONT
BRIGGS CANAL
Sunnyside
Trailer Park
Kings Canyon Jr High Sch
Easterby Sch
SUNNYSIDE AVE
CANAL
TULARE
CREEK
FANCHER
HUNTINGTON BLVD
KINGS CANYON
ROAD
Wash Sch
Sunnyside Country Club
DRIVE
BUTLER
Water Tank
Goldleaf
US Dept Agriculture Horticultural Field Station
PACIFIC
SOUTHERN
Locans
US Experimental Station
CLOVIS
FOWLER
LOCAN
CHURCH


Goldleaf
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Radio Tower (KBIF)
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NATIVE AMERICAN HERITAGE COMMISSION

CHAIRPERSON
Laura Miranda
Luiseño

VICE CHAIRPERSON
Reginald Pagaling
Chumash

PARLIAMENTARIAN
Russell Attebery
Karuk

SECRETARY
Sara Dutschke
Miwok

COMMISSIONER
William Mungary
Paiute/White Mountain Apache

COMMISSIONER
Isaac Bojorquez
Ohlone-Costanoan

COMMISSIONER
Buffy McQuillen
Yokayo Pomo, Yuki, Nomlaki

COMMISSIONER
Wayne Nelson
Luiseño

COMMISSIONER
Stanley Rodriguez
Kumeyaay

EXECUTIVE SECRETARY
Raymond C. Hitchcock
Miwok/Nisenan

NAHC HEADQUARTERS
1550 Harbor Boulevard
Suite 100
West Sacramento,
California 95691
(916) 373-3710
nahc@nahc.ca.gov

June 23, 2022

Dr. Dana DePietro
First Carbon Solutions

Via Email to: ddepietro@fcs-intl.com

Re: Native American Tribal Consultation, Pursuant to the Assembly Bill 52 (AB 52), Amendments to the California Environmental Quality Act (CEQA) (Chapter 532, Statutes of 2014), Public Resources Code Sections 5097.94 (m), 21073, 21074, 21080.3.1, 21080.3.2, 21082.3, 21083.09, 21084.2 and 21084.3, Fresno Southeast Development Area Specific Plan Project, Fresno County

Dear Dr. DePietro:

Pursuant to Public Resources Code section 21080.3.1 (c), attached is a consultation list of tribes that are traditionally and culturally affiliated with the geographic area of the above-listed project. Please note that the intent of the AB 52 amendments to CEQA is to avoid and/or mitigate impacts to tribal cultural resources, (Pub. Resources Code §21084.3 (a)) ("Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource.")

Public Resources Code sections 21080.3.1 and 21084.3(c) require CEQA lead agencies to consult with California Native American tribes that have requested notice from such agencies of proposed projects in the geographic area that are traditionally and culturally affiliated with the tribes on projects for which a Notice of Preparation or Notice of Negative Declaration or Mitigated Negative Declaration has been filed on or after July 1, 2015. Specifically, Public Resources Code section 21080.3.1 (d) provides:

Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section.

The AB 52 amendments to CEQA law does not preclude initiating consultation with the tribes that are culturally and traditionally affiliated within your jurisdiction prior to receiving requests for notification of projects in the tribe's areas of traditional and cultural affiliation. The Native American Heritage Commission (NAHC) recommends, but does not require, early consultation as a best practice to ensure that lead agencies receive sufficient information about cultural resources in a project area to avoid damaging effects to tribal cultural resources.

The NAHC also recommends, but does not require that agencies should also include with their notification letters, information regarding any cultural resources assessment that has been completed on the area of potential effect (APE), such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

- A listing of any and all known cultural resources that have already been recorded on or adjacent to the APE, such as known archaeological sites;
- Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
- Whether the records search indicates a low, moderate, or high probability that unrecorded cultural resources are located in the APE; and
- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

    - Any report that may contain site forms, site significance, and suggested mitigation measures.

      All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for public disclosure in accordance with Government Code section 6254.10.

3. The result of any Sacred Lands File (SLF) check conducted through the Native American Heritage Commission was positive. Please contact the Traditional Choinumni Tribe on the attached list for more information.

4. Any ethnographic studies conducted for any area including all or part of the APE; and

5. Any geotechnical reports regarding all or part of the APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS are not exhaustive and a negative response to these searches does not preclude the existence of a tribal cultural resource. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the event that they do, having the information beforehand will help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify the NAHC. With your assistance, we can assure that our consultation list remains current.

If you have any questions, please contact me at my email address: Cameron.vela@nahc.ca.gov.

Sincerely,

Cameron Vela

Cameron Vela
Cultural Resources Analyst

Attachment

Native American Heritage Commission
Tribal Consultation List
Fresno County
6/23/2022

Big Sandy Rancheria of Western Mono Indians
Elizabeth Kipp, Chairperson
P.O. Box 337
Auberry, CA, 93602
Phone: (559) 374 - 0066
Fax: (559) 374-0055
lkipp@bsrnation.com
Western Mono

Cold Springs Rancheria of Mono Indians
Carol Bill, Chairperson
P.O. Box 209
Tollhouse, CA, 93667
Phone: (559) 855 - 5043
Fax: (559) 855-4445
coldsprgstribe@netptc.net
Mono

Dumna Wo-Wah Tribal Government
Robert Ledger, Chairperson
2191 West Pico Ave.
Fresno, CA, 93705
Phone: (559) 540 - 6346
ledgerrobert@ymail.com
Foothill Yokut
Mono

Kings River Choinumni Farm Tribe
Stan Alec,
3515 East Fedora Avenue
Fresno, CA, 93726
Phone: (559) 647 - 3227
Foothill Yokut

North Fork Rancheria of Mono Indians
Elaine Fink, Chairperson
P.O .Box 929
North Fork, CA, 93643
Phone: (559) 877 - 2461
Fax: (559) 877-2467
efink@nfr-nsn.gov
Mono

North Valley Yokuts Tribe
Timothy Perez,
P.O. Box 717
Linden, CA, 95236
Phone: (209) 662 - 2788
huskanam@gmail.com
Costanoan
Northern Valley Yokut

North Valley Yokuts Tribe
Katherine Perez, Chairperson
P.O. Box 717
Linden, CA, 95236
Phone: (209) 887 - 3415
canutes@verizon.net
Costanoan
Northern Valley Yokut

Picayune Rancheria of Chukchansi Indians
Claudia Gonzales, Chairwoman
P.O. Box 2226
Oakhurst, CA, 93644
Phone: (559) 412 - 5590
cgonzales@chukchansitribe.net
Foothill Yokut

Table Mountain Rancheria
Brenda Lavell, Chairperson
P.O. Box 410
Friant, CA, 93626
Phone: (559) 822 - 2587
Fax: (559) 822-2693
rpennell@tmr.org
Yokut

Traditional Choinumni Tribe
David Alvarez, Chairperson
2415 E. Houston Avenue
Fresno, CA, 93720
Phone: (559) 217 - 0396
Fax: (559) 292-5057
davealvarez@sbcglobal.net
Foothill Yokut

Tule River Indian Tribe
Neil Peyron, Chairperson
P.O. Box 589
Porterville, CA, 93258
Phone: (559) 781 - 4271
Fax: (559) 781-4610
neil.peyron@tulerivertribe-nsn.gov
Yokut

Wuksache Indian Tribe/Eshom Valley Band
Kenneth Woodrow, Chairperson
1179 Rock Haven Ct.
Salinas, CA, 93906
Phone: (831) 443 - 9702
kwood8934@aol.com
Foothill Yokut
Mono

This list is current only as of the date of this document. Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and section 5097.98 of the Public Resources Code.

This list is only applicable for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 for the proposed Fresno Southeast Development Area Specific Plan Project, Fresno County.

January 30, 2022

Kings River Choinumni Farm Tribe
Stan Alec
3515 East Fedora Avenue
Fresno, CA, 93726

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Stan Alec:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Records Search maps with a 0.5 mile buffer around the site is enclosed for your reference.

As part of the cultural resources assessment, FCS conducted a Sacred Lands File (SLF) search and California Historical Resource Information System (CHRIS). The results of the SLF records search was positive. The CHRIS search showed that there are 11 recorded resources within the project site. However, 12 cultural resources were recorded within a 0.5 mile radius of the project site. The CHRIS search also found 26 recorded reports within the project site and 23 reports recorded within a 0.5 mile radius of the project site. The Native American Heritage Commission (NAHC) suggested you might be able to provide further information. If you have any additional information regarding potential historic or cultural resources in proximity or relation to the proposed project area, we would greatly appreciate your input.

UNITED STATES

T +1 888 826 5814
T +1 714 508 4100
F +1 714 508 4110
E info@fcs-intl.com

Irvine
250 Commerce
Suite 250
Irvine, CA 92602

Bay Area
1350 Treat Boulevard
Suite 380
Walnut Creek, CA 94597

Central Valley
7726 N. First Street
#413
Fresno, CA 93720

Inland Empire
967 Kendall Drive
#A-537
San Bernardino, CA 92407

Sacramento Valley
2351 Sunset Boulevard
Suite 170-301
Rocklin, CA 95765

Utah
2901 Bluegrass Boulevard
Suite 200-62
Lehi, UT 84043

Connecticut
2 Corporate Drive
Suite 450
Shelton, CT 06484

New York
10 Monument Street
Deposit, NY 13754

56 Broome Corporate Parkway
Conklin, NY 13748

CANADA

UNITED KINGDOM

PORTUGAL

FRANCE

KENYA

AUSTRALIA

PHILIPPINES

CHINA

MALAYSIA

SINGAPORE

Please note that this letter is a request for information pertaining to a cultural resources assessment and is not notification of a project under Senate Bill (SB) 18, Assembly Bill (AB) 52 or Section 106 of the National Historic Preservation Act. Designated lead agencies under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) are handling project notification and consultation requirements. Please feel free to contact me at 530.219.1432 or via email at ddepietro@fcs-intl.com and thank you for your valuable assistance.

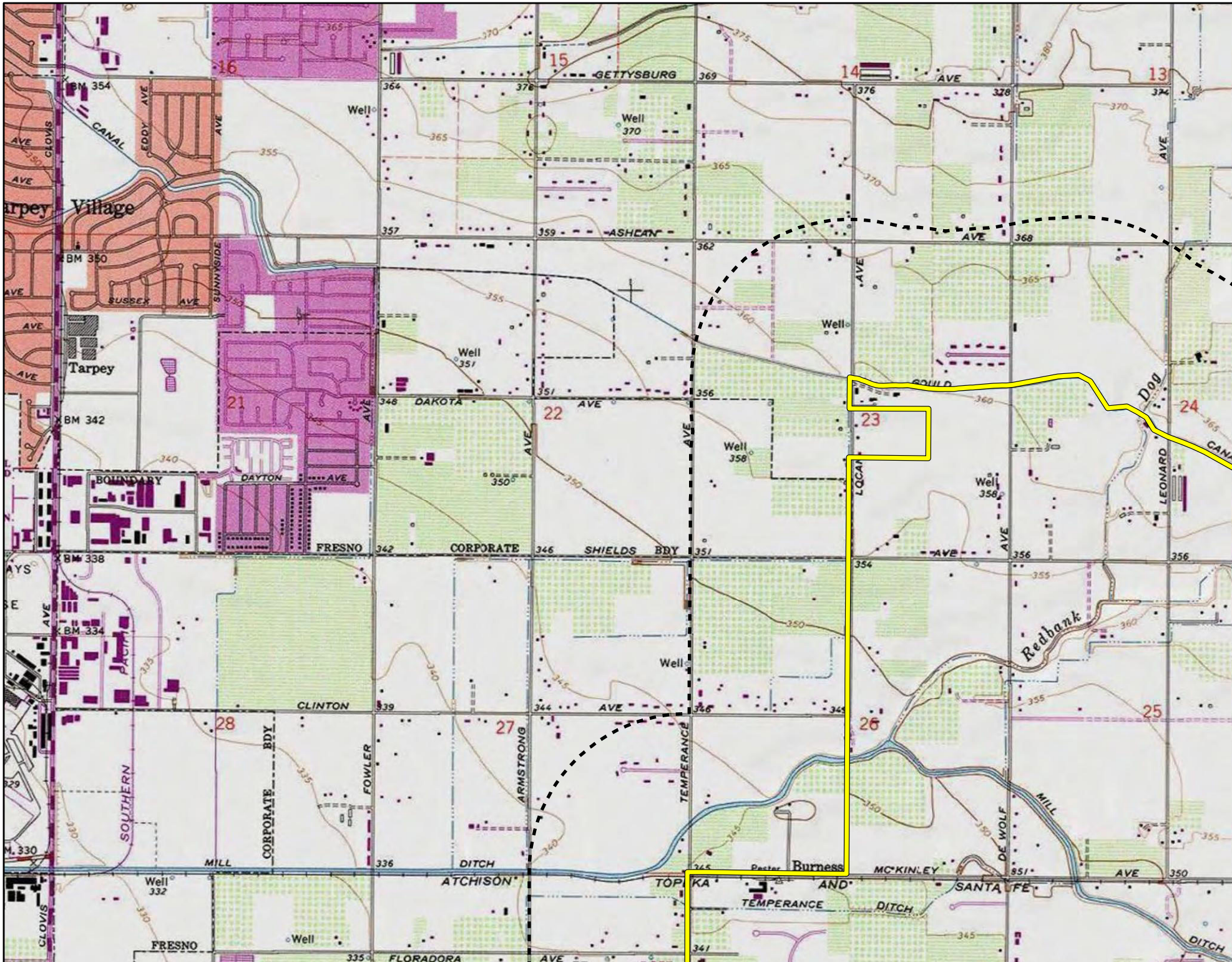
Sincerely,

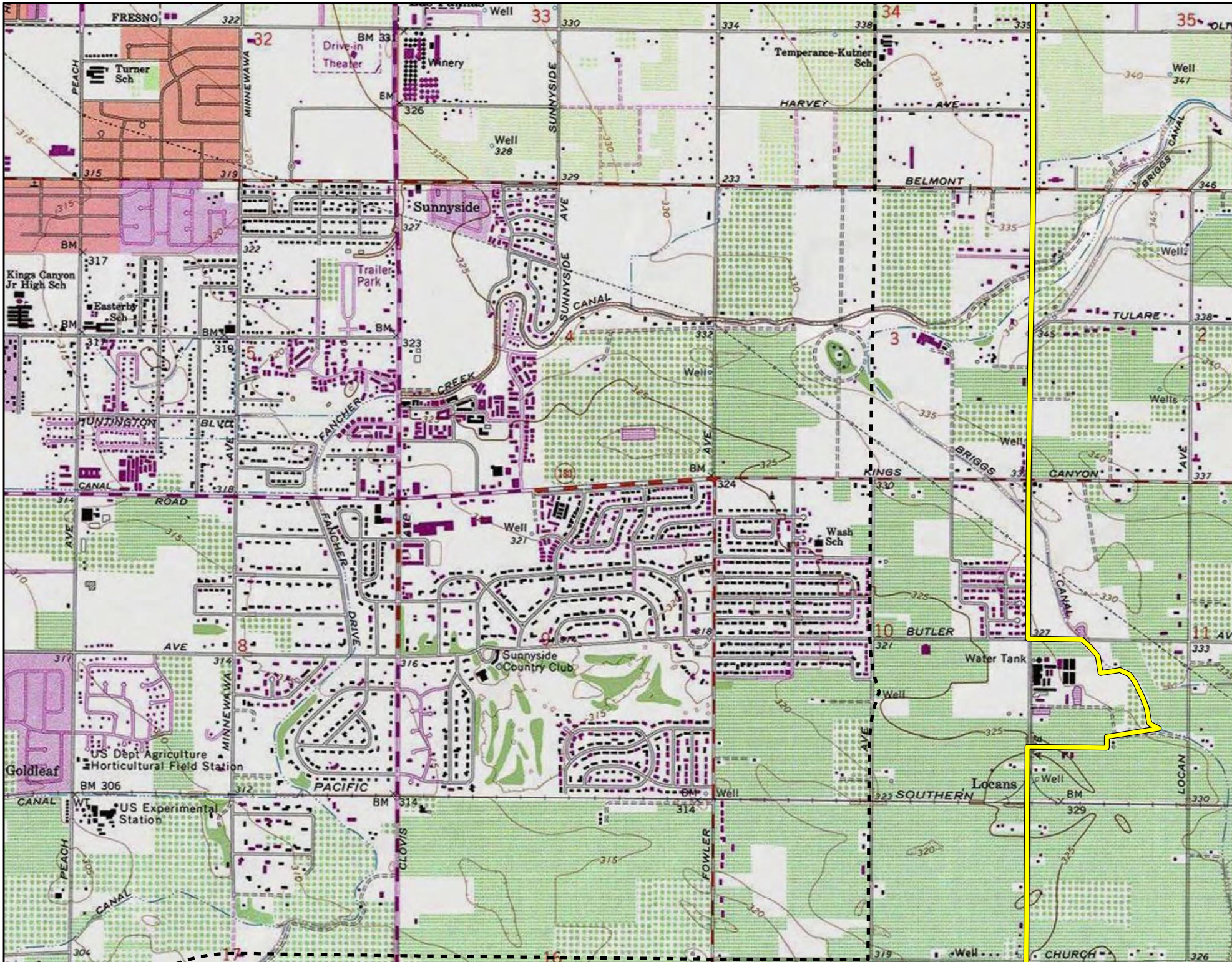


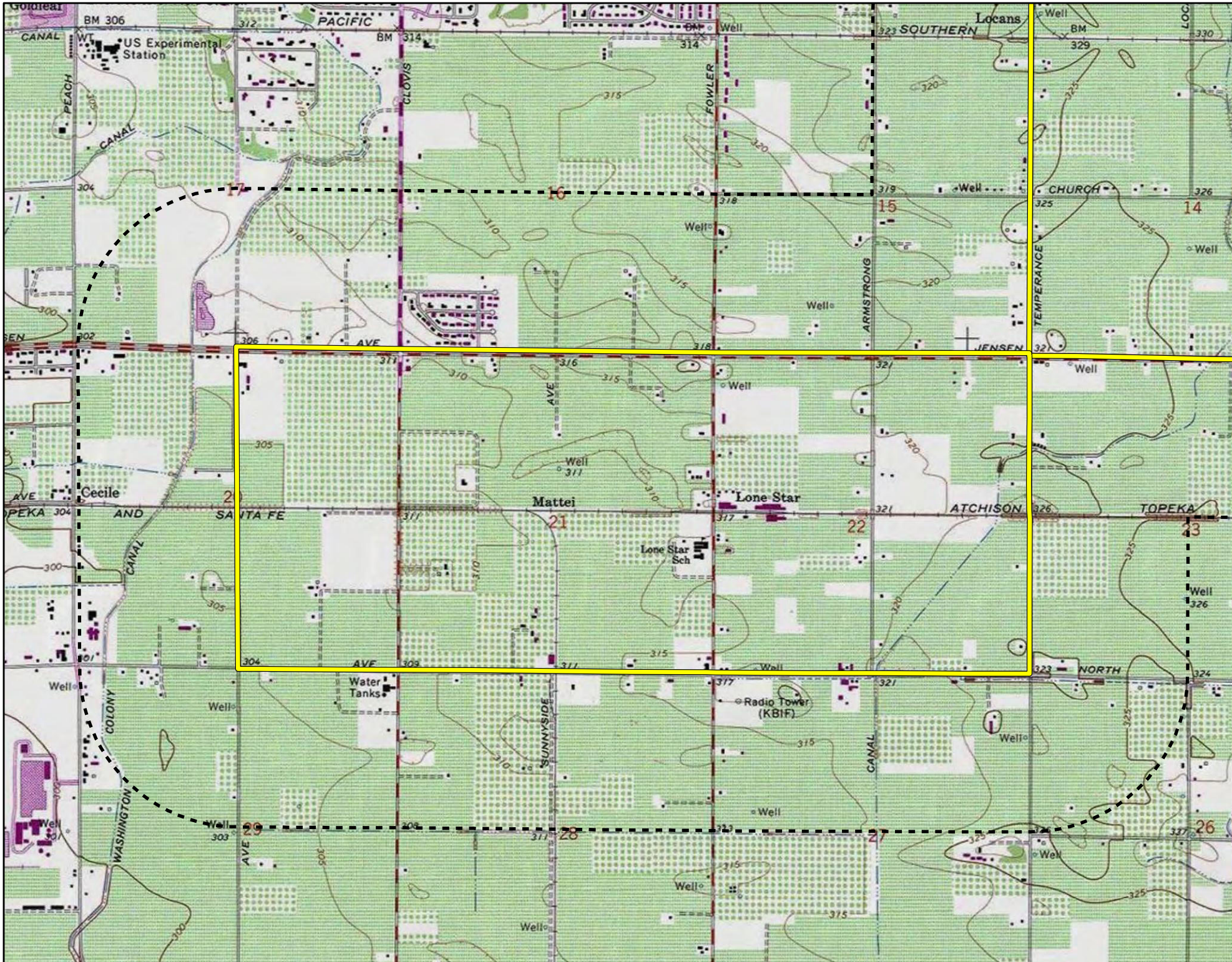
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Enc: Attachment A: Records Search Map

Attachment A:
Records Search Map


Tarpey Village
Tarpey
GETTYSBURG
ASHLAN
DAKOTA
CORPORATE
SHIELDS BDY
BOUNDARY
DAYTON
CLINTON
FRESNO
SOUTHERN PACIFIC
CORPORATE BDY
FOWLER
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FRESNO
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Easterby Sch
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KINGS CANYON
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Locans
US Experimental Station
CLOVIS
FOWLER
LOCAN
CHURCH


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Water Tanks
SUNNYSIDE
Radio Tower (KBIF)
CANAL
WASHINGTON
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January 30, 2022

Traditional Choinumni Tribe
David Alvarez, Chairperson
2415 E. Houston Avenue
Fresno, CA, 93720

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Alvarez:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

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Fresno, CA 93720

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#A-537
San Bernardino, CA 92407

Sacramento Valley
2351 Sunset Boulevard
Suite 170-301
Rocklin, CA 95765

Utah
2901 Bluegrass Boulevard
Suite 200-62
Lehi, UT 84043

Connecticut
2 Corporate Drive
Suite 450
Shelton, CT 06484

New York
10 Monument Street
Deposit, NY 13754

56 Broome Corporate Parkway
Conklin, NY 13748

CANADA

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SINGAPORE

Please note that this letter is a request for information pertaining to a cultural resources assessment and is not notification of a project under Senate Bill (SB) 18, Assembly Bill (AB) 52 or Section 106 of the National Historic Preservation Act. Designated lead agencies under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) are handling project notification and consultation requirements. Please feel free to contact me at 530.219.1432 or via email at ddepietro@fcs-intl.com and thank you for your valuable assistance.

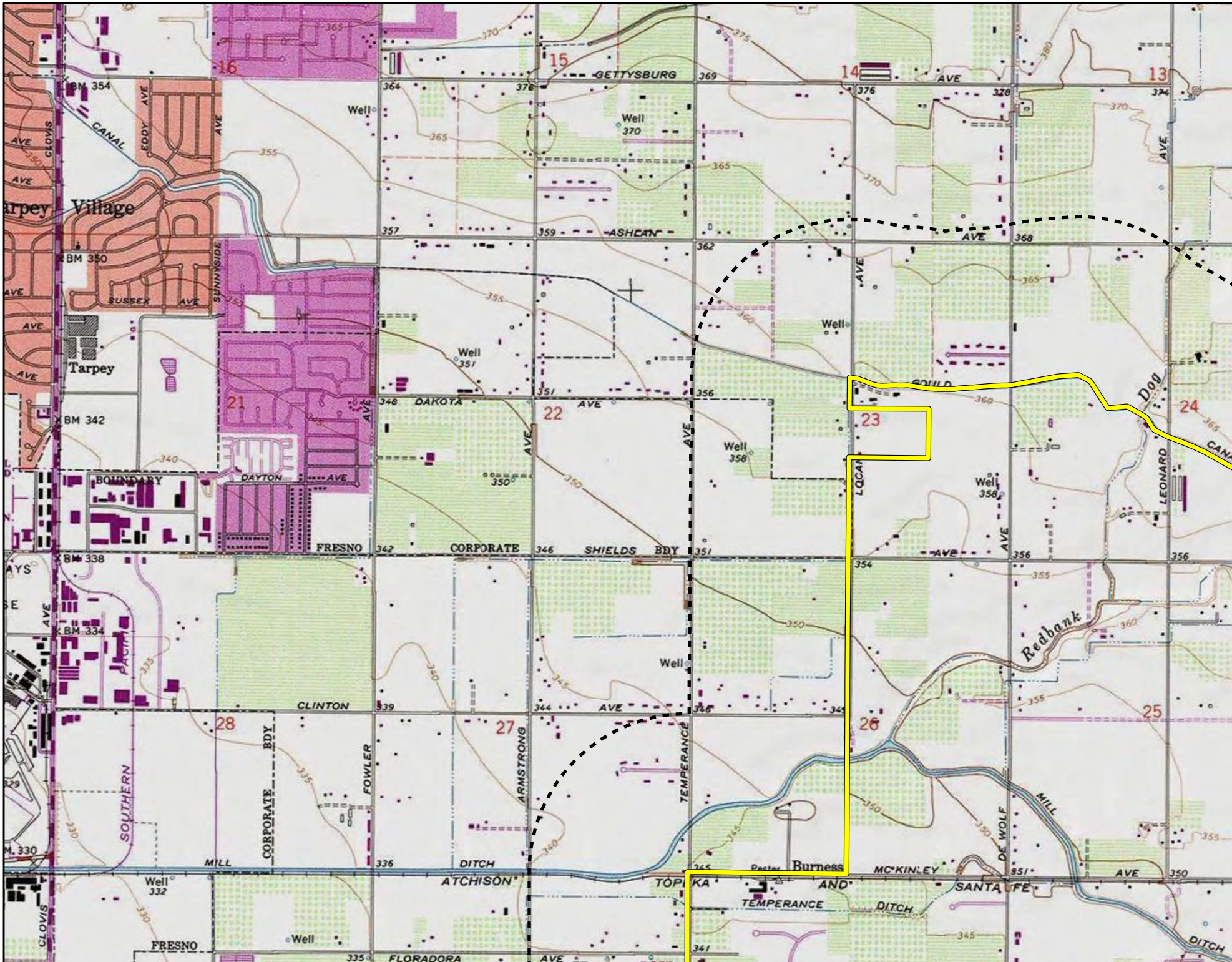
Sincerely,

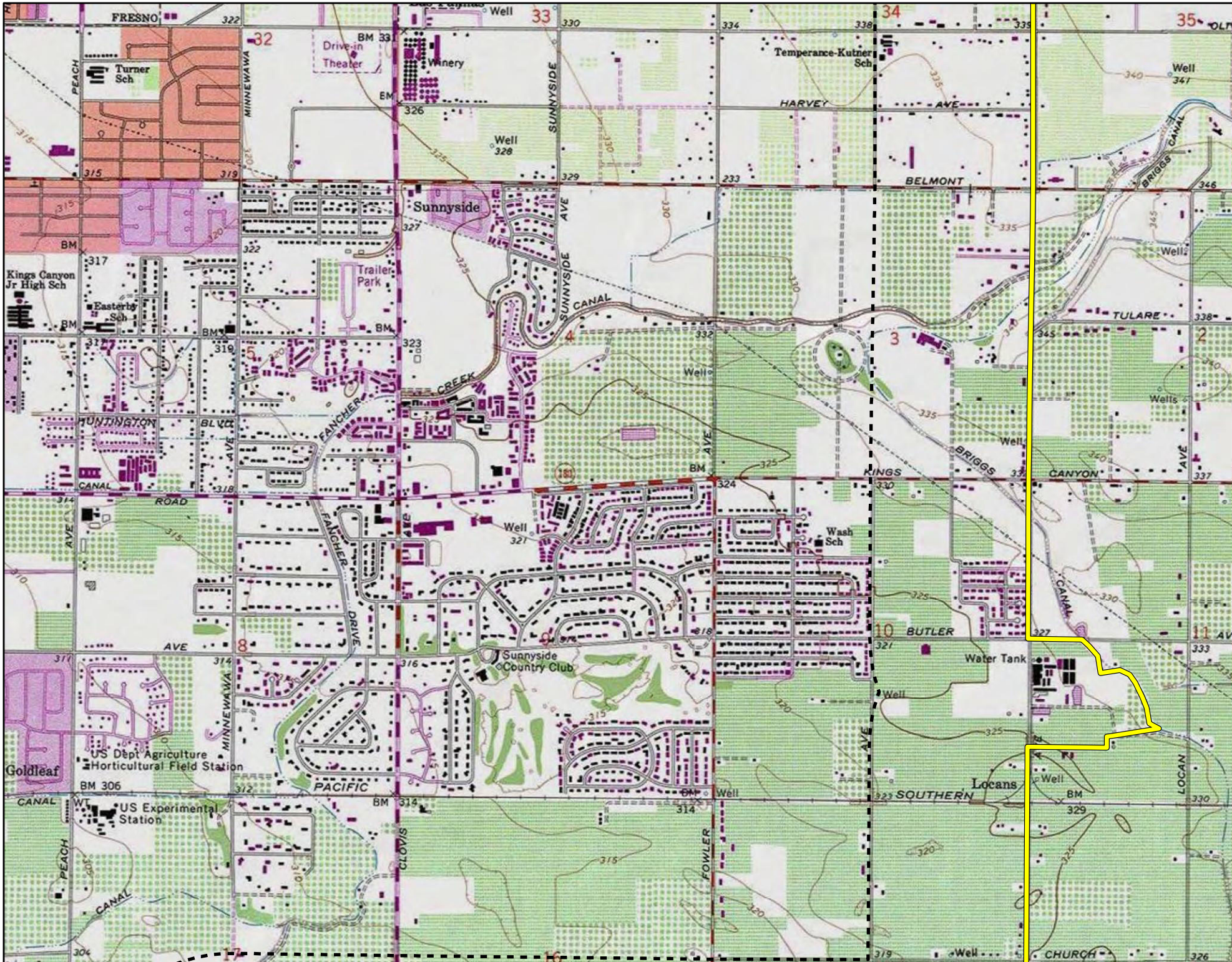


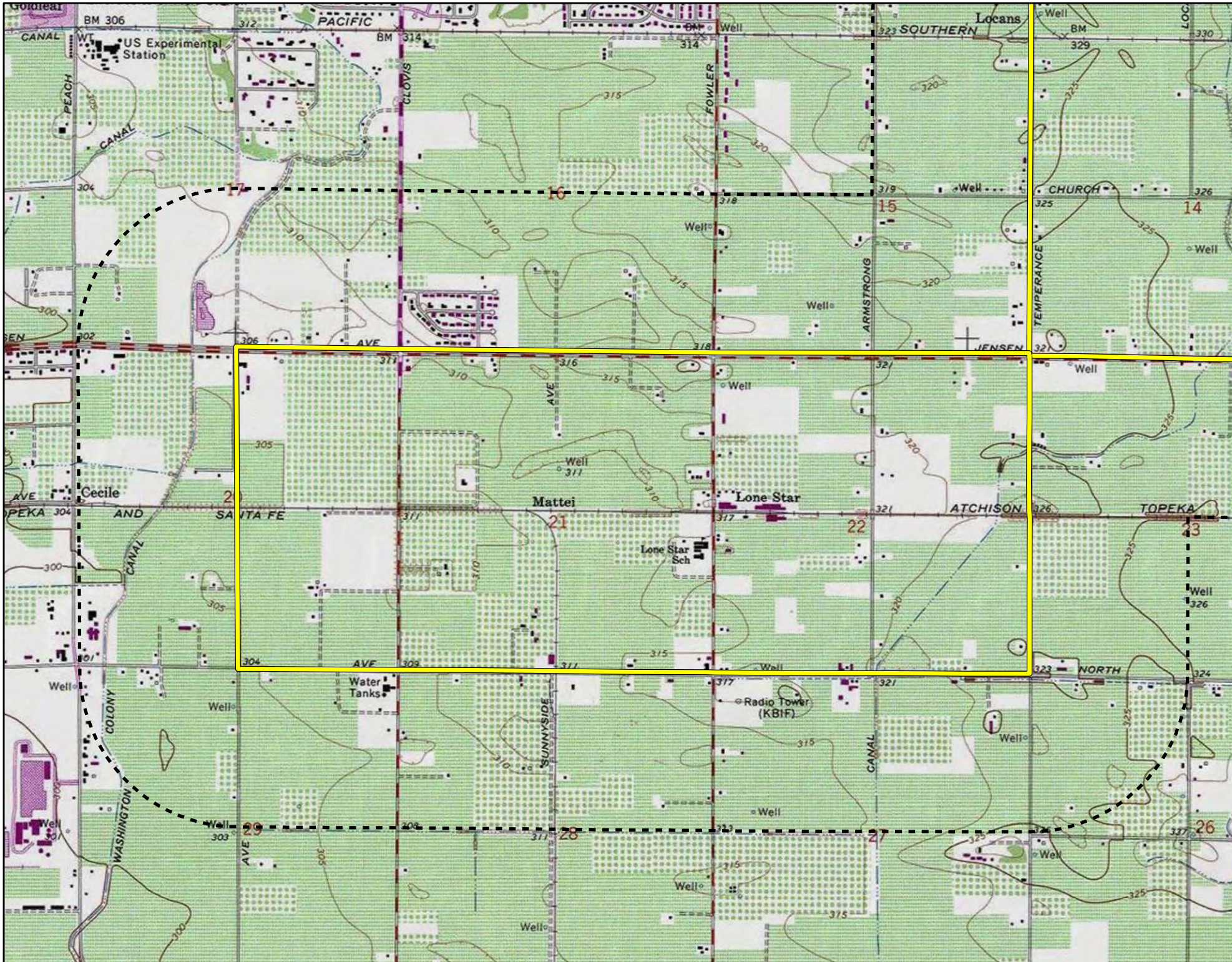
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Enc: Attachment A: Records Search Map

Attachment A:
Records Search Map


Tarpey Village
Tarpey
GETTYSBURG
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DAKOTA
CORPORATE
SHIELDS BDY
BOUNDARY
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CLINTON
FRESNO
SOUTHERN PACIFIC
CORPORATE BDY
FOWLER
ARMSTRONG
TEMPERANCE
MILL DITCH
ATCHISON TOPEKA AND SANTA FE
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January 30, 2022

Cold Springs Rancheria of Mono Indians
Carol Bill, Chairperson
P.O. Box 209
Tollhouse, CA, 93667

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Bill:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Records Search maps with a 0.5 mile buffer around the site is enclosed for your reference.

As part of the cultural resources assessment, FCS conducted a Sacred Lands File (SLF) search and California Historical Resource Information System (CHRIS). The results of the SLF records search was positive. The CHRIS search showed that there are 11 recorded resources within the project site. However, 12 cultural resources were recorded within a 0.5 mile radius of the project site. The CHRIS search also found 26 recorded reports within the project site and 23 reports recorded within a 0.5 mile radius of the project site. The Native American Heritage Commission (NAHC) suggested you might be able to provide further information. If you have any additional information regarding potential historic or cultural resources in proximity or relation to the proposed project area, we would greatly appreciate your input.

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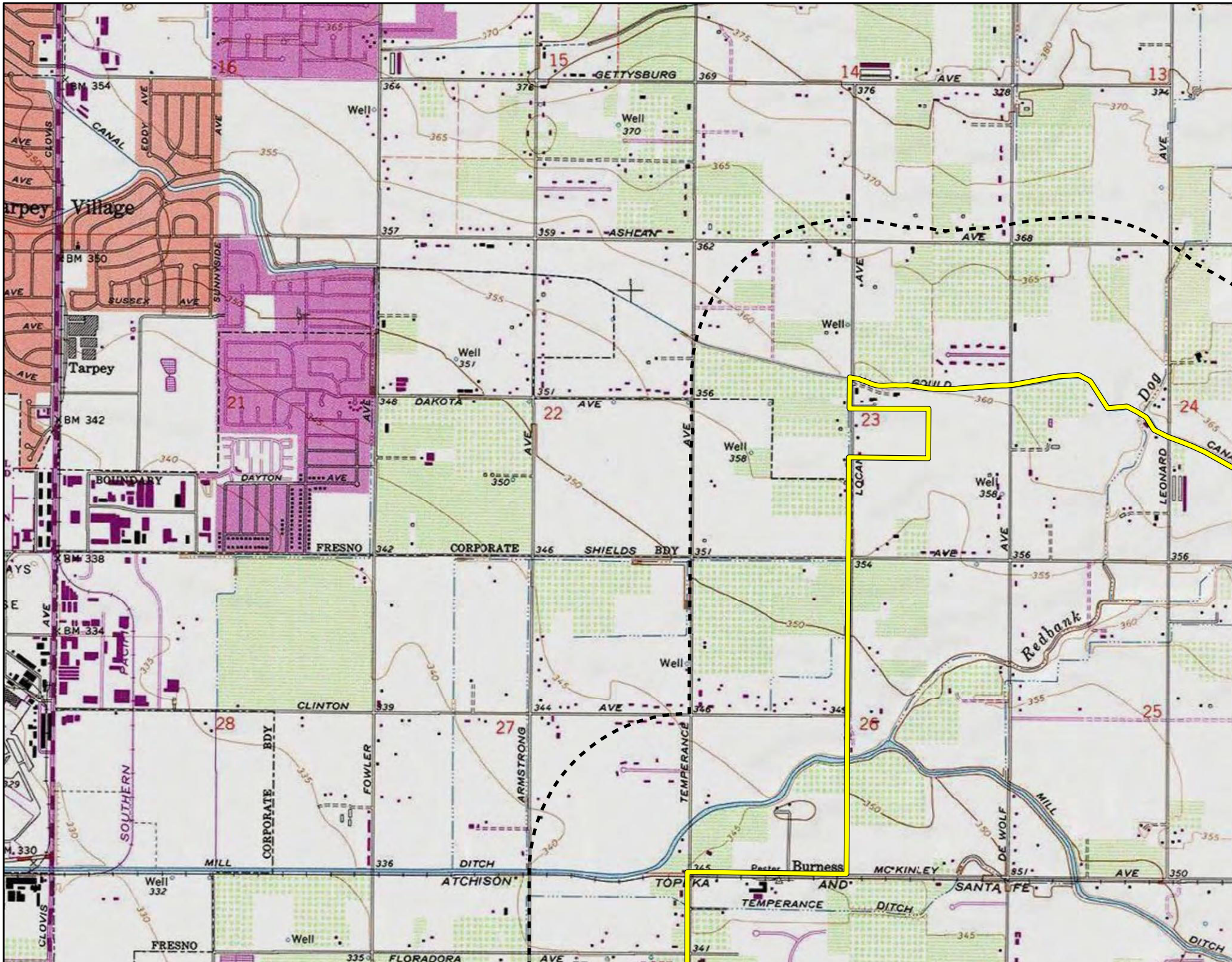
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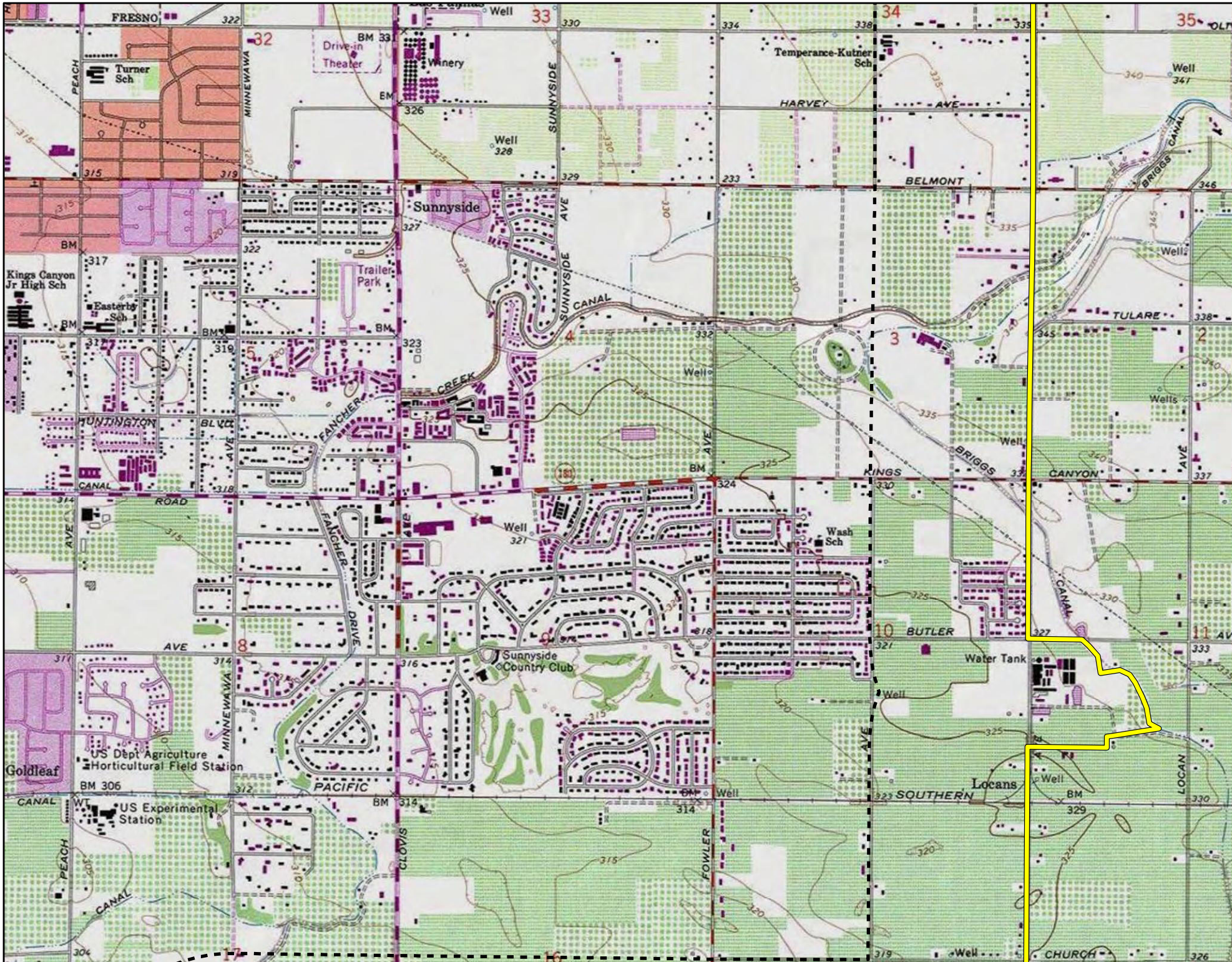


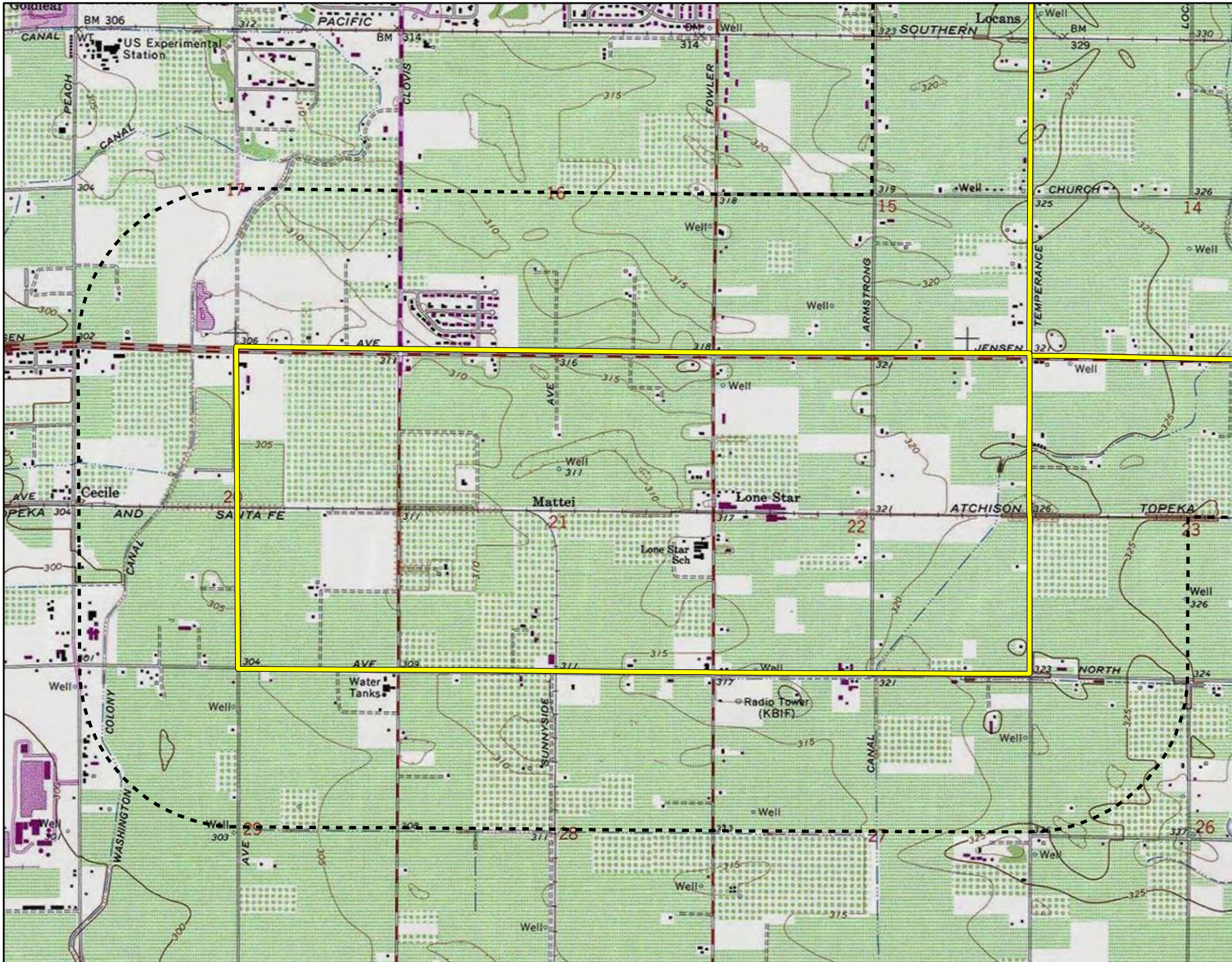
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Enc: Attachment A: Records Search Map

Attachment A:
Records Search Map


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January 30, 2022

North Fork Rancheria of Mono Indians
Elaine Fink, Chairperson
P.O .Box 929
North Fork, CA, 93643

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Fink:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

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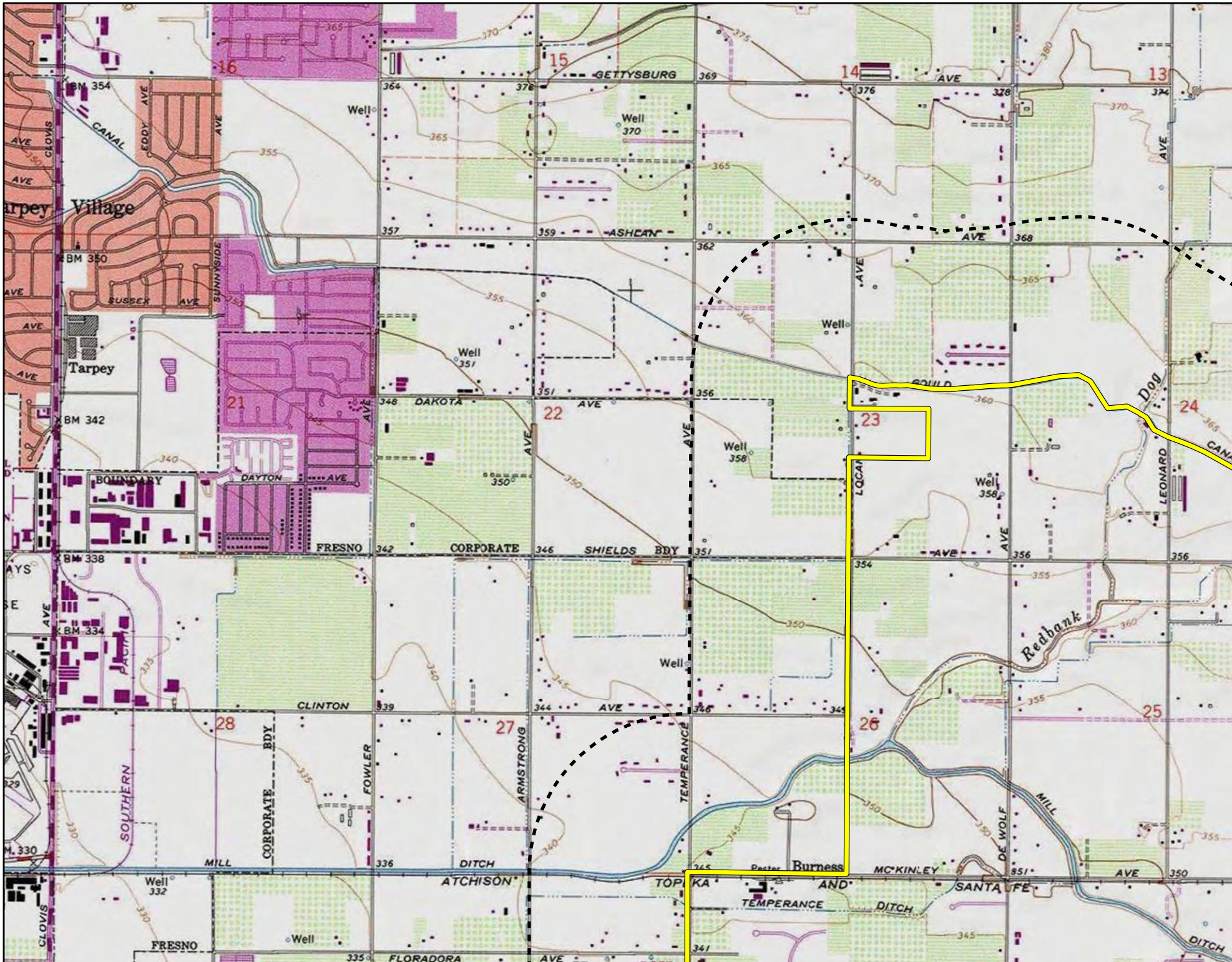
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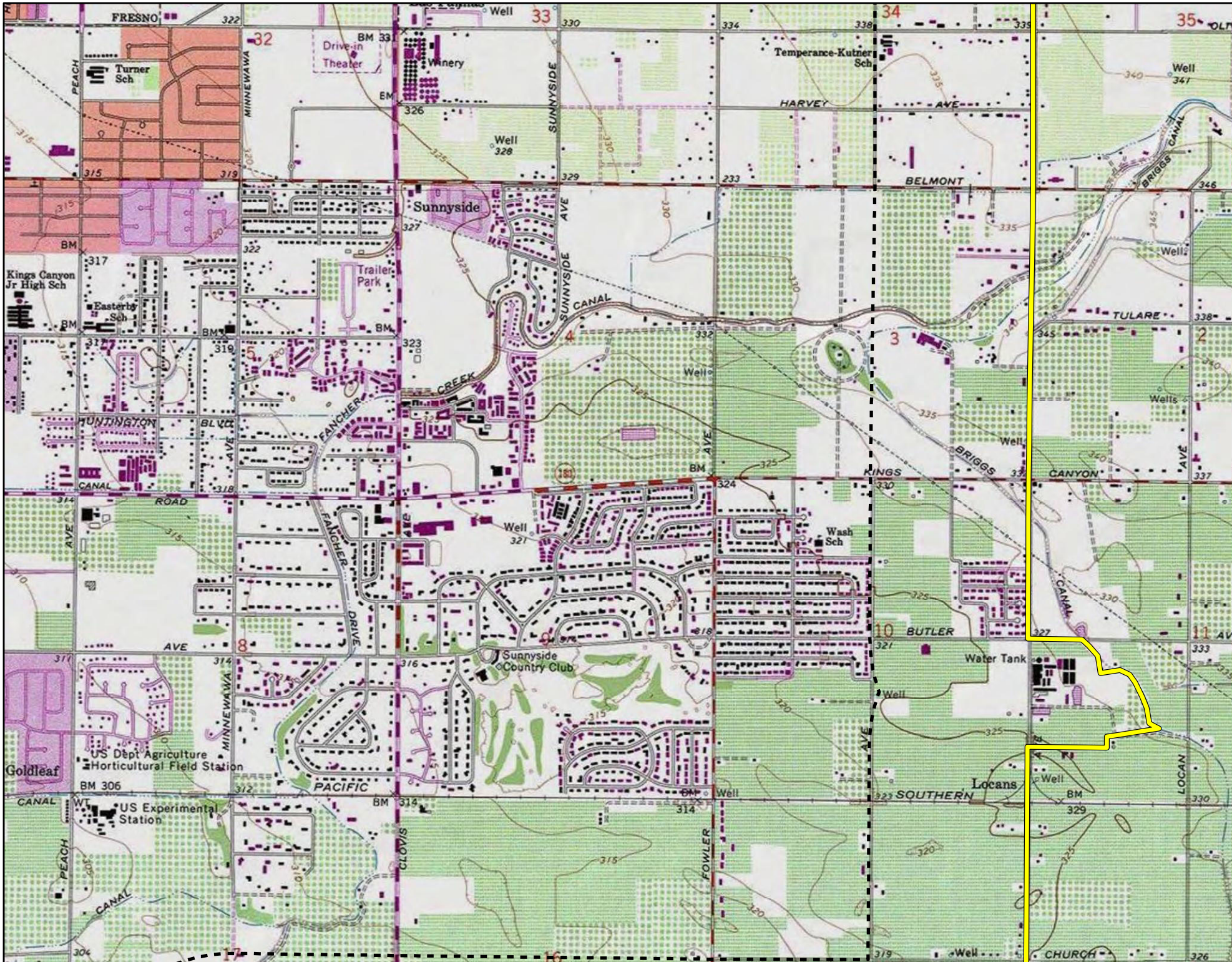


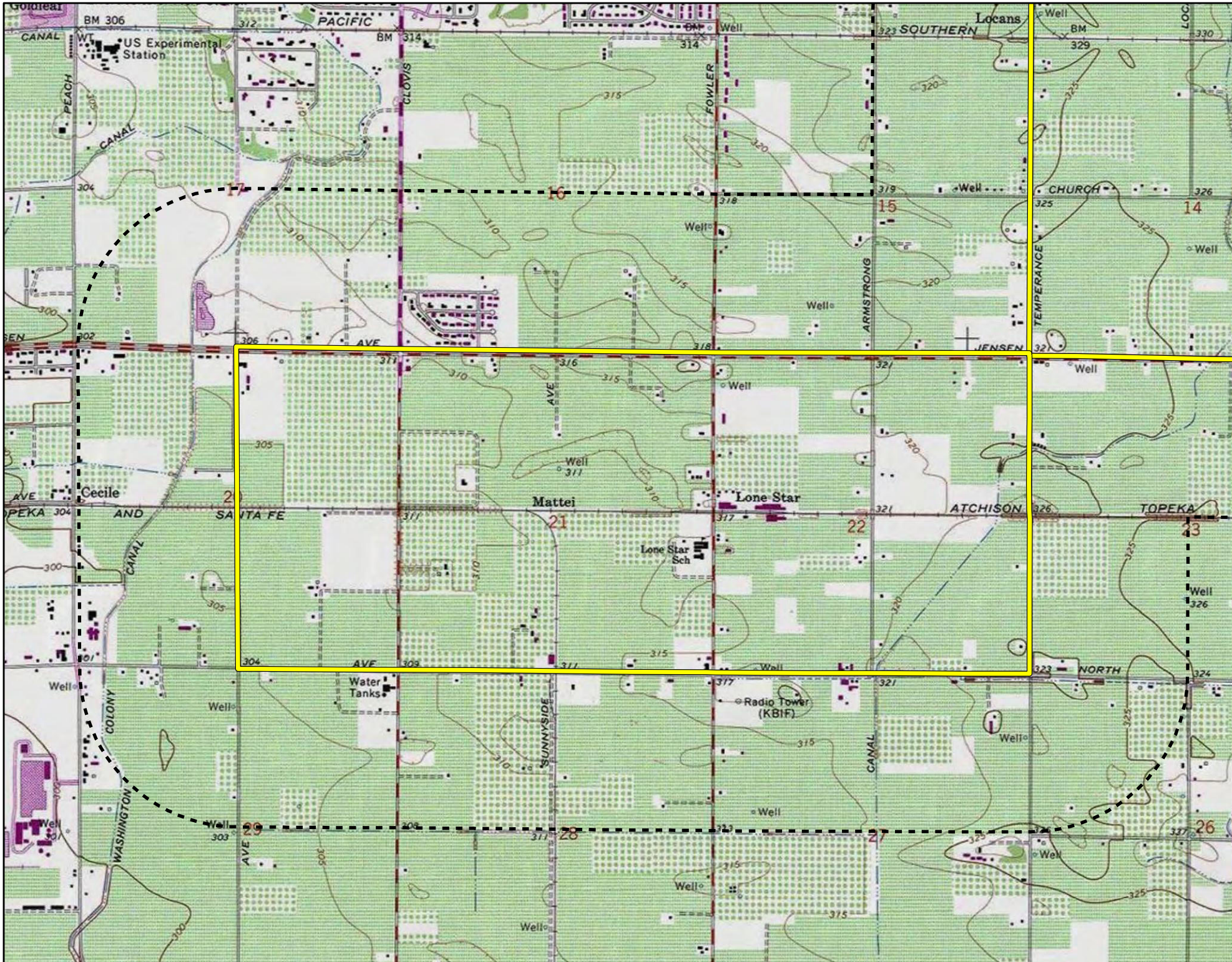
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
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Enc: Attachment A: Records Search Map

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January 30, 2022

Picayune Rancheria of Chukchansi Indians
Claudia Gonzales, Chairwoman
P.O. Box 2226
Oakhurst, CA, 93644

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairwoman Gonzales:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

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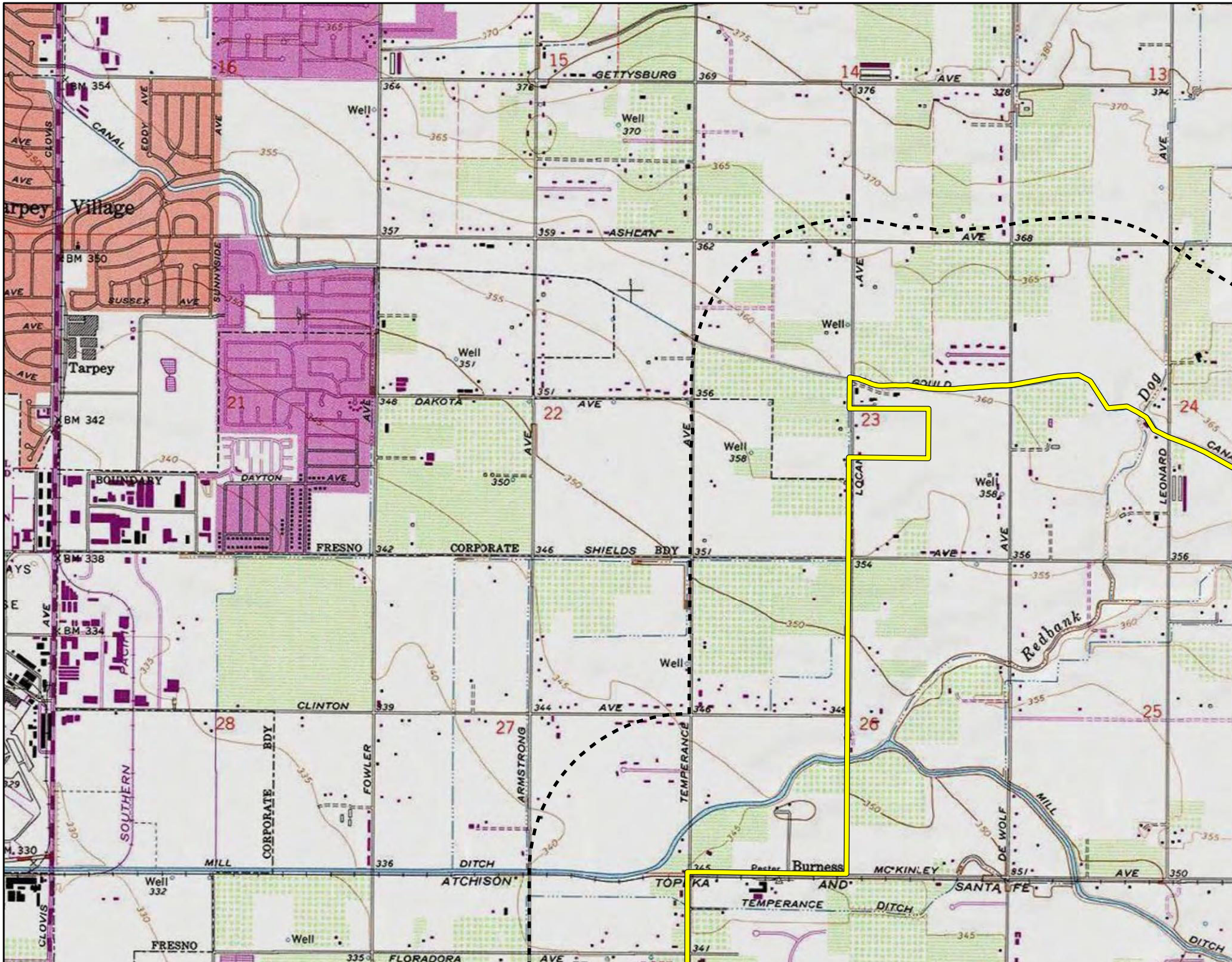
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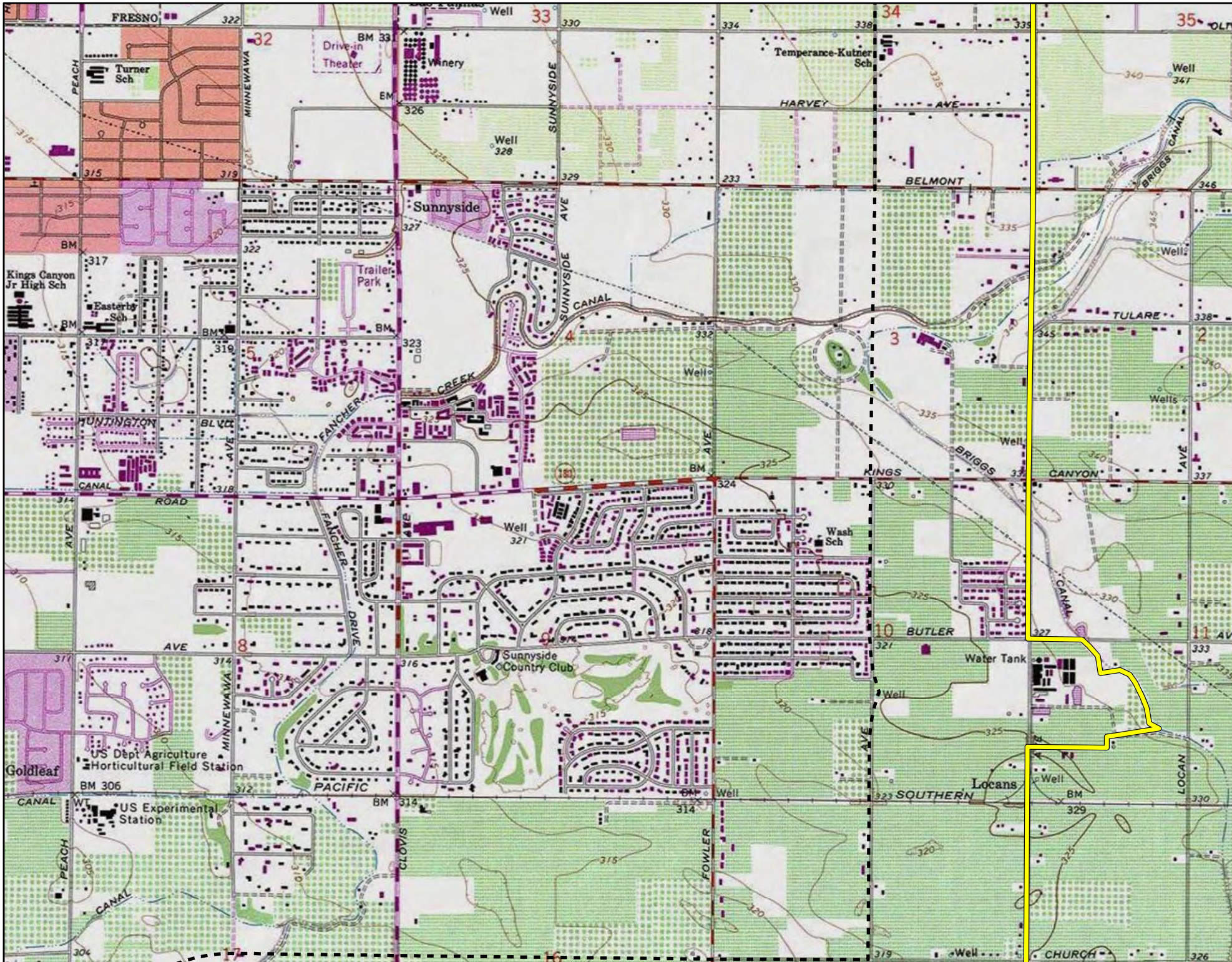


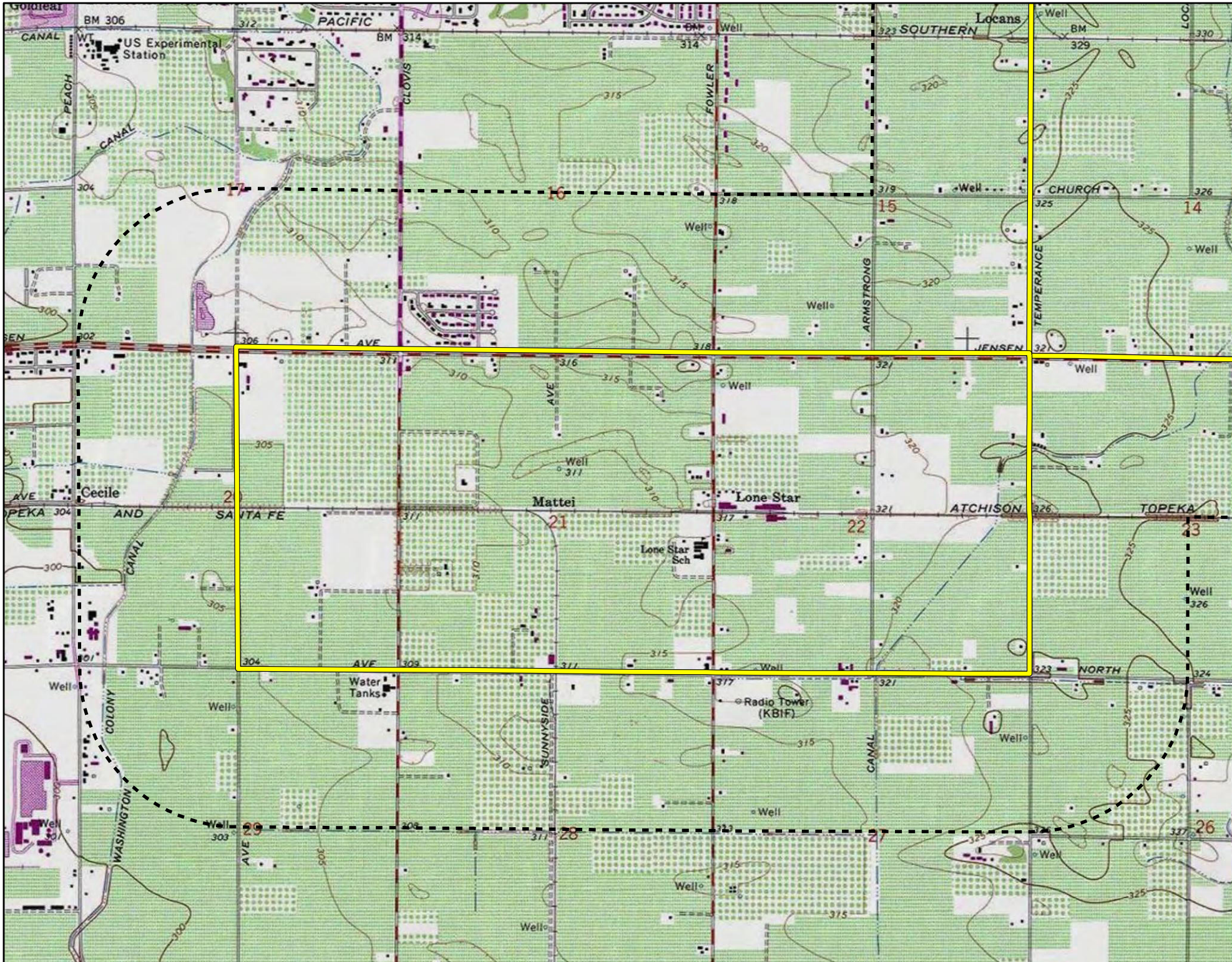
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January 30, 2022

North Valley Yokuts Tribe
Katherine Perez, Chairperson
P.O. Box 717
Linden, CA, 95236

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Perez:

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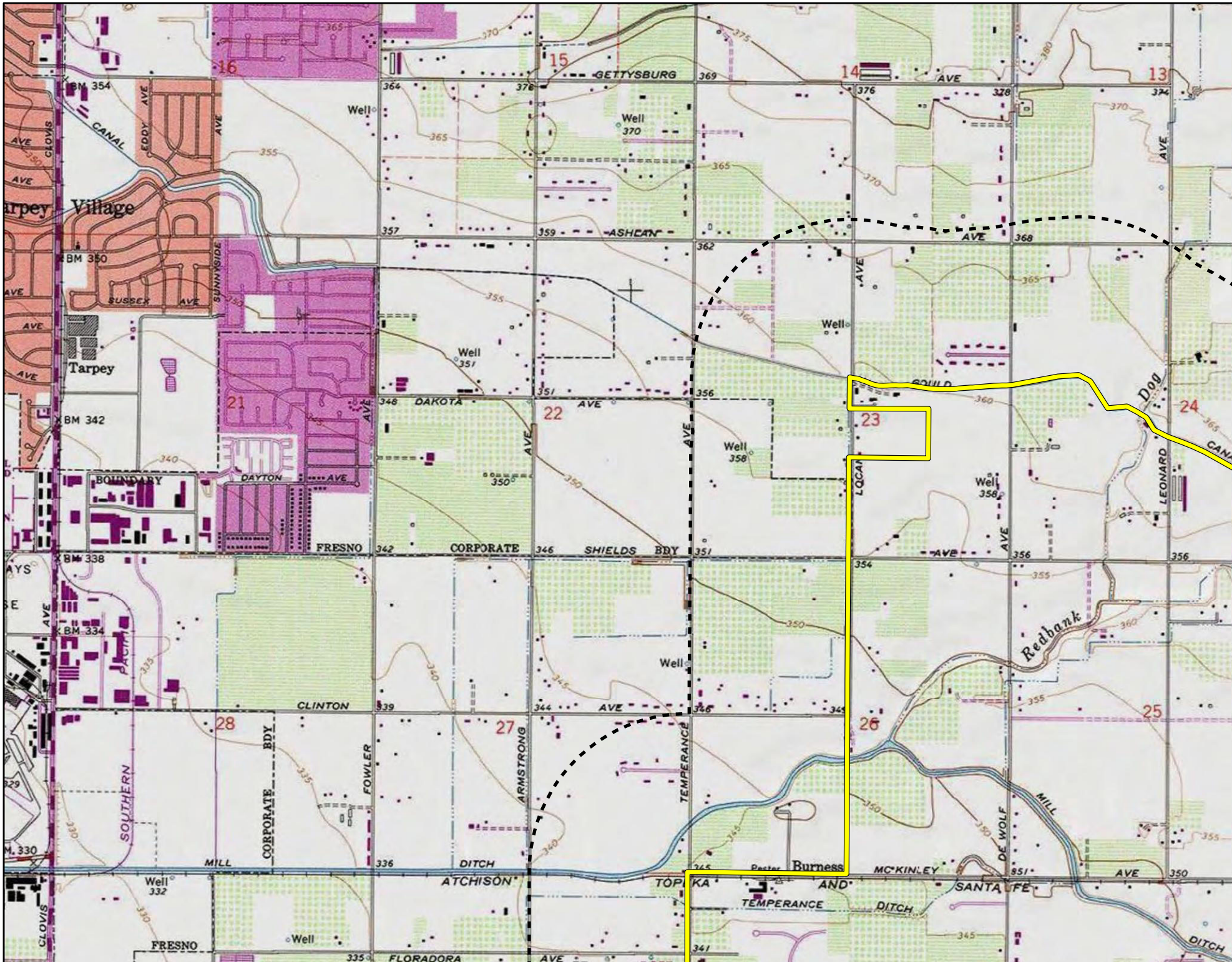
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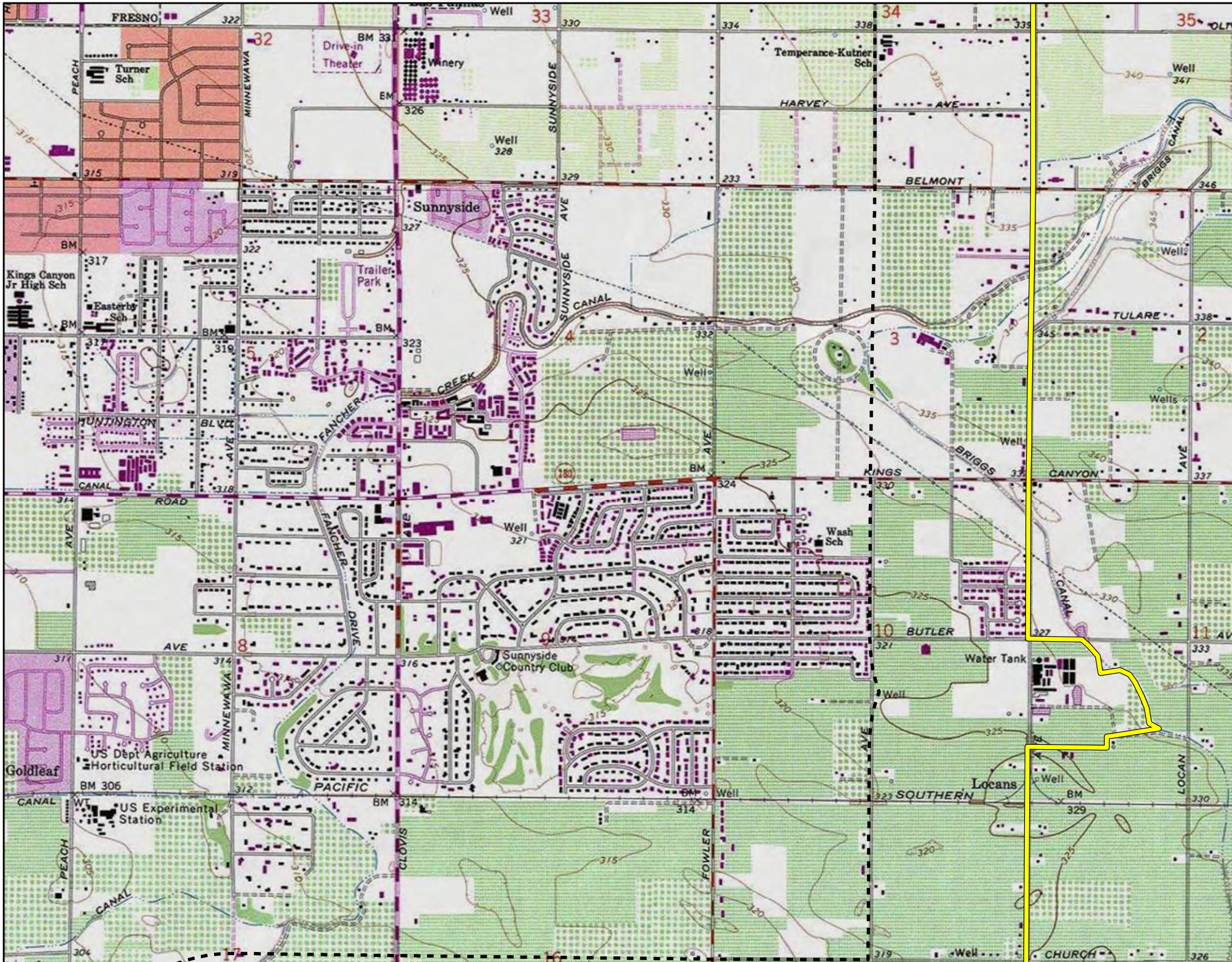


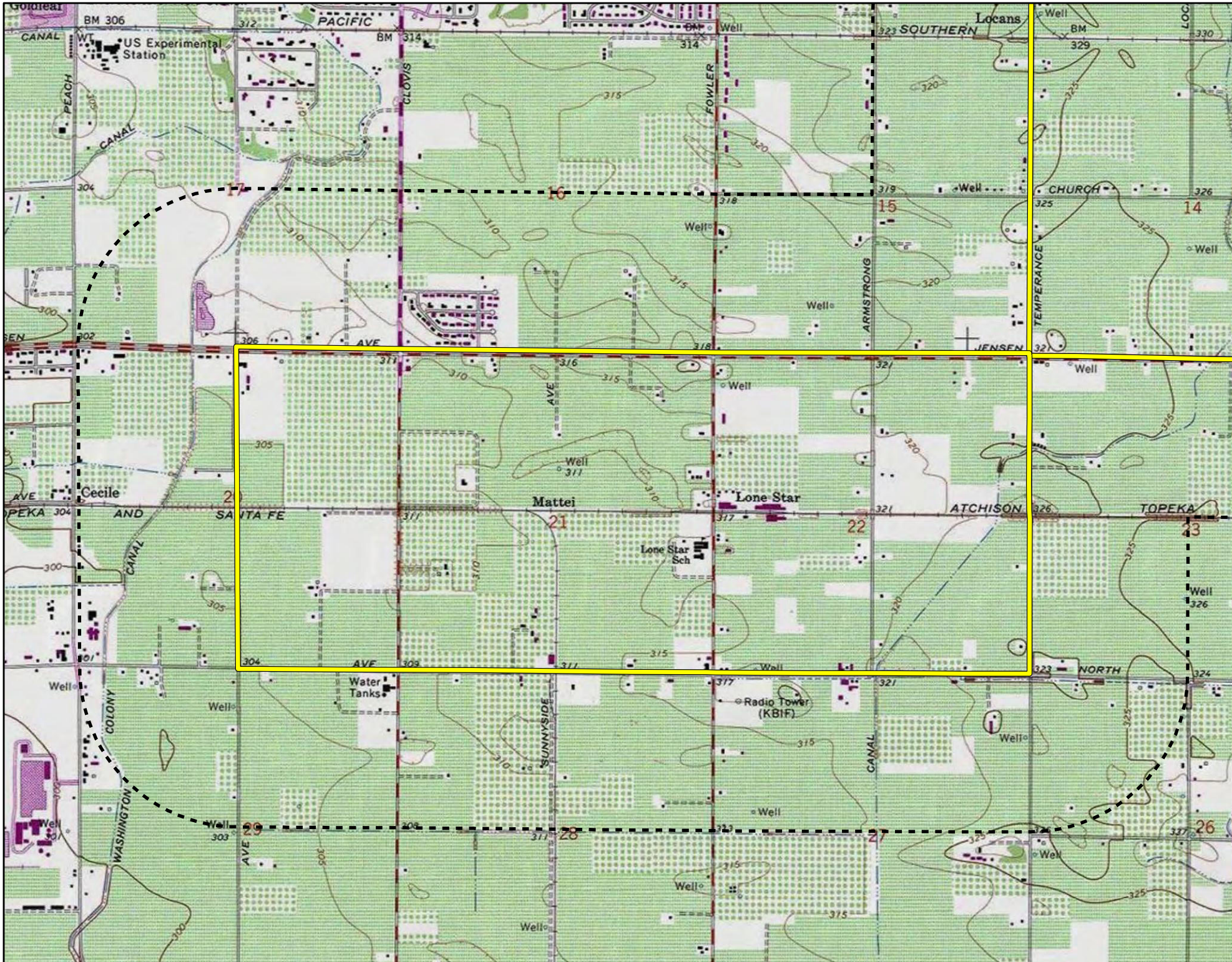
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January 30, 2022

Big Sandy Rancheria of Western Mono Indians
Elizabeth Kipp, Chairperson
P.O. Box 337
Auberry, CA, 93602

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Kipp:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Records Search maps with a 0.5 mile buffer around the site is enclosed for your reference.

As part of the cultural resources assessment, FCS conducted a Sacred Lands File (SLF) search and California Historical Resource Information System (CHRIS). The results of the SLF records search was positive. The CHRIS search showed that there are 11 recorded resources within the project site. However, 12 cultural resources were recorded within a 0.5 mile radius of the project site. The CHRIS search also found 26 recorded reports within the project site and 23 reports recorded within a 0.5 mile radius of the project site. The Native American Heritage Commission (NAHC) suggested you might be able to provide further information. If you have any additional information regarding potential historic or cultural resources in proximity or relation to the proposed project area, we would greatly appreciate your input.

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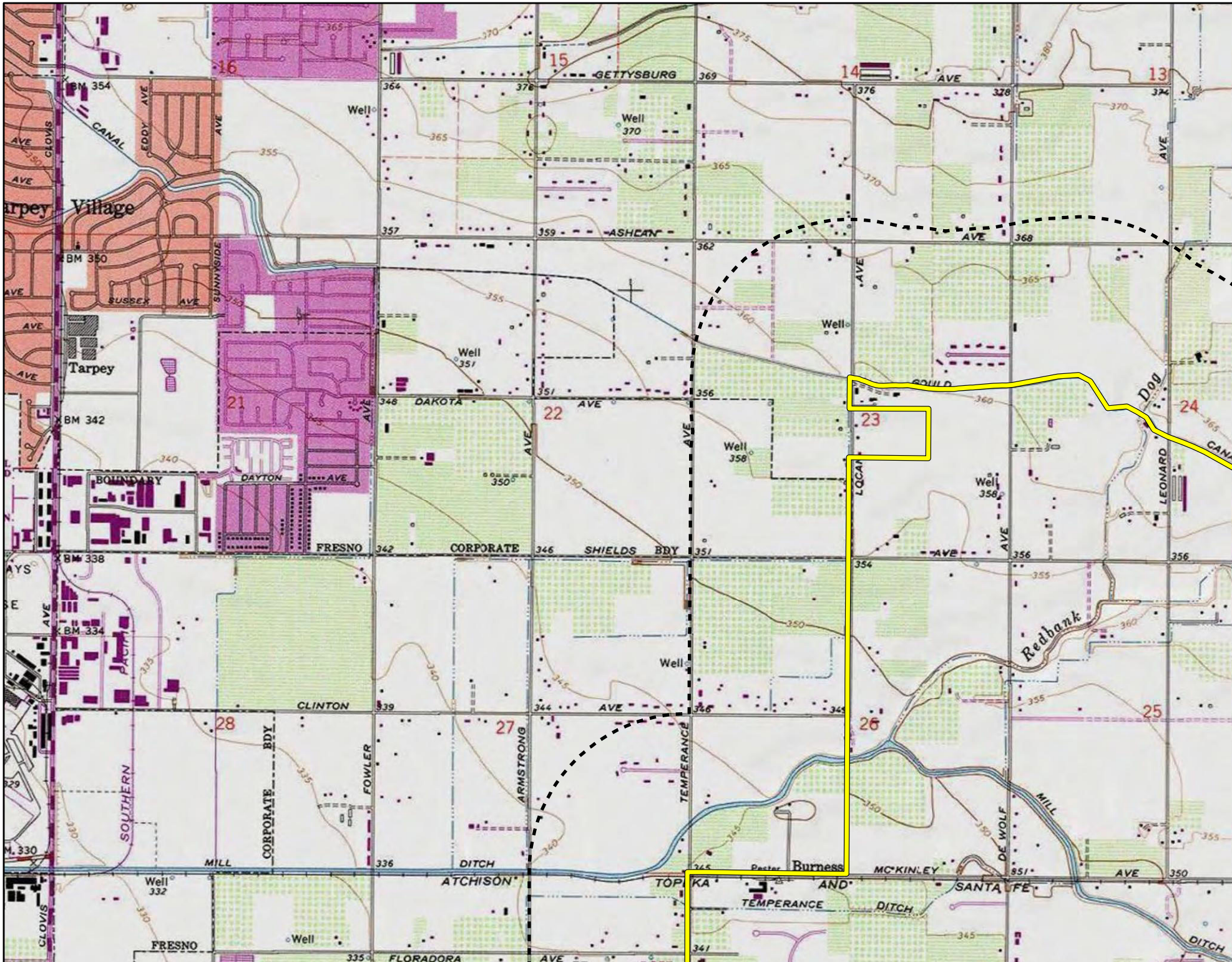
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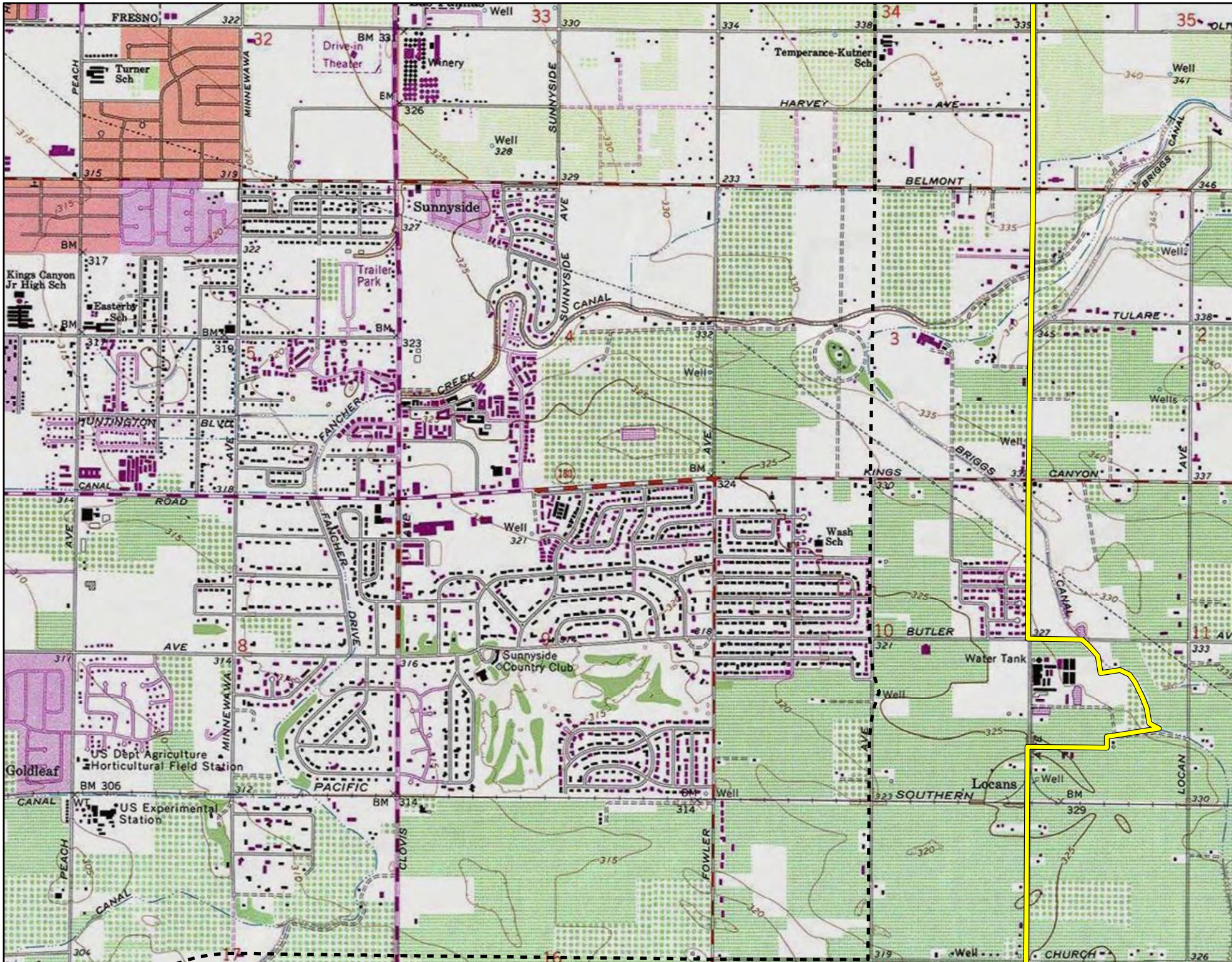


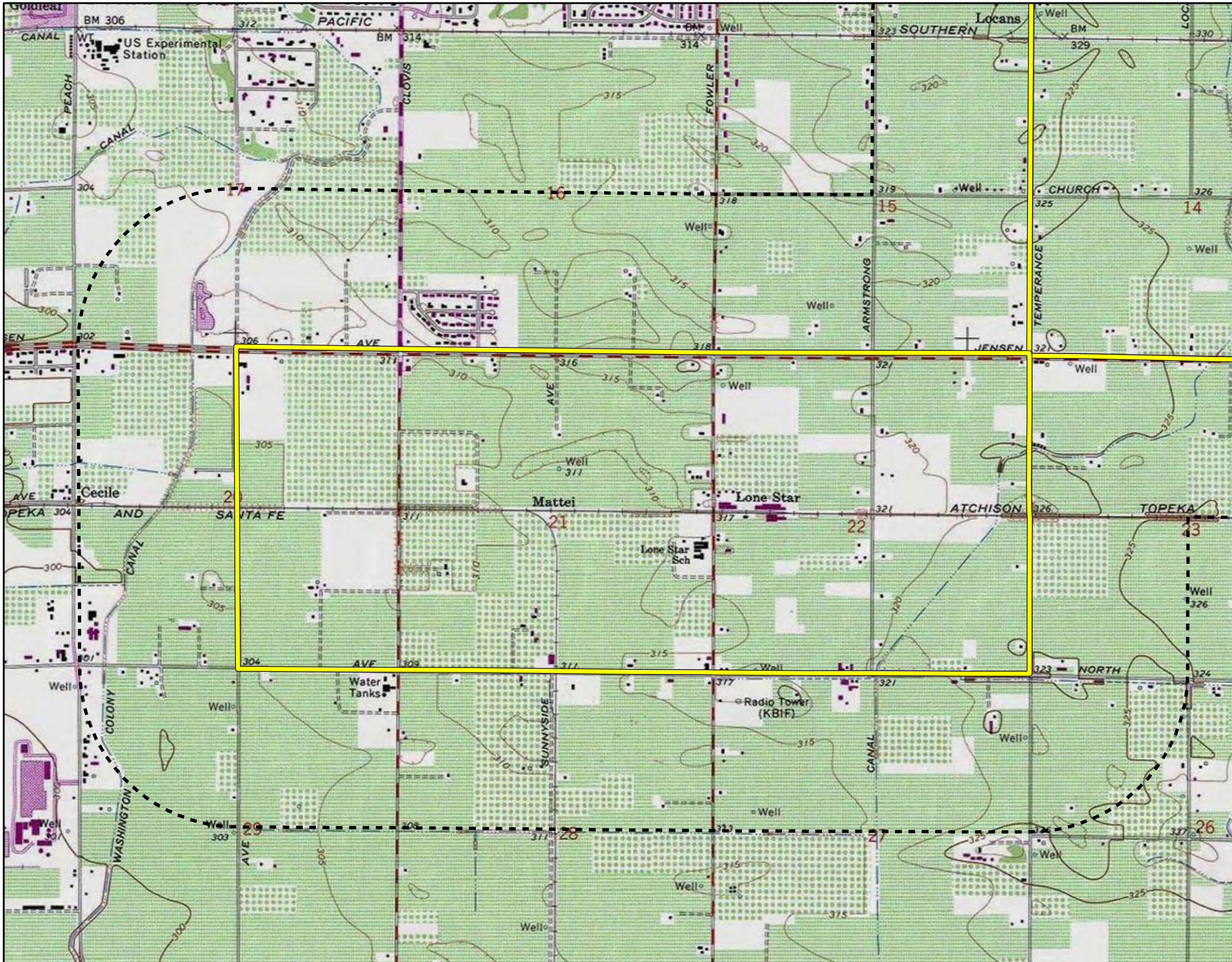
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Enc: Attachment A: Records Search Map

Attachment A:
Records Search Map


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January 30, 2022

Table Mountain Rancheria
Brenda Lavell, Chairperson
P.O. Box 410
Friant, CA, 93626

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Lavell:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

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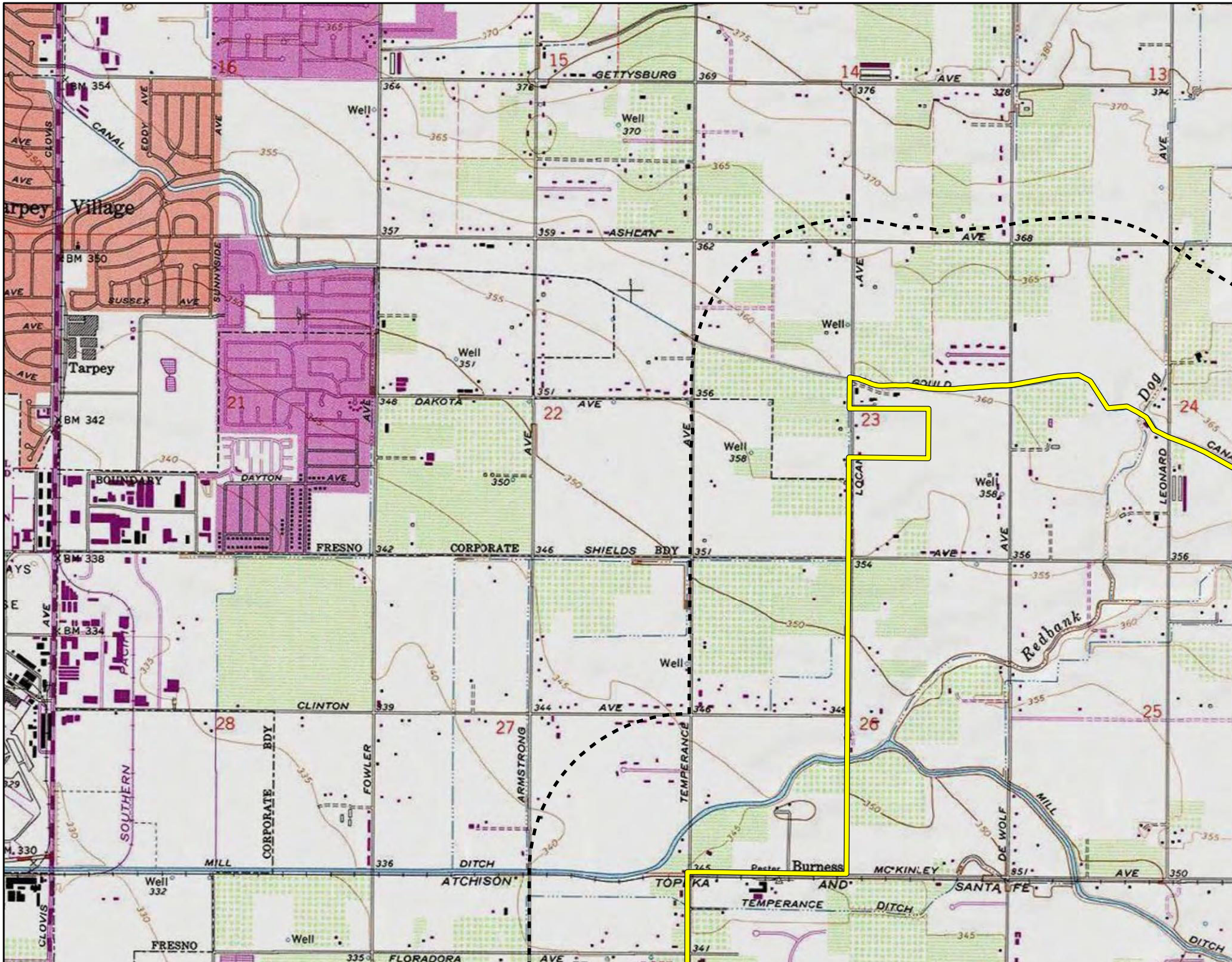
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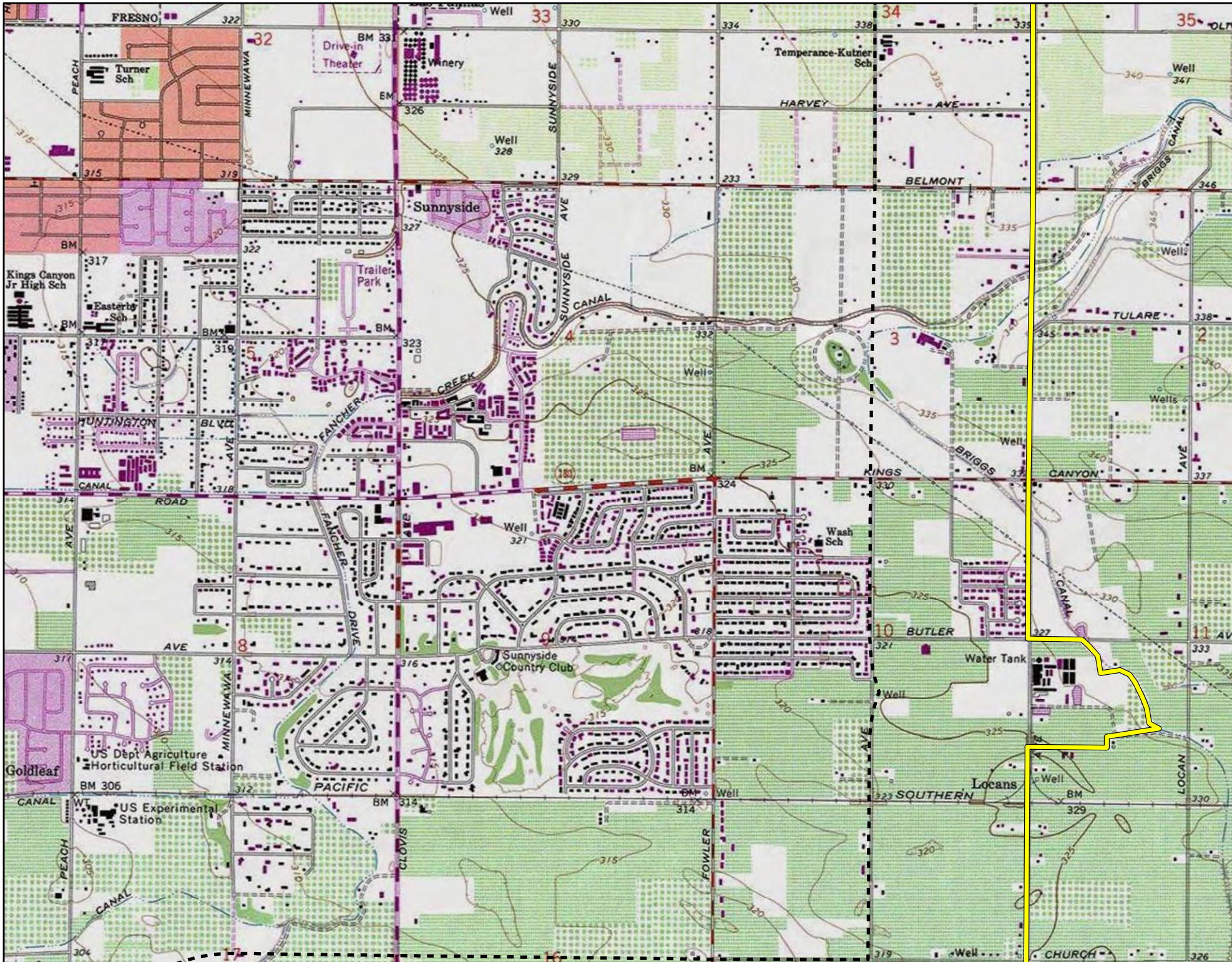


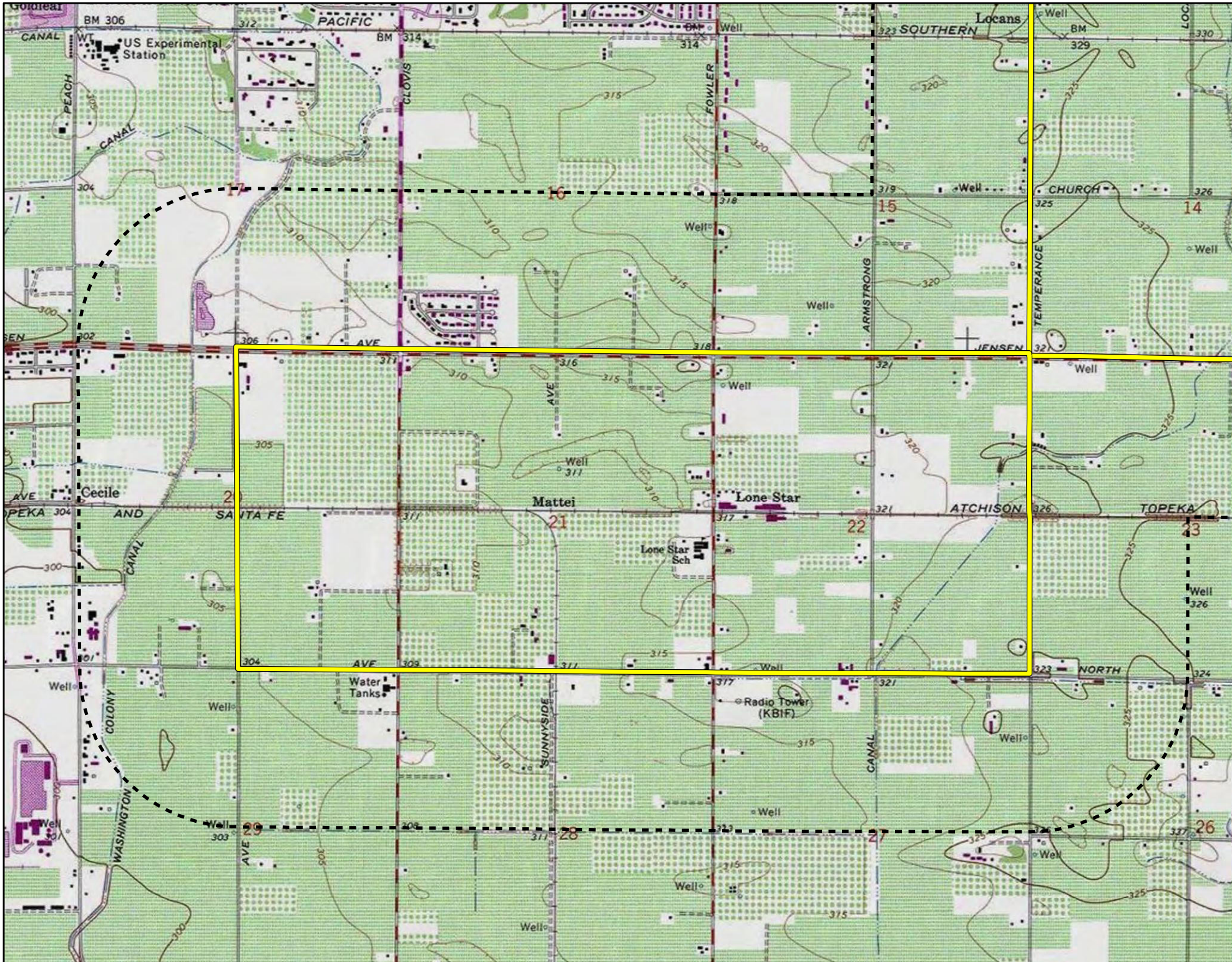
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
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Enc: Attachment A: Records Search Map

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January 30, 2022

Dumna Wo-Wah Tribal Government
Robert Ledger, Chairperson
2191 West Pico Ave.
Fresno, CA, 93705

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Ledger:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

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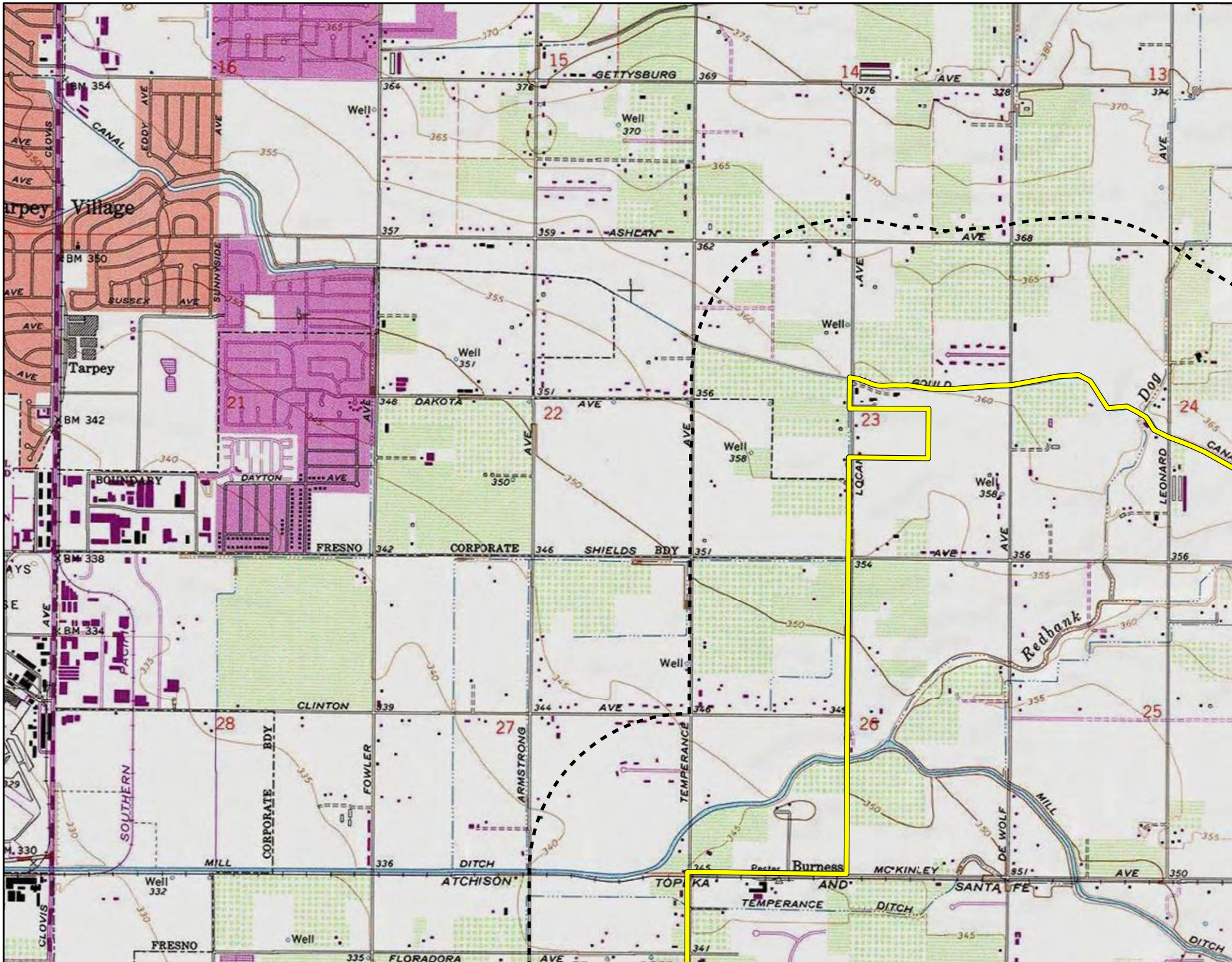
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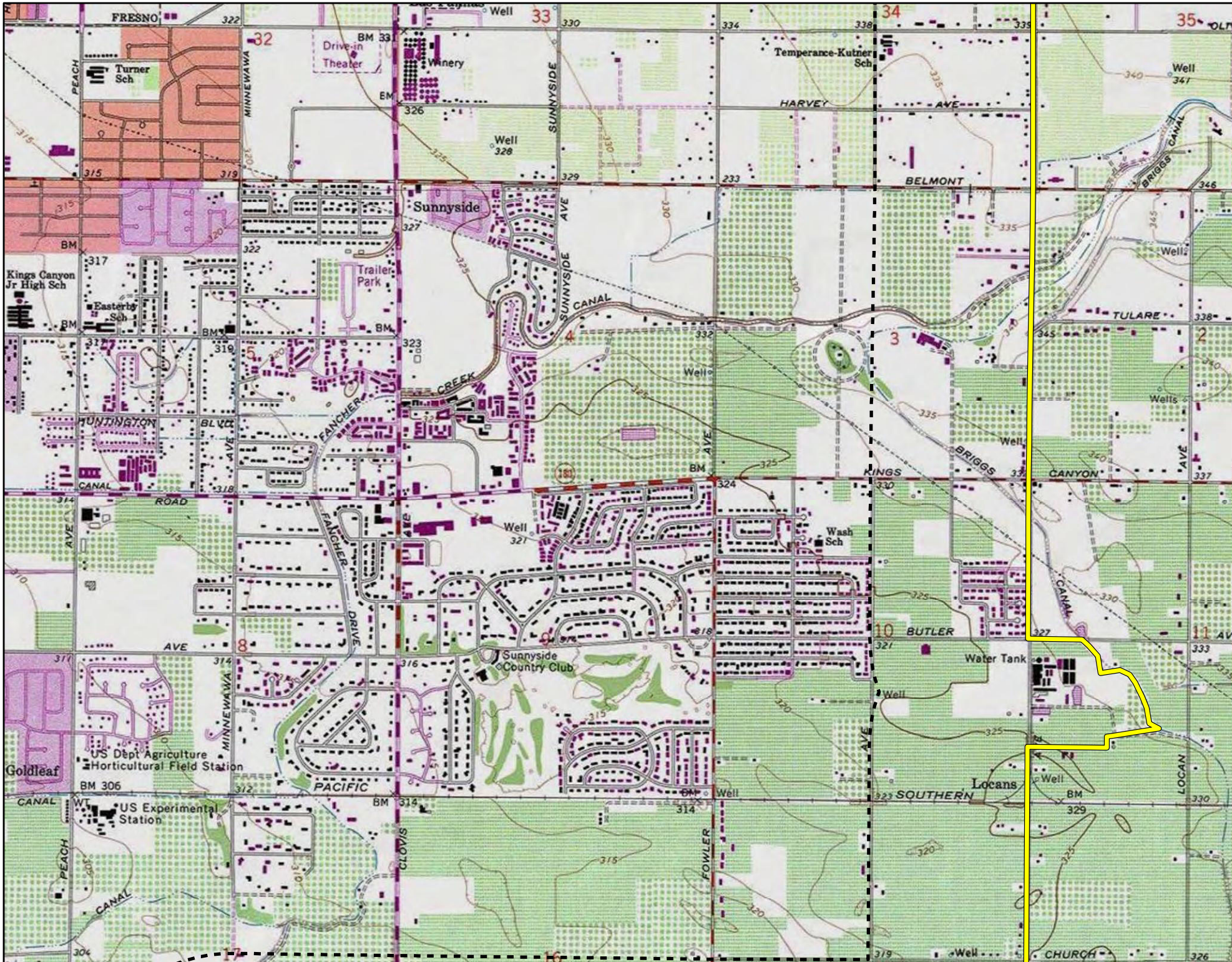


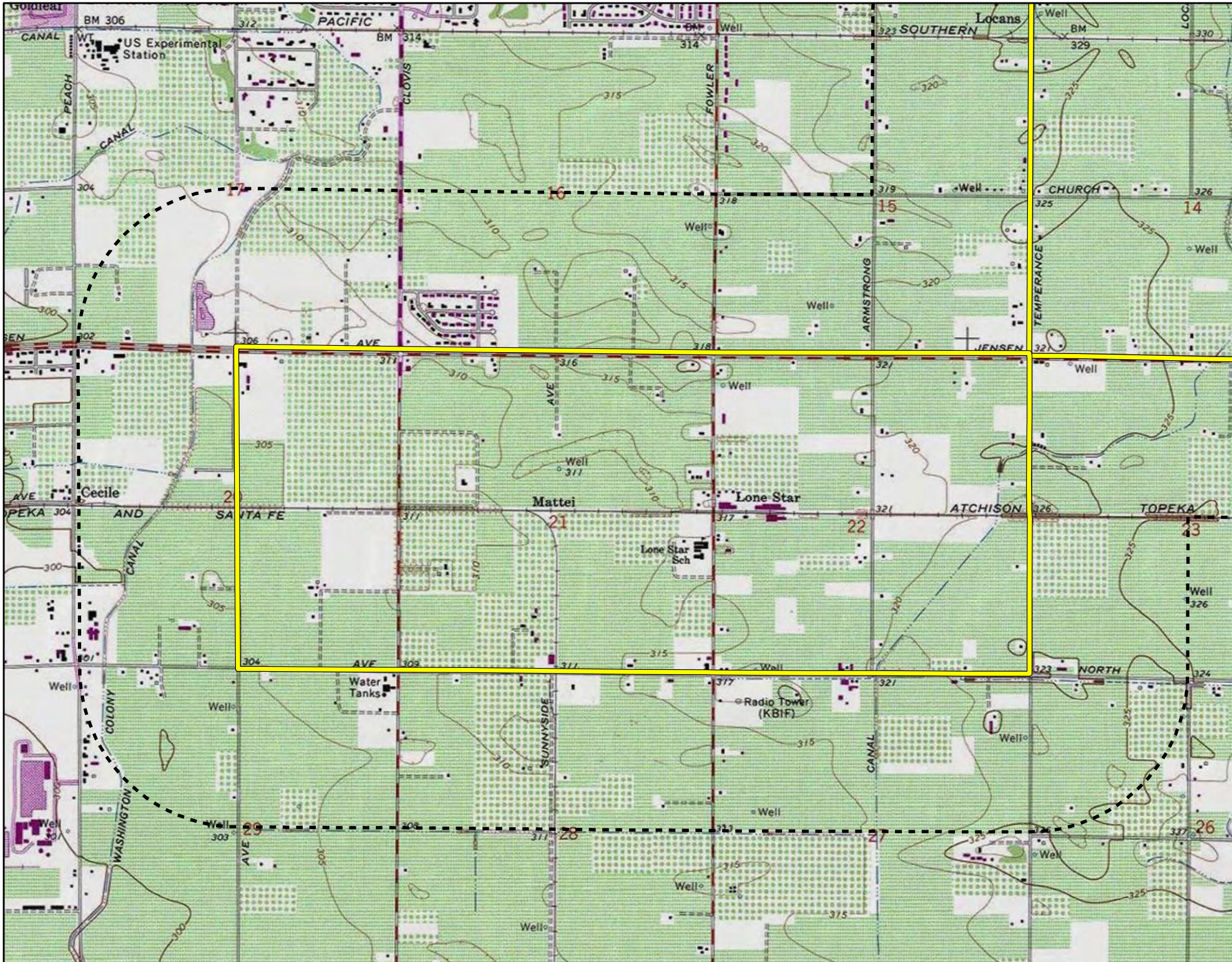
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January 30, 2022

North Valley Yokuts Tribe
Timothy Perez
P.O. Box 717
Linden, CA, 95236

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Timothy Perez:

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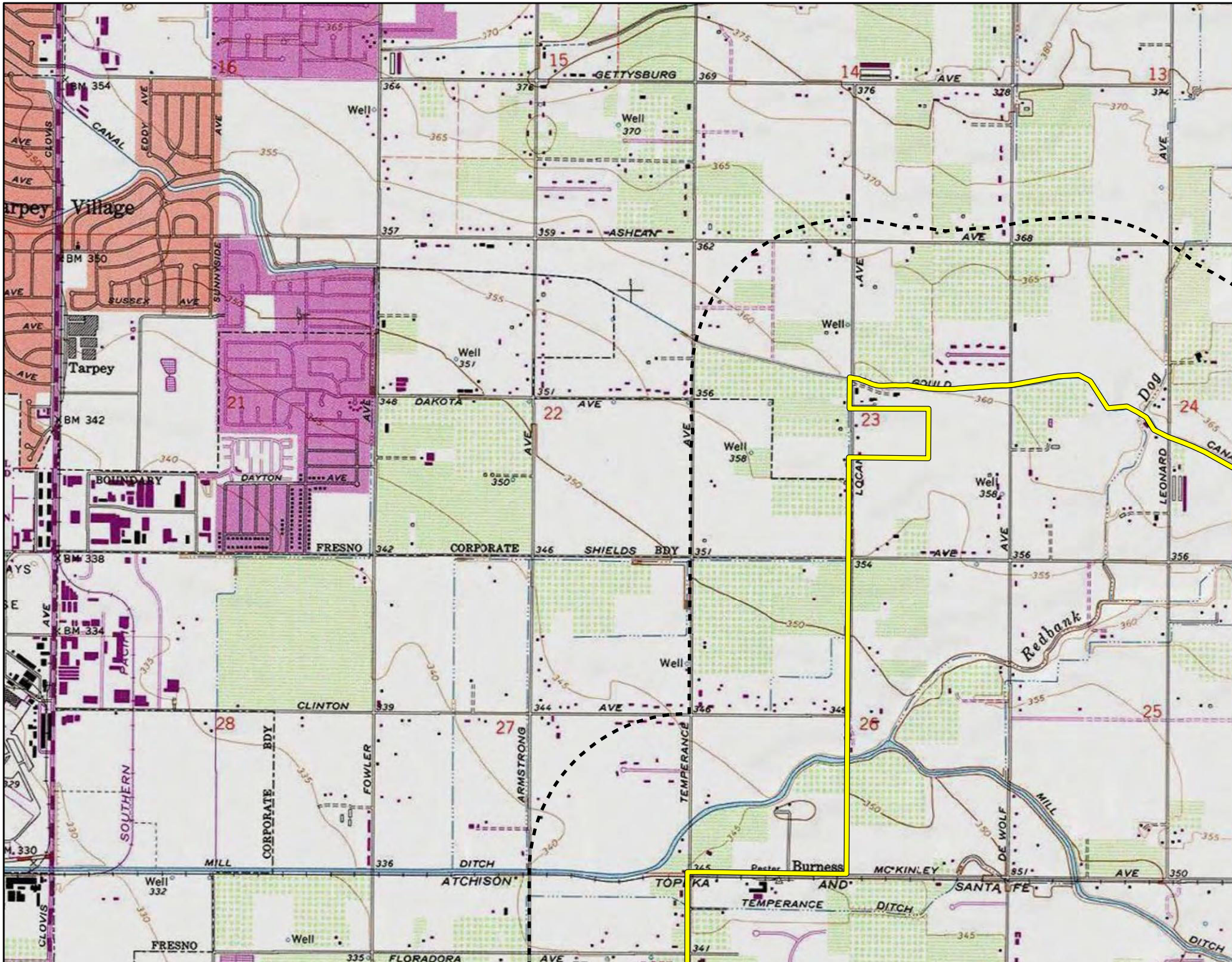
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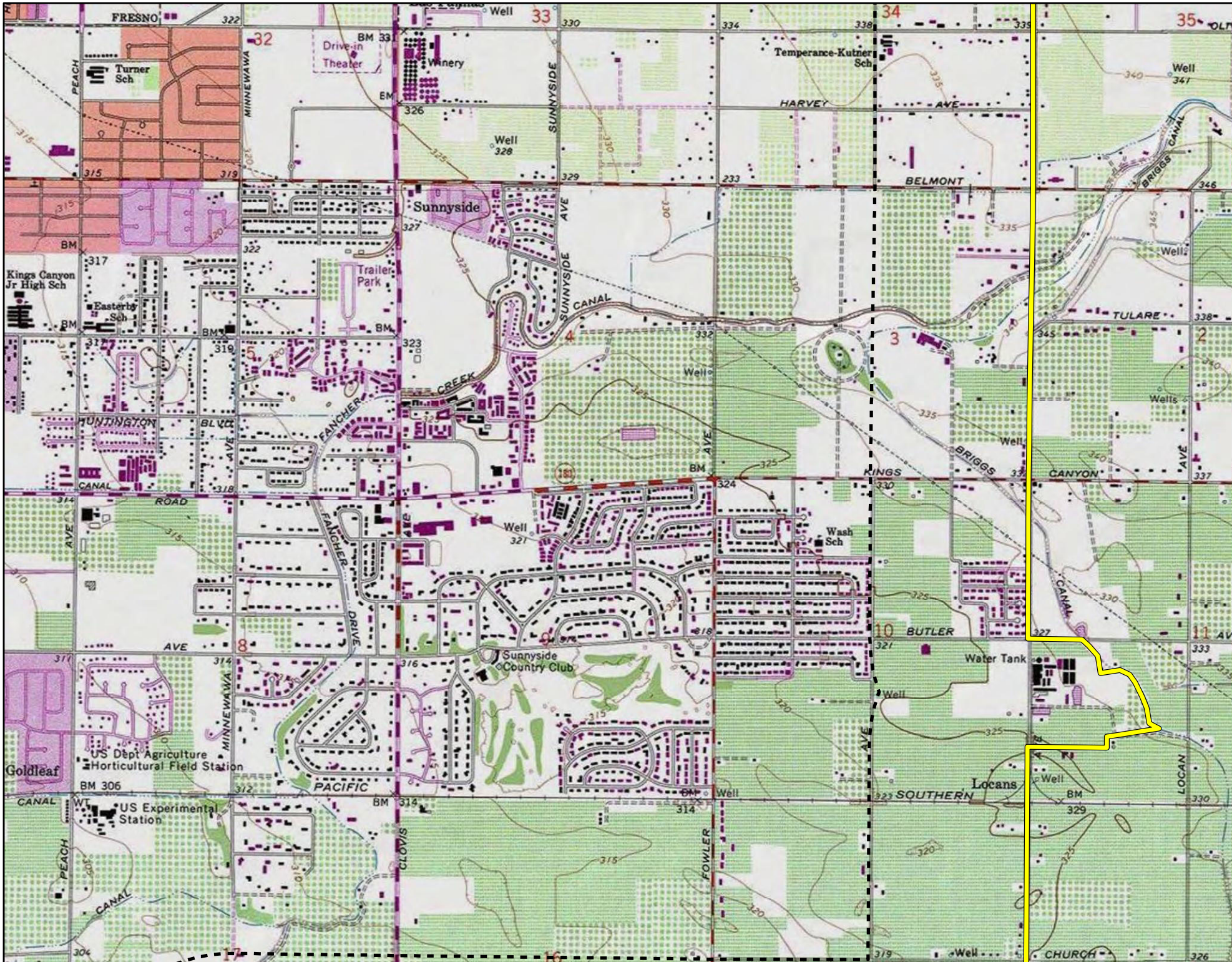


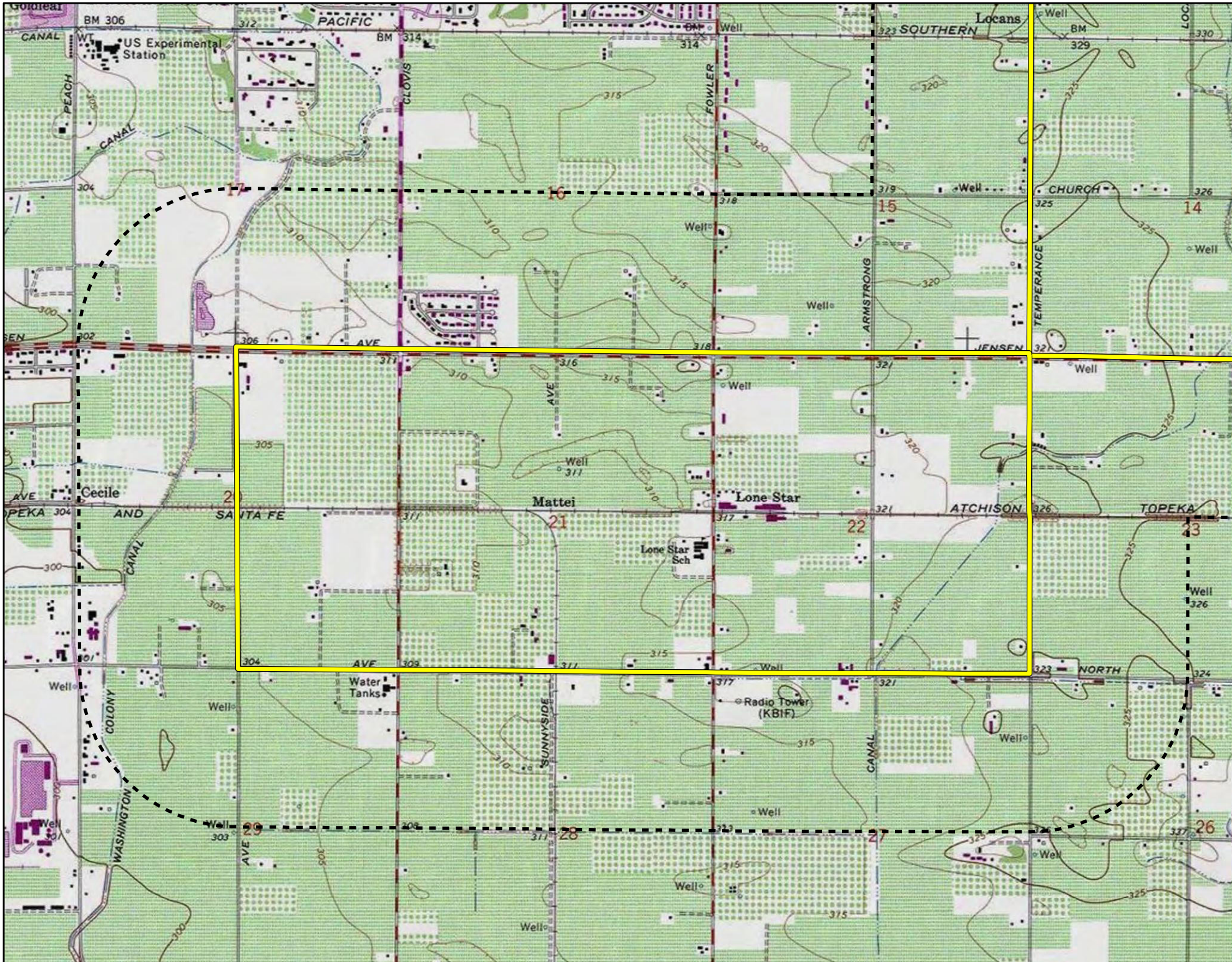
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FRESNO
Turner Sch
PEACH
MINNEWAWA
Drive-in Theater
Winery
SUNNYSIDE
Temperance-Kutner Sch
HARVEY AVE
BELMONT
BRIGGS CANAL
Sunnyside
Trailer Park
Kings Canyon Jr High Sch
Easterby Sch
SUNNYSIDE AVE
CANAL
TULARE
CREEK
FANCHER
HUNTINGTON BLVD
KINGS CANYON
ROAD
Wash Sch
Sunnyside Country Club
DRIVE
BUTLER
Water Tank
Goldleaf
US Dept Agriculture Horticultural Field Station
PACIFIC
SOUTHERN
Locans
US Experimental Station
CLOVIS
FOWLER
LOCAN
CHURCH


Goldleaf
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NORTH
COLONY
Water Tanks
SUNNYSIDE
Radio Tower (KBIF)
CANAL
WASHINGTON
20
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January 30, 2022

Tule River Indian Tribe
Neil Peyron, Chairperson
P.O. Box 589
Porterville, CA, 93258

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Peyron:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

The proposed project is a Specific Plan for the SEDA that would provide for increased density and accelerate housing production throughout the Plan Area. The proposed project would offer flexibility in meeting the evolving needs of households in the region through a multimodal transportation network and diverse housing types and affordability levels. It has the potential to accommodate approximately 45,000 homes and 37,000 jobs within the nearly 9,000-acre planning area by the year 2050. Framed within three interrelated goals: fiscal responsibility, social equity, and environmental sustainability the proposed project would link a series of complete communities and mixed-use centers with a multimodal transportation network. The proposed project would include major transit lines, mixed-use centers, diverse residential districts, employment districts, open space, agriculture, and green infrastructure.

Records Search maps with a 0.5 mile buffer around the site is enclosed for your reference.

As part of the cultural resources assessment, FCS conducted a Sacred Lands File (SLF) search and California Historical Resource Information System (CHRIS). The results of the SLF records search was positive. The CHRIS search showed that there are 11 recorded resources within the project site. However, 12 cultural resources were recorded within a 0.5 mile radius of the project site. The CHRIS search also found 26 recorded reports within the project site and 23 reports recorded within a 0.5 mile radius of the project site. The Native American Heritage Commission (NAHC) suggested you might be able to provide further information. If you have any additional information regarding potential historic or cultural resources in proximity or relation to the proposed project area, we would greatly appreciate your input.

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10 Monument Street
Deposit, NY 13754

56 Broome Corporate Parkway
Conklin, NY 13748

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MALAYSIA

SINGAPORE

Please note that this letter is a request for information pertaining to a cultural resources assessment and is not notification of a project under Senate Bill (SB) 18, Assembly Bill (AB) 52 or Section 106 of the National Historic Preservation Act. Designated lead agencies under the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA) are handling project notification and consultation requirements. Please feel free to contact me at 530.219.1432 or via email at ddepietro@fcs-intl.com and thank you for your valuable assistance.

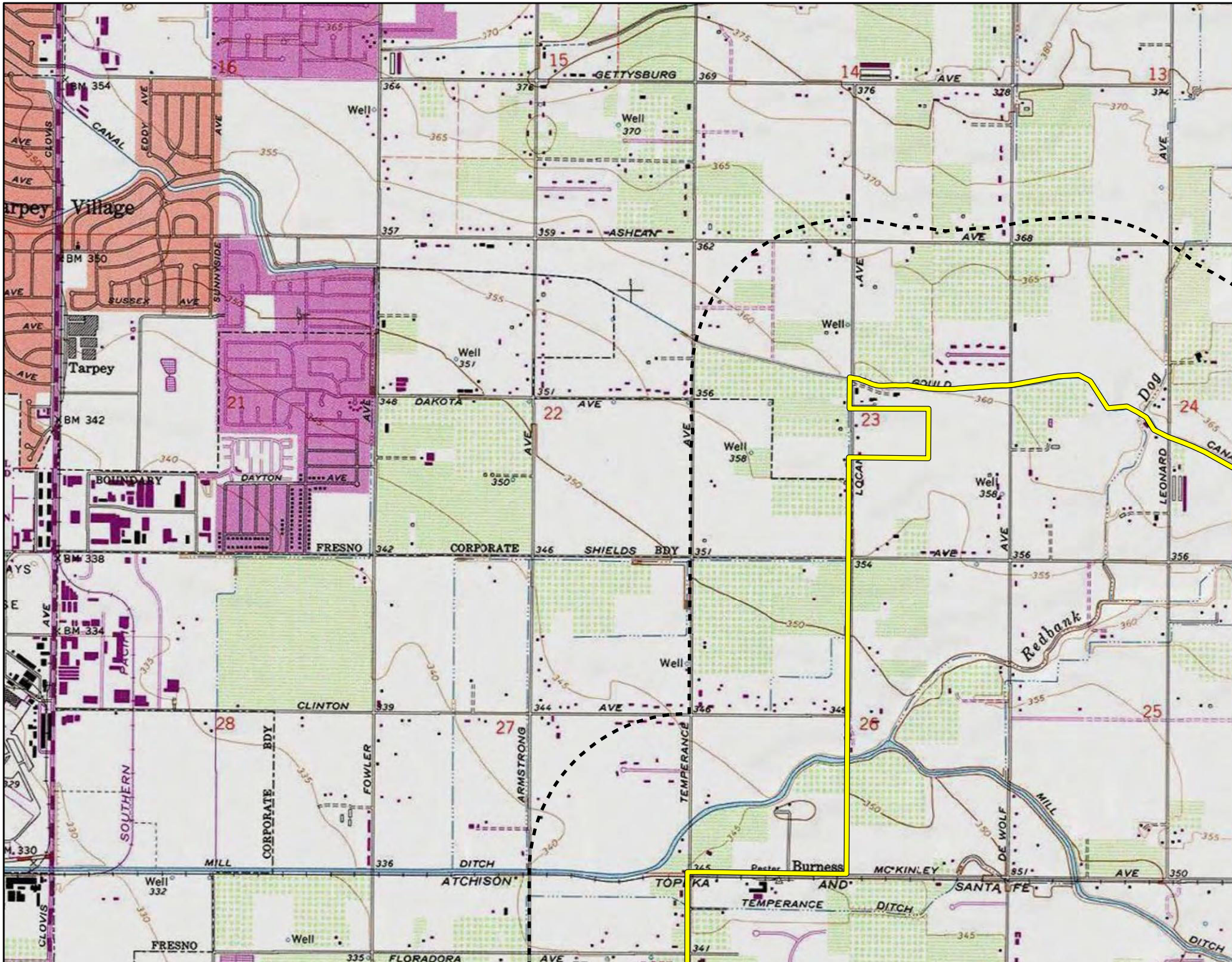
Sincerely,

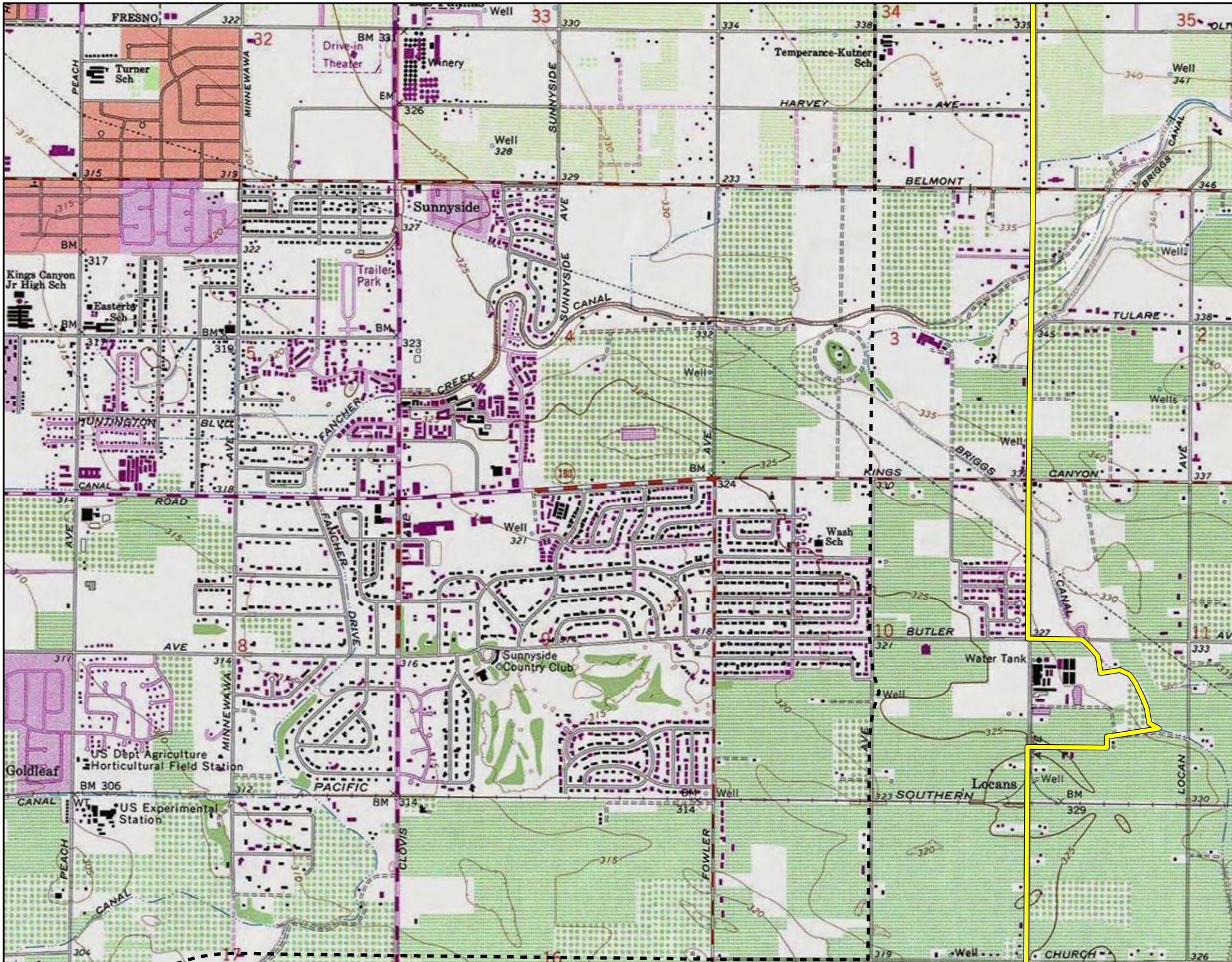


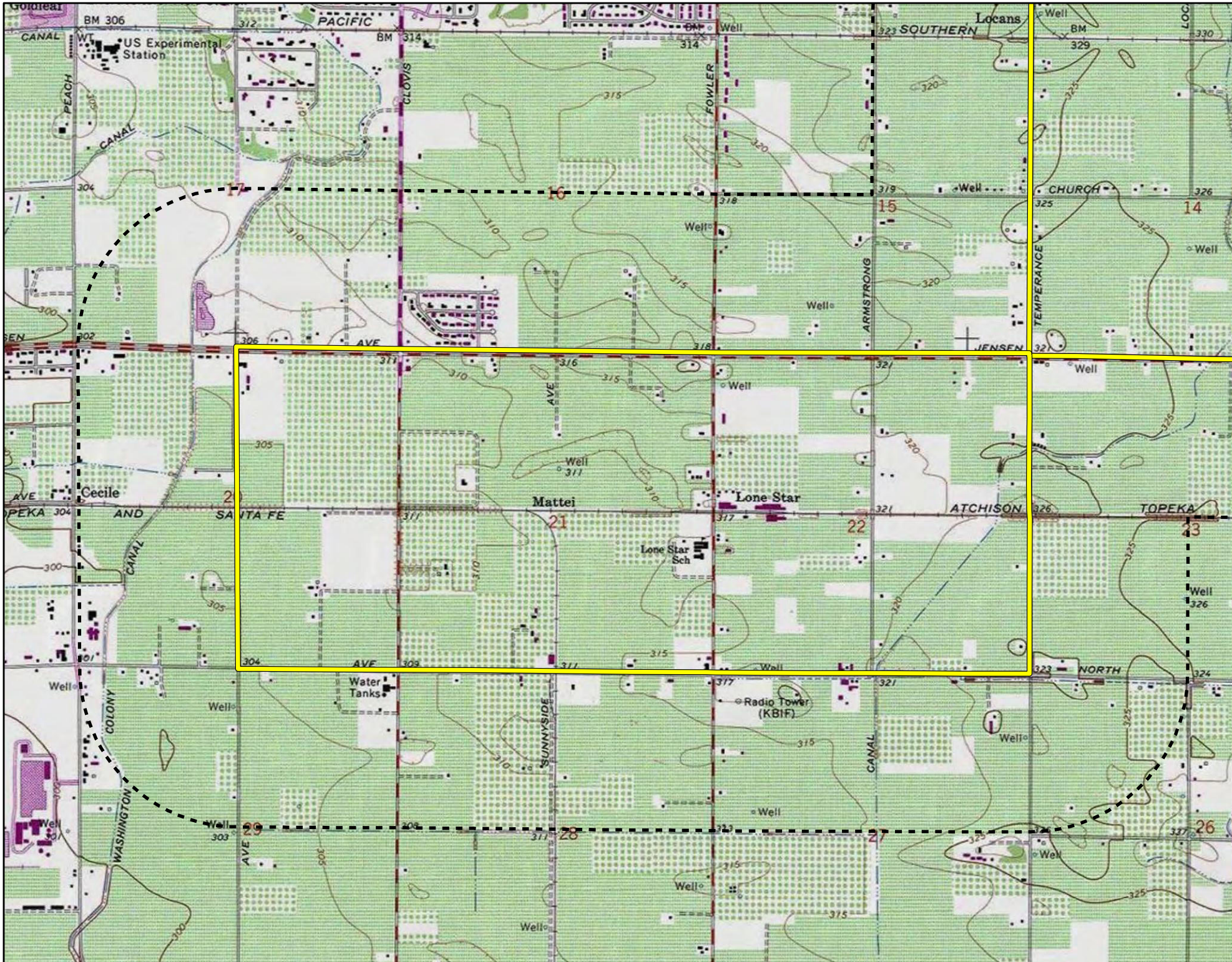
Dana Douglas DePietro, PhD
Director of Cultural Resources
FirstCarbon Solutions
1350 Treat Boulevard, Suite 380
Walnut Creek, CA 94597

Enc: Attachment A: Records Search Map

Attachment A:
Records Search Map


Tarpey Village
Tarpey
GETTYSBURG
ASHLAN
DAKOTA
CORPORATE
SHIELDS BDY
BOUNDARY
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20
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January 30, 2022

Wuksache Indian Tribe/Eshom Valley Band
Kenneth Woodrow, Chairperson
1179 Rock Haven Ct.
Salinas, CA, 93906

Subject: Proposed Fresno Southeast Development Area Specific Plan Project

Dear Chairperson Woodrow:

FirstCarbon Solutions (FCS) is preparing an Initial Study/Mitigated Negative Declaration (ISMND) for the proposed Fresno Southeast Development Area Specific Plan Project on behalf of the City of Fresno. As part of the environmental review process, we are conducting a cultural resources assessment.

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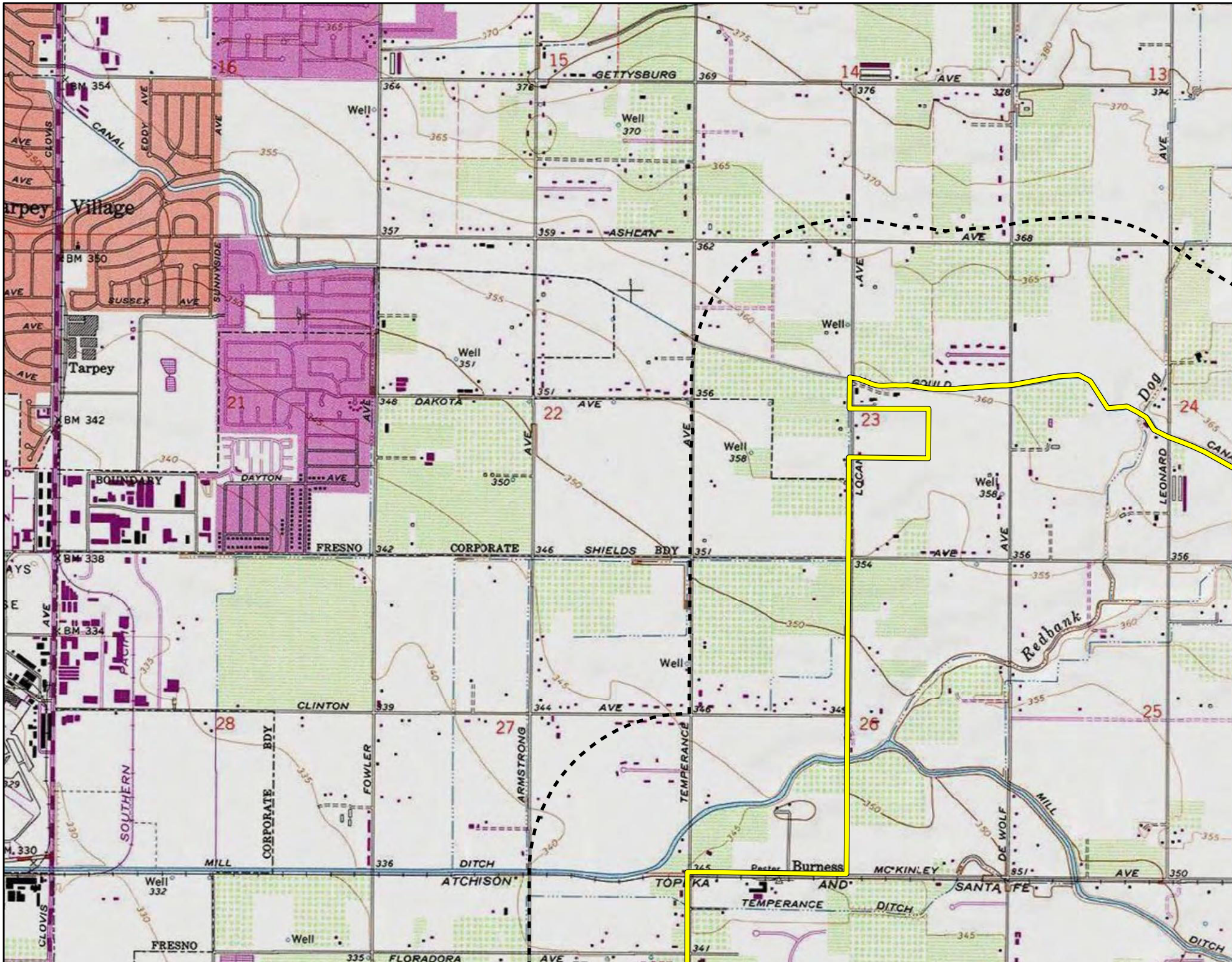
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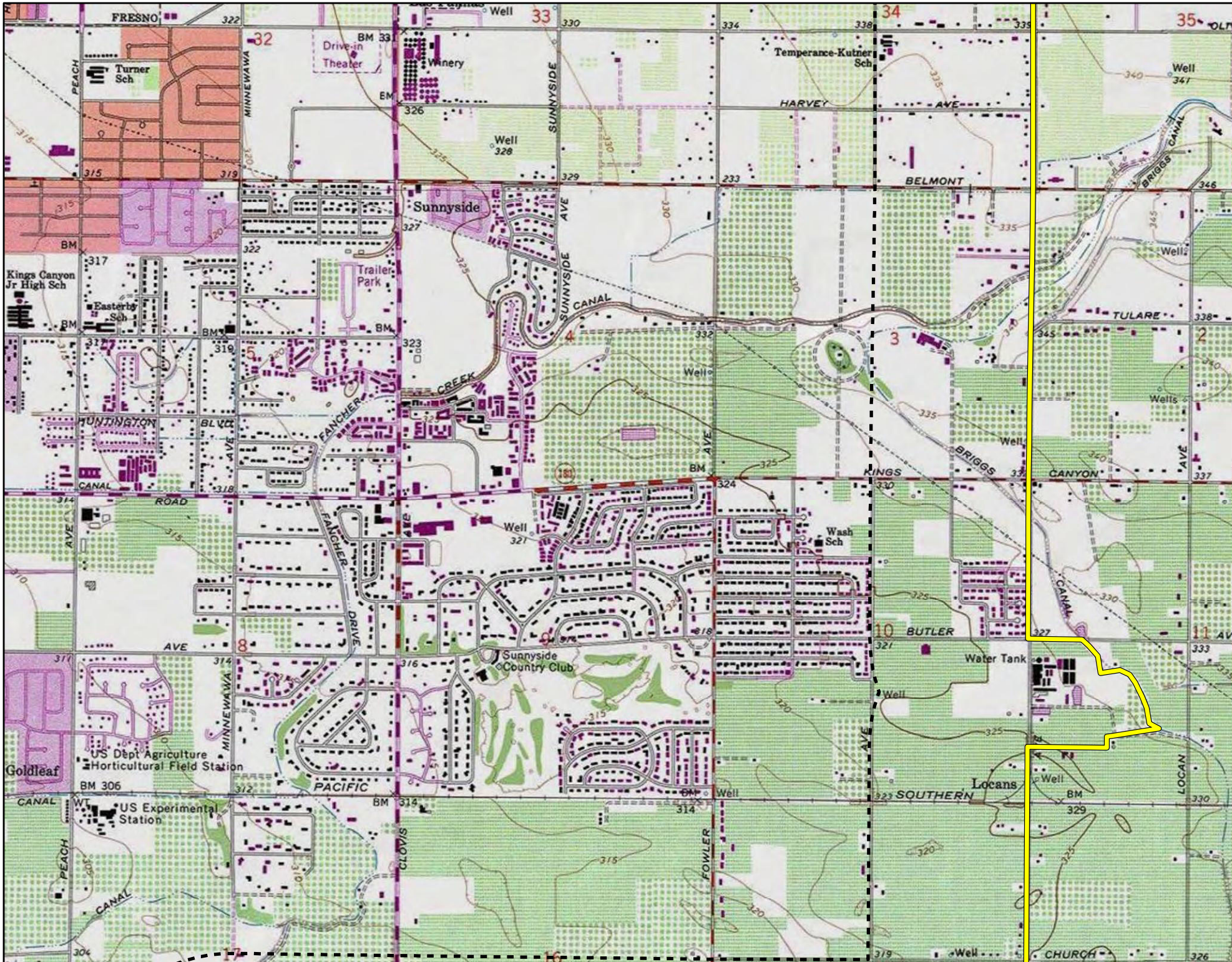


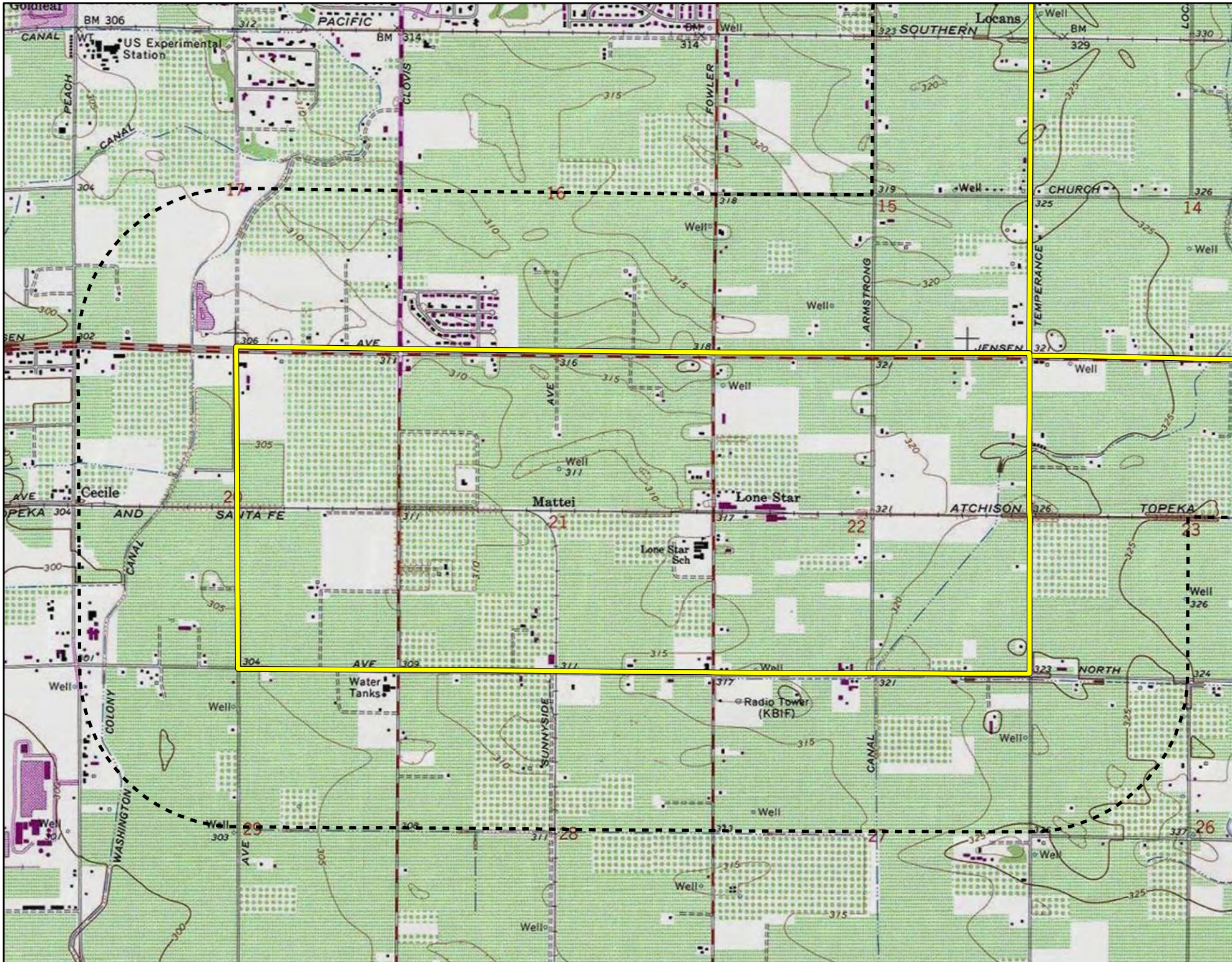
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Appendix E:
Energy Supporting Information

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Appendix E: Energy Consumption Calculations

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Energy Consumption Summary..... 1

Energy Calculations 2

Fresno SEDA Specific Plan Energy Consumption Summay

Summary of Energy Use During Construction

Construction vehicle fuel	294,072,433	gallons (gasoline, diesel)
Construction equipment fuel	861,427	gallons (diesel)
Total construction fuel	294,933,859	gallons (gasoline, diesel)

Summary of Energy Use During Operations		(Annually)
Operation vehicle fuel	57,483,614	gallons (gasoline, diesel)
Operation natural gas	1,200,642,400	kilo-British Thermal Units
Operation electricity	500,083,800	kilowatt hours

Construction Vehicle Fuel Calculations

California Air Resource Board (ARB). 2022. EMFAC2021 Web Database. Website: https://arb.ca.gov/emfac/emissions-inventory/

VMT = Vehicle Miles Traveled
FE = Fuel Economy

Source: EMFAC2017 (v1.0.3) Emissions Inventory
Region Type: Sub-Area
Region: Fresno (SJV)
Calendar Year: 2024
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Units: miles/day for CVMT and EVMT, trips/day for Trips, kWh/day for Energy Consumption, tons/day for Emissions, 1000 gallons/day for Fuel Consumption

CalYr	VehClass	MdlYr	Speed	Fuel	Population	VMT (mi/day)	Fuel Consumption	FE (mi/gallon)	VMT*FE
2024	HHDT	Aggregate	Aggregate	Gasoline	0.91779018	69.44543	0.018035207	3.85054799	267.4029615
2024	HHDT	Aggregate	Aggregate	Diesel	14420.401	2065363.2	343.6885277	6.00940385	12411601.32
2024	LDA	Aggregate	Aggregate	Gasoline	315119.581	12133467	410.3671735	29.5673441	358754405.4
2024	LDA	Aggregate	Aggregate	Diesel	708.812072	21074.605	0.474386501	44.4249678	936238.6519
2024	LDT1	Aggregate	Aggregate	Gasoline	30596.8039	993295.81	40.64748998	24.4368301	24273000.87
2024	LDT1	Aggregate	Aggregate	Diesel	18.8924069	217.86161	0.00859385	25.3508733	5522.981979
2024	LDT2	Aggregate	Aggregate	Gasoline	145366.063	5656654	237.1886608	23.8487538	134904147.8
2024	LDT2	Aggregate	Aggregate	Diesel	375.227507	15817.53	0.461913662	34.2434776	541647.2392
2024	LHDT1	Aggregate	Aggregate	Gasoline	12363.7564	442604.91	46.68025073	9.48163097	4196616.427
2024	LHDT1	Aggregate	Aggregate	Diesel	11041.7401	396666.76	25.1163181	15.7931891	6264633.159
2024	LHDT2	Aggregate	Aggregate	Gasoline	2053.92887	70185.222	8.437278009	8.31846745	583833.4885
2024	LHDT2	Aggregate	Aggregate	Diesel	4082.41606	149342.53	11.38052244	13.1226431	1959768.77
2024	MHDT	Aggregate	Aggregate	Gasoline	939.877494	52454.034	11.171826	4.69520682	246282.5359
2024	MHDT	Aggregate	Aggregate	Diesel	7764.57127	374754.48	43.22629384	8.66959549	3248969.765

Worker	
Sum of VMT*FE (Column BI)	**519414963**
Total VMT	**18820527.18**
Weighted Average FE	**27.59832166**
Vendor	
Sum of VMT*FE (Column BI)	**28911972.87**
Total VMT	**3551440.55**
Weighted Average FE	**8.140914219**
Haul	
Sum of VMT*FE (Column BI)	**12411868.72**
Total VMT	**2065432.606**
Weighted Average FE	**6.00933126**

Fresno SEDA Construction Assumptions

CalEEMod output file: Fresno SEDA EIR Project - Fresno County, Annual

Time stamp: Date: 6/22/2022 9:53 AM

Construction Schedule	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days
1	Demolition	Demolition	1/1/2024	3/28/2025	5	325
2	Site Preparation	Site Preparation	1/1/2024	9/27/2024	5	195
3	Grading	Grading	1/1/2024	12/4/2025	5	504
4	Building Construction	Building Construction	1/1/2024	4/30/2043	5	5044
5	Paving	Paving	1/1/2024	5/14/2025	5	358
6	Architectural Coating	Architectural Coating	1/1/2024	5/14/2025	5	358

Trips and VMT	Phase Name	Trips per Day			Total Trips					Trips per Phase			VMT per Phase			Fuel Consumption (gallons)		
		Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Vendor Ve	Num Days	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trips	Vendor Trips	Hauling Trips	Worker Trips	Vendor Trips	Hauling Trips
	Demolition	15	0	0	10.8	7.3	20	HDT_Mix	325	4,875	0	0	52,650	0	0	1,907.72	0	0
	Site Preparation	18	0	0	10.8	7.3	20	HDT_Mix	195	3,510	0	0	37,908	0	0	1,373.56	0	0
	Grading	20	0	0	10.8	7.3	20	HDT_Mix	504	10,080	0	0	108,864	0	0	3,944.59	0	0
	Building Construction	81,695	28,857	0	10.8	7.3	20	HDT_Mix	5044	412,069,580	145,554,708	0	4,450,351,464	1,062,549,368	0	161,254,424.06	130,519,662	0
	Paving	15	0	0	10.8	7.3	20	HDT_Mix	358	5,370	0	0	57,996	0	0	2,101.43	0	0
	Architectural Coating	16,339	0	0	10.8	7.3	20	HDT_Mix	358	5,849,362	0	0	63,173,110	0	0	2,289,019.98	0	0

Total Construction VMT (miles)

5,576,331,360

Total Fuel Consumption (gallons)

294,072,433

Construction Equipment Fuel Calculation

Source: AQ/GHG Appendix, CalEEMod Output

CalEEMod output file: Fresno SEDA EIR Project - Fresno County, Annual

Time stamp: Date: 6/22/2022 9:53 AM

Construction Schedule	Phase Name	Phase Type	Start Date	End Date	Week	Num Days
1	Demolition	Demolition	1/1/2024	3/28/2025	5	325
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5	Paving	Paving	1/1/2024	5/14/2025	5	358
6	Architectural Coating	Architectural Coating	1/1/2024	5/14/2025	5	358

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor	Number of Days	HP Hours	Diesel Fuel Usage
Demolition	Concrete/Industrial Saws	1	8	81	0.73	325	153,738.00	7,686.90
Demolition	Excavators	3	8	158	0.38	325	468,312.00	23,415.60
Demolition	Rubber Tired Dozers	2	8	247	0.4	325	513,760.00	25,688.00
Site Preparation	Rubber Tired Dozers	3	8	247	0.4	195	462,384.00	23,119.20
Site Preparation	Tractors/Loaders/Backhoes	4	8	97	0.37	195	223,953.60	11,197.68
Grading	Excavators	2	8	158	0.38	504	484,162.56	24,208.13
Grading	Graders	1	8	187	0.41	504	309,133.44	15,456.67
Grading	Rubber Tired Dozers	1	8	247	0.4	504	398,361.60	19,918.08
Grading	Scrapers	2	8	367	0.48	504	1,420,554.24	71,027.71
Grading	Tractors/Loaders/Backhoes	2	8	97	0.37	504	289,416.96	14,470.85
Building Construction	Cranes	1	7	231	0.29	5044	2,365,282.92	118,264.15
Building Construction	Forklifts	3	8	89	0.2	5044	2,154,796.80	107,739.84
Building Construction	Generator Sets	1	8	84	0.74	5044	2,508,280.32	125,414.02
Building Construction	Tractors/Loaders/Backhoes	3	7	97	0.37	5044	3,801,612.36	190,080.62
Building Construction	Welders	1	8	46	0.45	5044	835,286.40	41,764.32
Paving	Pavers	2	8	130	0.42	358	312,748.80	15,637.44
Paving	Paving Equipment	2	8	132	0.36	358	272,194.56	13,609.73
Paving	Rollers	2	8	80	0.38	358	174,131.20	8,706.56
Architectural Coating	Air Compressors	1	6	78	0.48	358	80,421.12	4,021.06

Construction Equipment Fuel Consumption **861,426.54 gallons**

Notes:

Equipment assumptions are provided in the CalEEMod output files.

Fuel usage estimate of 0.05 gallons of diesel fuel per horsepower-hour is from the SCAQMD CEQA Air Quality Handbook, Table A9-3E.

South Coast Air Quality Management District. 1993. Air Quality Handbook, Table A9-3E.

Website: http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook.

Proposed Operation Fuel Calculation

California Air Resource Board (ARB). 2022. EMFAC2017 Web Database. Website: https://arb.ca.gov/emfac/emissions-inventory/

EMFAC2017 (v1.0.2) Emissions Inventory
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							Calculations	
VehClass	MdlYr	Speed	Fuel	Population	VMT	Fuel Consumptio	FE	VMT*FE
HHDT	Aggregate	Aggregate	Gasoline	0.547520258	73.5775311	0.01540365	4.776628119	351.4525037
HHDT	Aggregate	Aggregate	Diesel	22780.13858	3317991.82	441.275833	7.519088005	24948272.51
LDA	Aggregate	Aggregate	Gasoline	363760.0234	13416342.7	362.360818	37.02481624	496737622.7
LDA	Aggregate	Aggregate	Diesel	216.3062587	7696.4367	0.13093681	58.77977935	452394.8509
LDT1	Aggregate	Aggregate	Gasoline	24441.91598	844225.746	26.2251993	32.19139489	27176804.35
LDT1	Aggregate	Aggregate	Diesel	0.284540036	10.1540355	0.00032368	31.37017096	318.5338293
LDT2	Aggregate	Aggregate	Gasoline	206433.5203	7418001.16	239.327545	30.9951835	229922307.3
LDT2	Aggregate	Aggregate	Diesel	784.2897761	28371.2066	0.66885118	42.4178163	1203444.629
LHDT1	Aggregate	Aggregate	Gasoline	7053.009382	240784.45	21.1034534	11.4097179	2747282.649
LHDT1	Aggregate	Aggregate	Diesel	4580.738918	148715.357	8.81688613	16.86710648	2508397.763
LHDT2	Aggregate	Aggregate	Gasoline	783.9246594	25857.9138	2.55851666	10.10660364	261335.6861
LHDT2	Aggregate	Aggregate	Diesel	2308.178293	70768.0209	4.92973066	14.35535242	1015899.88
MCY	Aggregate	Aggregate	Gasoline	15761.46212	83384.6669	1.88567158	44.22014306	3687281.9
MDV	Aggregate	Aggregate	Gasoline	121298.2348	4160498.73	162.368687	25.62377513	106607683.9
MDV	Aggregate	Aggregate	Diesel	1345.471474	45198.6379	1.39298274	32.44737821	1466577.299
MH	Aggregate	Aggregate	Gasoline	891.5037125	9372.88384	2.12198506	4.417035733	41400.36285
MH	Aggregate	Aggregate	Diesel	572.9639183	5280.97511	0.56695188	9.314679516	49190.59067
MHDT	Aggregate	Aggregate	Gasoline	395.6809075	21185.3325	3.82276607	5.541885663	117406.6902
MHDT	Aggregate	Aggregate	Diesel	7521.075076	374812.899	37.1110007	10.09977883	3785527.383
OBUS	Aggregate	Aggregate	Gasoline	99.89947806	3774.40795	0.67794282	5.56744293	21013.80088
OBUS	Aggregate	Aggregate	Diesel	181.4603963	14328.6835	1.90775701	7.510748711	107619.1414
SBUS	Aggregate	Aggregate	Gasoline	51.62781783	2892.94516	0.25044913	11.5510291	33416.49371
SBUS	Aggregate	Aggregate	Diesel	384.7959335	8117.4784	0.88391726	9.183527381	74547.08513
UBUS	Aggregate	Aggregate	Gasoline	19.76618879	244.455468	0.02421446	10.09543472	2467.884224
UBUS	Aggregate	Aggregate	Diesel	1.474041067	19.1001764	0.00124365	15.35811837	293.3427694

	Vehicles
Sum of VMT*FE	**902,968,858**
Total VMT	**30,247,950**
Weighted Average FE	**29.85223349 miles/gallon**

Total VMT

Source: AQ/GHG Appendix, CalEEMod Output

Fresno SEDA EIR Project - Fresno County, Annual

Date: 6/22/2022 9:53 AM

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
City Park	580.32	1,458.24	1629.36	1,826,580	1,826,580
Condo/Townhouse	123,751.92	137,614.84	106169.68	360,995,596	360,995,596
Government Office Building	179,511.89	0.00	0.00	219,886,731	219,886,731
Office Park	48,966.15	7,254.24	3361.72	91,458,957	91,458,957
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	169,215.13	206,733.82	94581.17	287,389,365	287,389,365
Research & Development	32,631.03	5,506.12	3216.74	61,538,401	61,538,401
Single Family Housing	239,379.52	241,915.32	216810.90	692,918,651	692,918,651
Total	794,035.96	600,482.59	425,769.57	1,716,014,281	1,716,014,281

	Annual VMT (miles)	Fuel Consumption	
Total VMT	1,716,014,281	**57,483,614**	**gallons per year**

Operation Natural Gas Use

Source: AQ/GHG Appendix, CalEEMod Output
Fresno SEDA EIR Project - Fresno County, Annual
Date: 6/22/2022 9:53 AM

Land Use	Natural Gas Use	
City Park	-	kBTU/yr
Condo/Townhouse	281,092,000	kBTU/yr
Government Office Building	102,669,000	kBTU/yr
Office Park	99,790,100	kBTU/yr
Parking Lot	-	kBTU/yr
Regional Shopping Center	47,559,500	kBTU/yr
Research & Development	59,987,800	kBTU/yr
Single Family Housing	609,544,000	
Total	**1,200,642,400**	**kBTU/yr**

kBTU/yr = kilo-British Thermal Units/year

Operation Electricity Use

Source: AQ/GHG Appendix, CalEEMod Output

Fresno SEDA EIR Project - Fresno County, Annual

Date: 6/22/2022 9:53 AM

Project Electricity Use

Land Use	Electricity Use	
City Park	0	kWh/yr
Condo/Townhouse	83,610,800	kWh/yr
Government Office Building	70,247,200	kWh/yr
Office Park	49,850,800	kWh/yr
Parking Lot	33,718,000	kWh/yr
Regional Shopping Center	35,501,600	kWh/yr
Research & Development	24,951,400	kWh/yr
Single Family Housing	202,204,000	kWh/yr
Total	**500,083,800**	**kWh/yr**

kWh/yr = kilowatt-hours per year

Appendix F:
Hydrology and Water Quality Supporting Information

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Southeast Development Area (SEDA)
Specific Plan
Water Technical Study

April 26th, 2023

Prepared for:

City of FRESNO

City of Fresno, California

Prepared by:

Blair, Church & Flynn
CONSULTING ENGINEERS

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Date signed: 04/26/2023

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Appendix D – City of Fresno 2020 Urban Water Management Plan

CHAPTER 1
INTRODUCTION

1.1 Project Description and Background

The City of Fresno (City) is preparing a Specific Plan and Program Environmental Impact Report (PEIR) for the Southeast Development Area (SEDA). The SEDA Specific Plan Area (Plan Area), previously known as the Southeast Growth Area (SEGA), is an approximately 9,000-acre area in the southeast portion of the City of Fresno that is formally designated as a growth area in the City of Fresno General Plan (General Plan). The Plan Area is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jenson and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west; see Figure 1.1 for the Plan Area's location.

SEDA was approved for incorporation into the City by the Local Agency Formation Commission (LAFCo) in 2006, with a number of qualifying provisions, of which included the preparation of a Specific Plan and associated environmental documents before the land could be annexed to the City. Located in Growth Area II, SEDA was planned for development after other infill initiatives from the City's other planning efforts, and would be developed in phases. The General Plan established two levels of development – the General Plan Horizon and the General Plan Buildout. The General Plan Horizon is the level of development predicted to occur by the "Horizon Year," which was established as 2035, in accordance with the General Plan. General Plan Buildout is the level of development characterized by full occupancy of all developable sites in accordance with the General Plan; this was estimated to occur beyond 2035 (defined as past 2050).

As such, the General Plan defined development of SEDA under General Plan Horizon as a portion of the full buildout conditions – specifically, it assumed a residential development capacity of approximately 15,000 dwelling units, one third of the buildout capacity. Accordingly, the residential development capacity of SEDA under General Plan Buildout is approximately 45,000 dwelling units, and the General Plan assumed that the additional 30,000 dwelling units would not be developed until after 2035. However, though the General Plan was analyzed under the General Plan Horizon level, the associated MEIR (Master Environmental Impact Report) analyzed the environmental impacts of the General Plan under the buildout level of the Sphere of Influence (SOI), which encompasses other growth areas, including SEDA.

The Specific Plan for SEDA was developed for the buildout condition of the Plan Area of 45,000 dwelling units, and provides implementation mechanisms for development in the Plan Area that accommodate for increased density and accelerate housing production. As part of the City's General Plan, SEDA was designated with land use classifications as defined in the General Plan. The Specific Plan presents alternative land use classifications for SEDA, and seeks to propose how the Plan Area will develop over time to complete buildout conditions with these newly-defined land use categories.

As part of the Specific Plan process, a PEIR needs to be developed to evaluate the impacts associated with the proposed improvements to the Plan Area, and what, if any, mitigation measures are necessary to account for such impacts. This technical report will focus on the impacts of the SEDA Specific Plan on the water supply and distribution system proposed for the Plan Area.

1.2 Summary of Analysis

The City's General Plan assigned land use classifications to areas located within the SEDA Specific Plan Area. Each land use classification has a set of characteristics assigned to it with respect to a specific utility demand that have been determined and/or calculated by various contributing parties. The SEDA Specific Plan proposes new land use classifications for the Plan Area that may change the area's characteristics as it relates to utilities, e.g., water demand, wastewater generation, or storm water runoff, when compared to the General Plan. Additionally, some land uses have revised areas, which further alters those characteristics.

Changes in land use can affect a water distribution system's ability to supply, store, and distribute water to the City's residents. New development will require the construction of new water distribution facilities which may include water mains, valves, storage tanks, and booster pump stations, as well as potential new sources of water supply, such as new domestic water wells or surface water treatment plants. The City of Fresno's Metropolitan Water Resources Management Plan (Metro Plan)[1] and the Fresno General Plan Master Environmental Impact Report (MEIR)[2] include a number of proposed water facilities improvements to account for increased development and water demand based on the General Plan buildout conditions. The City of Fresno is currently developing an update to the Metro Plan, which includes an updated analysis of water demand factors for General Plan land uses developed by Akel Engineering Group, Inc,[3] which have been utilized in this analysis.

This technical study will focus on the analysis of water demand in the Plan Area, and how it may change based on Specific Plan development. The analysis to determine the change in water demands involved comparing the total demand determined for the Plan Area under both the General Plan and Specific Plan land use cases.

At the time of preparation of this study, the City was developing water demand factors for the new SEDA land use classifications. These factors were not available when completing the above stated analysis. Thus, a number of reasonable assumptions were made to correlate Specific Plan land uses with General Plan land uses in order to use the water demand factors prepared for the Metro Plan update.

This technical study focuses on specifically analyzing the change in water demand between the General Plan and the Specific Plan for SEDA in order to assist with the development of mitigation measures as needed.

[1] City of Fresno, "Metropolitan Water Resources Management Plan Update," Phase 1 – 2007, Phase 2 – 2011, Phase 3 – 2011, Phase 4 – 2014.
[2] City of Fresno, "Master Environmental Impact Report General Plan and Development Code Update," 2014.
[3] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update."

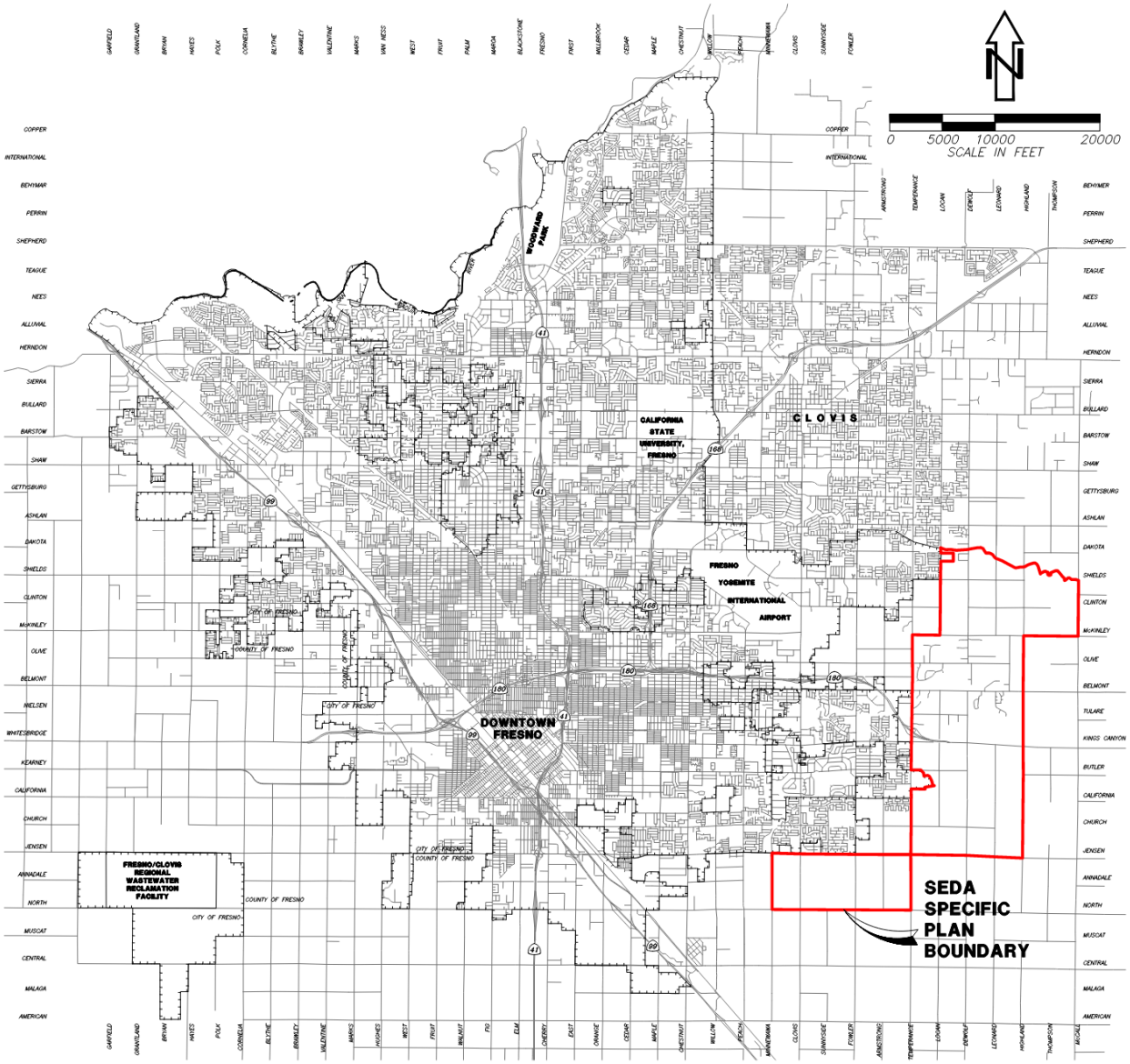


Figure 1.1 SEDA Specific Plan Location

CHAPTER 2
REGULATORY FRAMEWORK

2.1 General

The City of Fresno owns and operates the potable water distribution system that serves Fresno and other participating agencies, as well as the water supply sources and treatment facilities; specifically, the City Water Division manages the system. The City delivers potable water to urban residential, commercial, and industrial customers in over 115 square miles of the City, including many County islands and areas within the City's Sphere of Influence (SOI). Fresno's main sources of water include groundwater, treated surface water, and reclaimed water; groundwater is obtained through approximately 202 municipal supply wells located throughout Fresno; surface water is collected and treated at the Northeast Surface Water Treatment Facility (NESWTF), and the Southeast Surface Water Treatment Facility (SESWTF); reclaimed water is collected and treated at the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and the North Fresno Wastewater Reclamation Facility (NFWRF), and is mainly utilized for landscape irrigation.

There are a number of federal, state, and local regulations that must be adhered to when planning potable water facilities, many of which provide guidance and requirements for the handling and distribution of potable water, as well as regulations to safeguard water quality; several are discussed in the following sections.

2.2 Federal Regulations

Clean Water Act[4]

The Federal Water Pollution Control Act of 1972, commonly referred to as the Clean Water Act (CWA), regulates the discharge of pollutants into watersheds throughout the United States and quality standards for surface waters. It is the primary federal law regulating and governing water pollution, with the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA establishes the basic structure for regulating discharges of pollutants in waters of the United States and regulating quality standards for surface waters. Under the CWA, the Environmental Protection Agency (EPA) is tasked with developing national water quality criteria used as the basis for state water quality standards, and developing national water quality criteria recommendations for pollutants in surface waters. Water quality standards establish the designated use of a body of water (e.g., recreation, water supply, industrial, etc.), and a statement identifying the maximum concentrations of various pollutants that would not interfere with the designated use. Each state must set specific water quality standards, which serve as backup to federally set technology-based requirements. The City is responsible for monitoring water quality and conforming to the requirements of the CWA for all water sources.

Federal Safe Drinking Water Act[5]

The Federal Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designed for drinking, whether from above- or below-ground sources. The SDWA authorizes the EPA to establish national health-based minimum standards for drinking water to protect the public from naturally-occurring and man-made contaminants that may be found in drinking water. These standards, known as the National Primary Drinking Water Regulations, set enforceable maximum

[4] Clean Water Act, 33 U.S.C. §1251 et seq. (1972).
[5] Federal Safe Drinking Water Act, 42 U.S.C. §300f et seq. (1974).

contaminant levels for specific contaminants in drinking water, as well as required methods of treatment to remove said contaminants. The SDWA applies to all public water systems in the United States, except for private wells serving less than 25 people. In California, the Division of Drinking Water (DDW) within the State Water Resources Control Board (SWRCB) regulates public drinking water systems. If the water system does not meet the aforementioned standards, it is the responsibility of the water supplier to notify its customers.

2.3 State Regulations

California Porter-Cologne Water Quality Control Act[6]

The Porter-Cologne Water Quality Control Act is the principal law governing water quality in California, for both above- and below-ground supplies. This act designated the SWRCB as the statewide water quality planning agency, and gave authority to nine Regional Water Quality Control Boards (RWQCB) to oversee water quality on a day-to-day basis at both the local and regional levels. RWQCBs develop Regional Water Quality Plans (Basin Plans), regulate all pollutant or nuisance discharges that may affect either surface water or groundwater, and implement said water quality plans. The Central Valley RWQCB oversees the Fresno area.

California Urban Water Management Planning Act[7]

The Urban Water Management Planning Act updated the California Water Code (§10610-10656 and 10608) to include a requirement that all urban water suppliers within California prepare and adopt an Urban Water Management Plan (UWMP) and update it every five years. This applies to suppliers that provide either 3,000 acre-feet of water annually, or who serve more than 3,000 customers. UWMPs support suppliers' long-term resource planning to ensure that adequate water supplies are available to meet existing and future water demands. The Act is intended to encourage and support water conservation efforts, and ensure efficient use of available water supplies. UWMPs must assess the reliability of water sources over a 20-year planning time period, describe demand management measures and water shortage contingency plans, planning for single and multiple dry water years, and discuss the use and planned use of recycled water.

Senate Bills 610 and 221[8]

Senate Bill (SB) 610 and SB 221 amended state law in 2002 to ensure better coordination between local water supply and land use decisions, and to confirm that there is an adequate water supply for new developments. These two companion measures require authorities to demonstrate that adequate and reliable 20-year water supplies are available for any new development, as well as existing water users.

SB 610 requires the preparation of UWMPs and Water Supply Assessments (WSAs) for projects (as defined by Water Code §10912) which are subject to California Environmental Quality Act (CEQA) provisions. Projects required to prepare a WSA include:

- Residential developments of more than 500 dwelling units;
- Shopping centers or business establishments employing more than 1,000 persons or having more than 500,000 square feet of floor area;
- Hotels or motels, or both, having more than 500 rooms;

[6] California Porter-Cologne Water Quality Act, California Water Code Div. 7 §13000 et seq. (1969).
[7] California Urban Water Management Plan Act, California Water Code §10610-10656, 10608.
[8] SB 610 Water Supply Planning, Chapter 643, Statutes of 2001, Costa; SB 221 Land Use: Water Supplies, Chapter 642, Statutes of 2001, Kuehl.

- Industrial, manufacturing or processing plants, or industrial parks planned to employ more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area;
- Mixed-use projects that include one or more of the projects specified above;
- Projects that would demand an amount of water equivalent to, or greater than, the amount of water required for 500 dwelling units.

SB 221 establishes consultation and analysis requirements for water supply planning for residential subdivisions including more than 500 dwelling units. Written verification by the water supplier that sufficient water is available for the proposed plan is required before construction can begin.

California Groundwater Management Act of 1992[9]

The Groundwater Management Act was signed into law in 1992, and made groundwater management part of the California Water Code (Division 6, Part 2.75, Chapters 1-5, §10750-10755.4). First introduced as Assembly Bill (AB) 3030, the Act established specific procedures on how Groundwater Management Plans (GWMPs) are to be developed and adopted by local agencies. The intent of the Act is to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdictions and to provide a methodology for developing a GWMP. The Act has since been modified by Senate Bill (SB) 1938 in 2002 and AB 359 in 2011.

- AB 3030 provided a systematic procedure for existing local agencies to develop GWMPs.
- SB 1938 modified the Act by requiring any public agency seeking State funds administered through the California Department of Water Resources (DWR) for the construction of groundwater projects to prepare and implement a GWMP.
- AB359 further modified the Act by requiring public agencies to prepare and implement GWMPs with an additional required component that focused on identifying groundwater recharge areas. It also included several plan adoption procedural changes, requires GWMPs to be submitted to DWR, and requires DWR to provide public access to this information.

Sustainable Groundwater Management Act of 2014 (SGMA)[10]

The Sustainable Groundwater Management Act (SGMA) includes a three-bill legislative package composed of AB 1739, SB 1168, and SB 1319. SGMA requires local agencies to form Groundwater Sustainability Agencies (GSAs) for high and medium priority basins, and develop and implement Groundwater Sustainability Plans (GSPs) to avoid and mitigate overdraft of groundwater within 20 years. SGMA places the authority of groundwater management with local agencies; it establishes a definition of sustainable groundwater management, establishes a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources, prioritizes basins with the greatest problems, and sets a 20-year timeline for implementation.

State Updated Model Water Efficient Landscape Ordinance (AB 1881) (2015)[11]

The Model Water Efficient Landscape Ordinance (MWELO) is a state regulation designed to prevent water from being wasted on irrigated landscapes. Created in 1993, the MWELO was updated in 2015 by Executive Order EO B-29-15. Land use authorities (Cities and Counties) must ensure MWELO compliance on development projects with landscaped areas of 500 square feet or more. This applies to residential, commercial, industrial and institutional projects that require a

[9] California Groundwater Management Act, California Water Code Division 6, Part 2.75, Chapters 1-5, §10750-10755.4.
[10] Sustainable Groundwater Management Act (SGMA), California Water Code Div. 6, Part 2.74 §10720-10737.8 (2014).
[11] Model Water Efficient Landscape Ordinance (MWELO), Title 23 CCR, Div. 2, Chap. 2.7 §490 et seq.

permit, plan check, or design review. The California DWR provides technical assistance in helping Land Use Authorities adhere to the ordinance. The Fresno Municipal Code includes local ordinances that are required to reduce water consumption and conserve water.

State Mandated Water Reductions[12]

On January 18, 2022, as a result of drought conditions in California, the California SWRCB adopted Emergency Regulation Requirements for water conservation. The Governor previously urged Californians to reduce water usage in 2021 by 15%, however actual reduction was only about 6%. Thus, the SWRCB has enacted emergency regulations that will remain in effect for one year unless the SWRCB acts to end, modify, or readopt it. These regulations were readopted in December 2022 for another year. The regulations prohibit certain wasteful water use practices statewide, and encourage Californians to monitor their water usage more closely. Emergency Regulation Requirements prohibit using potable water for:

- Outdoor watering that lets water run onto sidewalks and other areas (except incidental runoff)
- Washing vehicles without an automatic shutoff nozzle
- Washing hard surfaces, like driveways and sidewalks, that don't absorb water
- Street cleaning or construction site preparation
- Filling decorative fountains, lakes, or ponds
- Outdoor watering within 48 hours after it rains at least 1/4 inch of rainfall
- Watering ornamental turf on public medians

An additional emergency water conservation regulation was enacted in June 2022 that prohibits the use of potable water to water decorative grass in commercial, industrial, and institutional areas including common areas of homeowners' associations.[13] The regulation also requires urban water suppliers to implement all demand-reduction actions under "Level 2" of their Water Shortage Contingency Plans, which are actions meant to address a 10% to 20% water shortage. Additionally, urban water suppliers are required to fast-track their submissions of supply and demand assessments to plan for potential extended dry conditions. "Level 2" actions vary for each water supplier, but often include things like increasing communication about the importance of water conservation, limiting outdoor irrigation to certain days or hours, increasing patrolling to identify water waste, and enforcing water-use prohibitions.

CALGreen Building Code[14]

The California Building Standards Commission adopted the nation's first green building standards in 2008. The standards code (Part 11, Title 24 CCR, known as "CALGreen") was adopted to apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure, unless otherwise indicated in the CCR, throughout California. CALGreen established planning and design standards for sustainable site development including water conservation. CALGreen provisions became effective on January 1, 2011. The purpose of the CALGreen provisions is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of concepts having reduced negative impact or positive environmental impact and encouraging sustainable construction practices.

[12] State Water Resources Control Board Resolution No. 2022-0002, "To Adopt an Emergency Regulation to Supplement Voluntary Water Conservation," 2022.
[13] State Water Resources Control Board Resolution No. 2022-0018, "To Adopt an Emergency Regulation to Reduce Water Demand and Improve Water Conservation." 2022.
[14] California Green Building Standards Code (CALGreen), Title 24 CCR Part 11.

California Plumbing Code[15]

The California Plumbing Code (Part 5, Title 24 CCR) serves to prevent disorder in the industry and to consolidate plumbing codes utilized by local jurisdictions to reduce confusion and conflicts among varying practices. The Plumbing Code covers water fixtures, potable and non-potable water systems, and recycled water systems, among other topics. Potable water supply and distribution facilities shall comply with all applicable provisions of the current edition of the California Plumbing Code.

2.4 Local Regulations

Fresno General Plan

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of potable water service and facilities (Table 2.1):

Table 2.1 City of Fresno General Plan Objectives and Policies Relevant to Potable Water Supply

Objective/Policy Number	Objective/Policy Text
Objective PU-3	Enhance the level of fire protection to meet the increasing demand for services from an increasing population.
Policy PU-3-f	**Adequate Infrastructure.** Continue to pursue the provision of adequate water supplies, hydrants, and appropriate property access to allow for adequate fire suppression throughout the City.
Objective PU-8	Manage and Develop the City's water facilities on a strategic timeline basis that recognizes the long life cycle of the assets and the duration of the resources, to ensure a safe, economical, and reliable water supply for existing customers and planned urban development and economic diversification.
Policy PU-8-a	**Forecast Need.** Use available and innovative tools, such as computerized flow modeling to determine system capacity, as necessary to forecast demand on water production and distribution systems by urban development, and to determine appropriate facility needs.
Policy PU-8-b	**Potable Water Supply and Cost Recovery.** Prepare for provision of increased potable water capacity (including surface water treatment capacity) in a timely manner to facilitate planned urban development consistent with the General Plan. Accommodate increase in water demand from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law, and recognizing the differences in terms of quantity, quality and reliability of the various types of water in the City's portfolio.
Policy PU-8-c	**Conditions of Approval.** Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.
Policy PU-8-d	**CIP Update.** Continue to evaluate Capital Improvement Programs and update them, as appropriate, to meet the demands of both existing and planned development consistent with the General Plan.
Policy PU-8-f	**Water Quality.** Continue to evaluate and implement measures determined to be appropriate and consistent with water system policies, including prioritizing

[15] California Plumbing Code, Title 24 CCR Part 5.

Objective/Policy Number	Objective/Policy Text
	the use of groundwater, installing wellhead treatment facilities, and enhancing transmission grid mains to promote adequate water quality and quantity.
Policy PU-8-g	**Review Project Impact on Supply.** Mitigate the effects of development and capital improvement projects on the long-range water budget to ensure an adequate water supply for current and future users.
Objective RC-6	Ensure that Fresno has a reliable, long-range source of drinkable water.
Policy RC-6-a	**Regional Efforts.** Support cooperative, multi-agency regional water resource planning efforts and activities on developing and implementing the Upper Kings Basin Integrated Regional Water Management Plan.
Policy RC-6-b	**Water Plans.** Adopt and Implement ordinances, standards, and policies to achieve the intent of the City of Fresno Urban Water Management Plan, Fresno-Area Regional Groundwater Management Plan, and City of Fresno Metropolitan Water Resources Management Plan to ensure a dependable supply of water.
Policy RC-6-c	**Land Use and Development Compliance.** Ensure that land use and development projects adhere to the objective of the Fresno Metropolitan Water Resources Management Plan to provide sustainable and reliable water supplies to meet the demand of existing and future customers through 2025.
Objective RC-7	Promote water conservation through standards, incentives and capital investments.

Fresno Municipal Code – Model Water Efficient Landscape Ordinance (MWELO)

As stated, MWELO requires local agencies to implement water efficiency measures as part of its review of landscaping plans. Local agencies can either adopt the MWELO or incorporate provisions of the ordinance into its own code requirements for landscaping. Section 11 of Chapter 11, "Building Permits and Regulations," and Section 23 of Chapter 15, "Citywide Development Code," of the City Municipal Code include requirements for landscape design and incorporates the requirements of the California MWELO, among other state codes and regulations. For new landscaping projects of 2,500 square feet of more that require a discretionary or ministerial approval, the applicant is required to submit a detailed "Landscape Documentation Package" that discusses water efficiency, soil management, and landscape design elements.

City of Fresno Metropolitan Water Resources Management Plan

The City of Fresno Metropolitan Water Resources Management Plan (Metro Plan) was prepared to document the existing conditions of the City's water system, and facilitate future water resources decisions and facilities improvements. Phase 1 consists of a baseline system characterization[16], Phase 2 consists of the development and evaluation of future water supplies[17], Phase 3 consists of implementation of the management plan[18], and Phase 4 included the preparation of an Environmental Impact Report (EIR) for the City. [19] Chapters 4, 5, 6 and 8 of Phase 2 discuss objectives, goals and policies related to potable water, including water conservation (Chapter 4), groundwater (Chapter 5), surface water (Chapter 6), and future water supplies (Chapter 8). It should be noted that this plan was prepared in 2011, and a number of the

[16] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 1 Baseline System Characterization," December 2007.
[17] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 2 Alternative Development and Evaluation of Future Water Supply Plan," January 2011.
[18] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 3 Implementation Plan," January 2011.
[19] City of Fresno, "Metropolitan Water Resources Management Plan Update, Final Environmental Impact Report," May 2014.

stated objectives/goals/policies have already been completed. At the time of preparation of this study, an update to the Metro Plan is being developed by the City.

Urban Water Management Plan[20]

The City's Urban Water Management Plan (UWMP) was prepared as a requirement of the Urban Water Management Planning Act (UWMPA).[21] The UWMP outlines a water supplier's long-term water resource planning to ensure sufficient water supplies for existing and future demands; it essentially sets the roadmap for how the City will utilize water over the coming years. UWMPs are updated and submitted to the Department of Water Resources (DWR) every five (5) years. The UWMPA applies to urban water suppliers with 3,000 or more connections being served, or supplying more than 3,000 acre-feet of water annually. The most recent version of the City's UWMP was prepared for 2020.

City of Fresno Standard Specifications and Plans

The City maintains its own set of standard Specifications and Plans to be followed when designing and constructing City projects. Those related to the water distribution system include, but are not limited to:

- Standard Specifications
  - Section 21 – Domestic Water Facilities Design Criteria
  - Section 22 – Water Facilities
  - Section 25 – Landscape Irrigation Systems
- Standard Plans
  - Plans W-1 through W-45

[20] City of Fresno, "2020 Urban Water Management Plan," July 2021.
[21] Division 6, Part 2.6, California Water Code, §10610-10656.

CHAPTER 3
EXISTING CONDITIONS

3.1 Water Infrastructure

3.1.1 General

The City of Fresno Water Division manages and operates the City's water system. The City provides potable water to over 550,000 customers including residential, commercial, and industrial users, in an approximately 115 square mile (73,500 acre) area that includes many County islands (unincorporated areas within the City), and areas within the City's Sphere of Influence (SOI). Fresno's domestic water supplies include groundwater, surface water, and reclaimed water.

The City's water system consists of approximately 1,860 miles of distribution and transmission pipes, 202 active groundwater wells, three (3) surface water treatment facilities (SWTFs), five (5) water storage facilities with pump stations, and three (3) booster pump facilities. The Service Area declines in elevation generally from the northeast to the southwest; to assist with pressure regulation, the area is divided into five (5) pressure zones: Highway 41, Shepherd, Sierra, Southwest, and Booster Pump 4 (BP04). The zones are separated by a series of closed/partially closed valves to prevent and/or impede flow from one zone to another.

3.1.2 Water Sources

The City is located within the Kings River Subbasin of the San Joaquin Valley Groundwater Basin. Historically, the City has relied heavily on groundwater pumped from the underground basin and aquifers. The City has a network of over 270 municipal water wells and operates approximately 202 active municipal supply wells that access groundwater from said basin.[22] The production capacity from the active wells is approximately 403 MGD (million gallons per day), and the total capacity including inactive wells is approximately 487 MGD. The wells are located around the City, and most are directly connected into the water distribution system. The City's water system depended completely upon groundwater as a water source until 2004 when the first surface water treatment facility (SWTF) was commissioned. Today, groundwater is still heavily relied upon as a primary water source for the City.

Groundwater quality generally meets primary and secondary drinking water standards for municipal water use, however the groundwater basin has been impacted by several chemical contaminant plumes and nitrates that require monitoring and wellhead treatment. Treatment efforts and removal of specific wells from service are conducted as required to maintain drinking water supply quality and standards.

In 2004, the City commissioned the Northeast Surface Water Treatment Facility (NESWTF). The facility, located at Chestnut and Behymer Avenues, is designed for a 30-MGD capacity, and is planned to be expanded to a total of 60 MGD as development in Fresno continues. The NESWTF has reduced the City's dependance on groundwater and allowed an increased degree of groundwater recharge to occur. The City also constructed a water storage and modular surface water treatment facility (T-3 SWTF) in 2015 in southeast Fresno, which has a design capacity of 8 MGD.

[22] City of Fresno, "2020 Urban Water Management Plan," July 2021.

Most recently, the City completed construction of the Southeast Surface Water Treatment Facility (SESWTF) in 2018, which is a 54-MGD facility with an ultimate capacity of 80 MGD. This included a 72-inch raw water transmission main to convey surface water from FID's Fresno Canal to the SESWTF. T-3 was shut down after the SESWTF was activated, however the City has indicated that there are future plans to reactivate the site. With the SESWTF and NESWTF combined, the City provided greater than 50% of its potable water supply through the use of surface water in 2019 and 2020.[23] Moving forward, the City expects to provide half or more of its potable water demand with surface water supplies. According to the 2020 Urban Water Management Plan, groundwater pumping has decreased steadily since Fresno began utilizing surface water; groundwater production decreased from 160,000 acre-feet in 2004 to 55,000 acre-feet in 2020.[23]

A portion of the surface water that is treated at the SWTFs is supplied via agreements that the City maintains with the United States Bureau of Reclamation (USBR) and the FID. In the 1960s, the City contracted with the USBR to receive 60,000 acre-feet of surface water per year to utilize for "intentional recharge" of the groundwater basin. This was completed by constructing recharge basins to store the surface water which was allowed to percolate through the soil to the aquifer. The surface water is conveyed to these basins through FID (Fresno Irrigation District) canals. Historically, the amount of water supplied varies year to year, averaging around 60,000 acre-feet; however, there have been extremely dry years in which no water was supplied. Additionally, the City signed an agreement with FID in 1976 for the delivery of surface water supplies from the Kings River based on the City's pro rata share of FID's water entitlements. The most recent agreement with FID made in 2016 placed a maximum percentage of FID's Kings River water at 29%. The average FID delivery between 1964 and 2019 was 452,541 acre-feet, which equates to an average City supply of 131,237 acre-feet, assuming the maximum 29% City supply percentage. The water supplied from both the USBR and FID agreements is used for groundwater recharge and potable use after treatment at one of the SWTFs.

Fresno is located within the North Kings Groundwater Sustainability Agency (GSA), which is working to reach groundwater sustainability in accordance with SGMA. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040; the Kings River Subbasin was identified as a critically overdrafted basin. As a result, the City has placed a higher priority on developing its surface water supply and decreasing its reliability on groundwater to allow the basin to recharge. This is being accomplished via intentional groundwater recharge in dedicated recharge basins around Fresno. The City also contracts with FID and FMFCD to utilize some of their facilities as additional recharge basins.

With the completion of various portions of the City's recycled water distribution system, and the upgrades at the Fresno-Clovis RWRF to allow disinfected tertiary-treatment of collected wastewater, the City has been using recycled water for beneficial uses in an effort to reduce reliance on potable water for non-potable uses. Disinfected tertiary treated wastewater can be used for a number of non-potable uses, including but not limited to landscaping irrigation, industrial processes, golf course irrigation, and agricultural irrigation. Additionally, the City discharges undisinfected secondary-treated wastewater into nearby percolation ponds at the Fresno-Clovis RWRF to allow the effluent to percolate through the soil into the aquifer. The City then extracts this water for delivery through FID facilities for agricultural users. The City also owns and operates the NFWRF, which produces recycled water used for irrigation at the Copper River Ranch Golf Course. Flows received at the Fresno-Clovis RWRF have averaged approximately 63,000 acre-feet over the last 5 years, and the City projects that recycled water deliveries will increase to 5,800 acre-feet per year of non-potable demand. These supplies will continue to help reduce potable water demand, and lend themselves to water conservation efforts.

[23] City of Fresno, "2020 Urban Water Management Plan," July 2021.

3.1.3 Water Distribution

The City's water distribution system consists of approximately 1,800 miles of distribution pipeline ranging in size from ¾-inch to 66 inches, 140,000+ service connections, 12,000+ fire hydrants, 18,000+ main line valves, and several booster pumps and storage tanks.

Generally, the Transmission Grid Mains (TGMs) convey water directly from municipal supply wells to customers, and Regional Transmission Mains (RTMs) convey water from surface water treatment plants to TGMs. TGM pipes range in size from 10 to 16 inches in diameter, and RTM pipes are 18 inches and larger. There is also a network of smaller distribution mains that serve individual customers via TGMs. Fire hydrants are located at regular intervals and served from the same distribution mains as all other customers. Main line valves are located at regular intervals and are used to shut down and isolate sections of the distribution system for emergency repairs, regular maintenance, or replacement projects. These valves are also used to regulate flows between the pressure zones as mentioned in Section 3.1.1. Booster pump stations help maintain the pressure within the system. There are a number of other miscellaneous appurtenances associated with the distribution system designed to assist regular operation, including air release/vacuum breaker assemblies, blow-off valves, backflow preventers, and access manways. Figure 3.1 shows the main infrastructure of the existing City water distribution system.

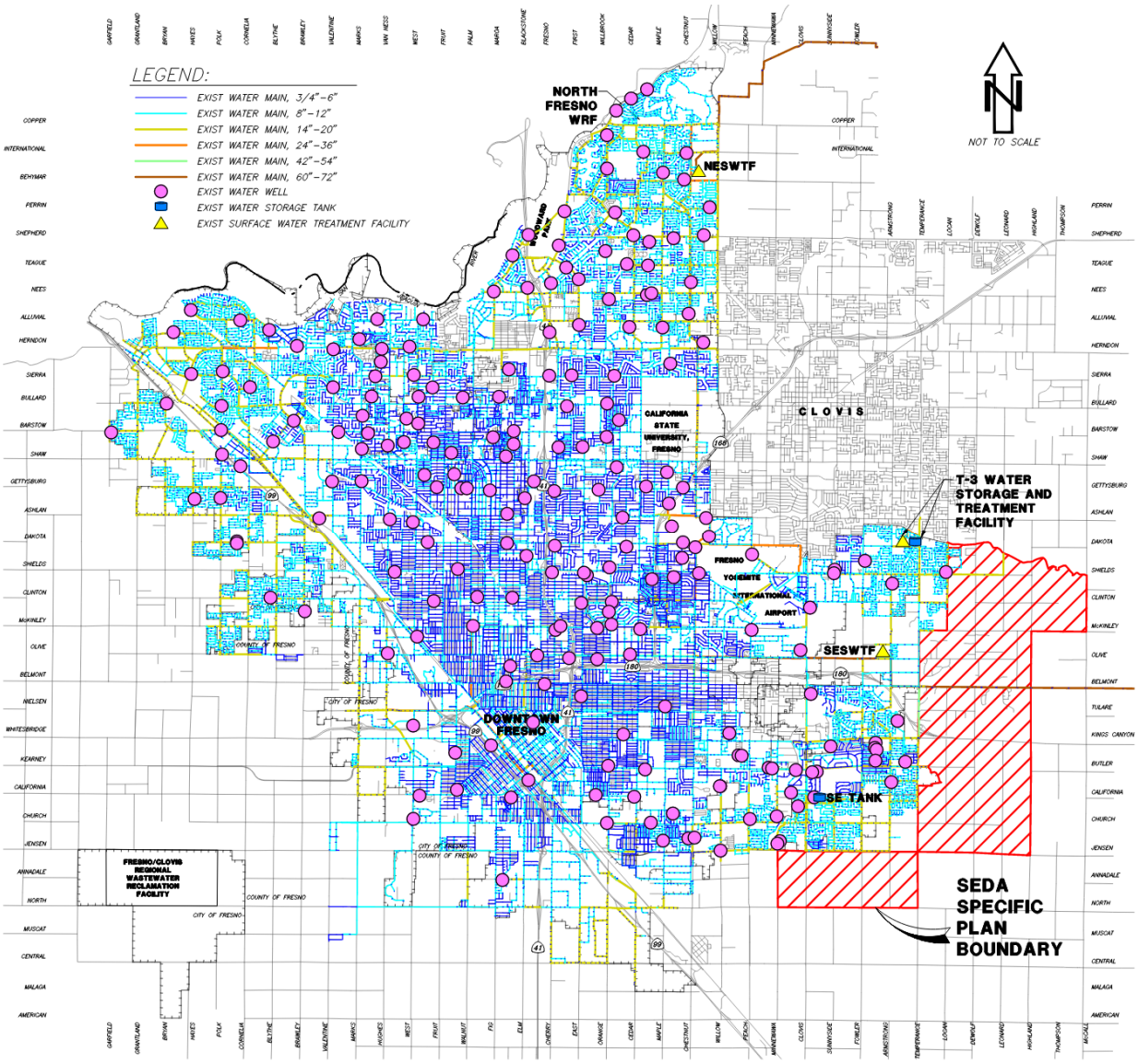


Figure 3.1 Existing City Water Distribution System

CHAPTER 4
FUTURE WATER INFRASTRUCTURE

4.1 General

Future water supply and distribution facilities are included in the City's Metro Plan. The City's General Plan includes developmental policies for water supply and distribution facilities for the City of Fresno, including growth areas such as SEDA.

4.2 General Plan Policies

The General Plan discusses aspects of the water supply and distribution system as they pertain to development in Fresno. As mentioned, the City owns, operates, and maintains the water supply and distribution system that serves Fresno and other participating agencies. See Table 2.1 for a summary of objectives and policies related to water facilities and infrastructure.

4.3 Buildout Improvements

The City Metro Plan analyzed the City's water supplies, treatment, storage, and distribution facilities for the existing conditions at the time the plan was drafted, and future needs based on General Planning policies and goals. The current version of the Metro Plan was completed in four (4) phases – Phase 1, "Baseline System Characterization," covered the existing conditions and analyzed the "Future without Project" alternative, or the impacts of development without additional planning; Phase 2, "Alternative Development and Evaluation of Future Water Supply Plan," analyzed different alternatives for development and infrastructure improvements to meet water resource challenges resulting from future development identified in Phase 1; Phase 3, "Implementation Plan," described the recommended alternative from Phase 2 and the funding and implementation plan for the alternative; and Phase 4, "Project/Programmatic Environmental Impact Report (EIR)," included the preparation of an EIR to evaluate potential impacts from the infrastructure improvements and future development included in the chosen alternative. The Phases were each developed and finalized at different times, with Phase 1 being approved in 2007, Phase 2 and 3 approved in 2011, and Phase 4 approved in 2014.

The Metro Plan and the Urban Water Management Plan (2020) include several objectives, goals, and policies to improve and develop water infrastructure as development progresses in the City. The critical focal points of the water system development are the implementation of further water conservation measures, installation of new municipal groundwater wells, increased groundwater recharge efforts to bring the City's groundwater pumpage into balance with its recharge rate, maximize use of available surface water, increased use of recycled water for landscape irrigation and other non-potable uses, and the acquisition of future water supplies when available.

At the time of preparation of this study, an update to the Metro Plan is being developed by the City. This update is revising the proposed improvements to the City's future water infrastructure, including that for the SEDA Specific Plan Area. There are a number of general improvements for the Plan Area included in the previous Metro Plan that will remain, including new municipal groundwater wells, water storage facilities, expansions to surface water treatment facilities, water booster pumps, and new water distribution mains, including Regional Transmission Mains (RTMs) and Transmission Grid Mains (TGMs). Improvements may include:

- New municipal groundwater wells
    - Municipal wells with wellhead treatment as needed

- Expansion of the NESWTF
- Water storage tanks and booster pump stations
- Extension of 48-inch diameter RTM
- Transmission Grid Mains of various sizes
- Recharge inter-ties to FMFCD basins.

CHAPTER 5
SPECIFIC PLAN WATER DEMAND ANALYSIS

5.1 General

The SEDA Specific Plan revised the General Plan buildout land use classifications in the Plan Area to new SEDA-specific land use classifications – see Figure 5.1 for the General Plan Land Use Map of the Plan Area, and Figure 5.2 for the SEDA Specific Plan Land Use Map for the chosen alternative for the Plan Area. With changes in land use classifications, the Plan Area will need to be evaluated for impacts to the proposed water supply and distribution system due to changes in water demand.

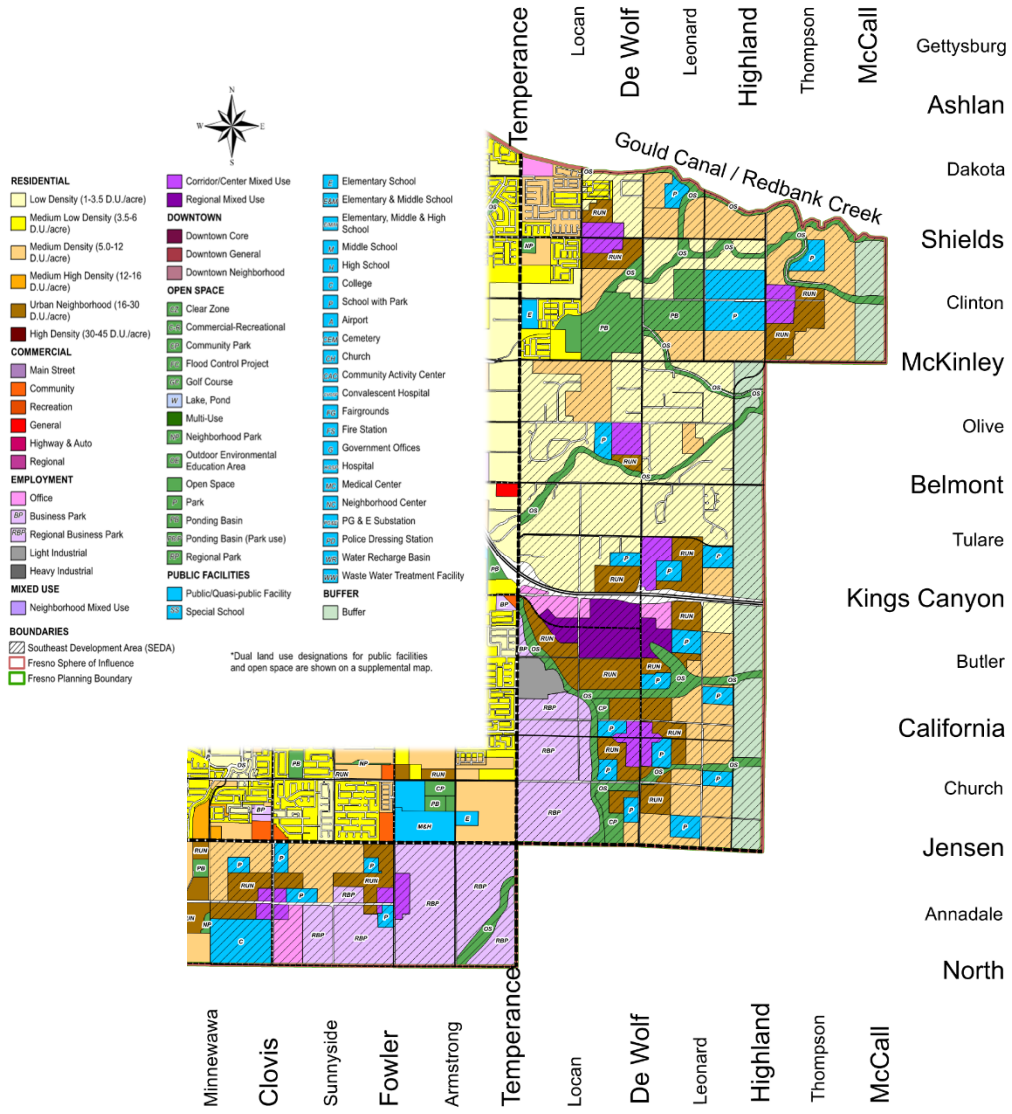
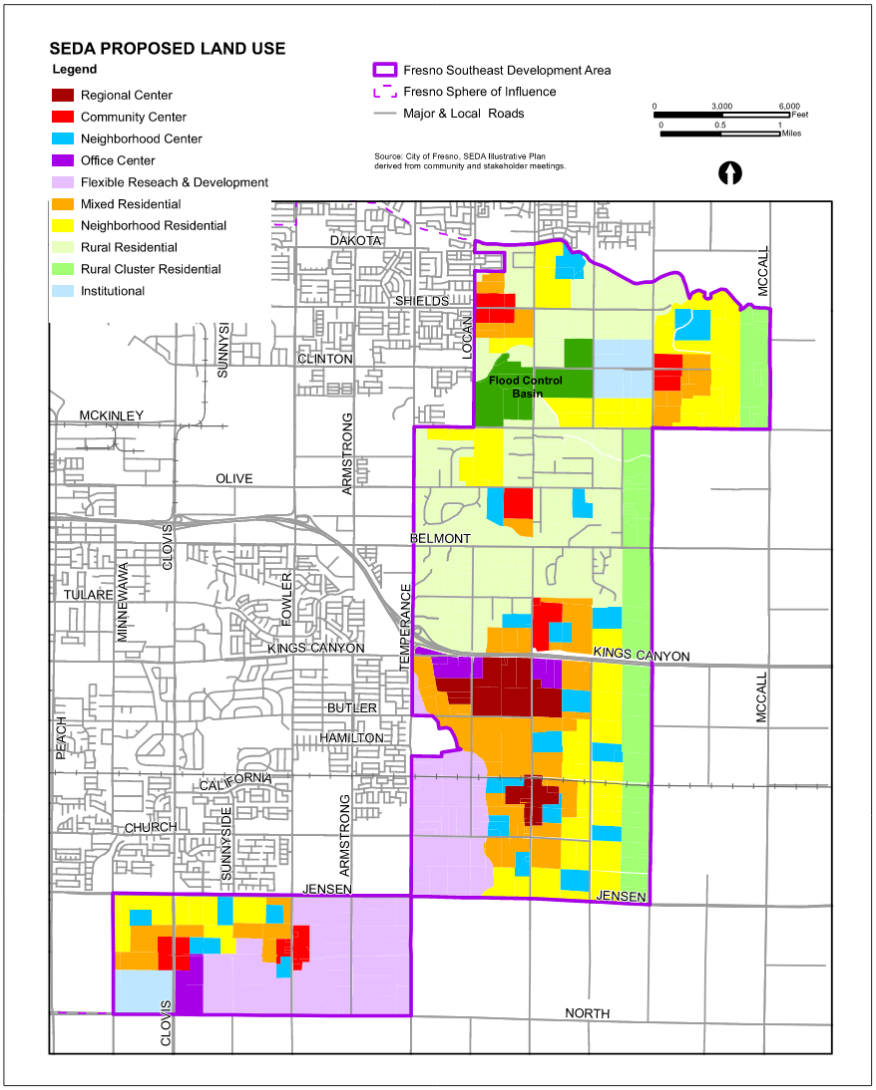


Figure 5.1 General Plan Land Use Map for SEDA Plan Area
Source: City of Fresno General Plan, Figure LU-1, December 2014, Figure Updated 3/2/2021



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

Figure 5.2 SEDA Proposed Land Use
Source: Southeast Development Area Specific Plan Notice of Preparation,
First Carbon Solutions, 02/2022

5.2 Analysis Methodology

The technical analysis of the land use changes in the Plan Area was focused on comparing the change in water demand from the General Plan Land Use case to the Specific Plan Land Use case to determine potential impacts to the water supply and distribution system, and to assist in the development of mitigation measures if necessary. General Plan land use classifications and Specific Plan land use classifications were provided by the City of Fresno Planning and Development Department in the form of GIS (Geographic Information System) and Shape files. GIS and Shape files were also obtained from the City of Fresno Department of Public Utilities for the existing water facilities in Fresno.

The SEDA Specific Plan does not use the same land use classifications as defined in the General Plan, and instead utilizes SEDA-specific land use classifications developed as part of the Specific Plan. At the time of preparation of this technical study, the City was developing water demand

factors for the SEDA-specific land uses as was done for the General Plan land uses; these factors were unavailable during the completion of the analysis for this technical study. However, the SEDA-specific land uses are similar in nature to many of the General Plan land uses, and similarities can be drawn between the two land use categories. Thus, a number of reasonable assumptions were made to determine equivalent General Plan land uses for each SEDA-specific land use in order to utilize the water demand factors for General Plan land uses. Table 5.1 shows the equivalent General Plan land uses established for each Specific Plan land use case as described below.

For the General Plan land use case, the technical memorandum prepared for the City of Fresno General Plan Update MEIR[24] was used to obtain projected water demand data for SEDA. In the memorandum, analyses were completed to project water demands for 2035, which is the buildout year for the City's General Plan. The analyses included one completed for the SEDA based on the land uses included in the General Plan; the demand determined for SEDA was 21,834 ac-ft/year.

For the Specific Plan analysis, the water demand factors used were prepared by Akel Engineering as part of the Metro Plan Update.[25] Table 5.1 shows the equivalent General Plan land uses and the associated category included in the Metro Plan updated table of factors, and

Table 5.2 shows the water demand factors used for each equivalent General Plan land use classification that was determined for each SEDA Specific Plan land use. It should be noted that some General Plan land uses did not exactly match up with those listed in the water demand factors, and some assumptions were made to determine approximate water demand factors; see Appendix B for the full list of water demand factors.

The GIS files for the General and Specific Plan land uses were georeferenced to the California State Plane Coordinate System, Zone 4, Foot, NAD83 Datum for analysis. This allowed mapping of the land uses to pull information necessary to complete the analysis, including the area of each land use. The water demand factors were then used with the area of the corresponding land use classification to determine a total water demand for the Plan Area based on the General Plan and the Specific Plan developments. The total water demand for the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in water demand for the Plan Area.

5.3 Analysis Results

The base water demand for all land uses in the Plan Area was found for both the General Plan and the Specific Plan conditions. The total General Plan base water demand was 21,843 AF/year, or 19.50 MGD,[24] and the Specific Plan base water demand was found to be 19.83 MGD, resulting in an increase in water demand of approximately 0.33 MGD, or 1.7%. See Table 5.3 and Table 5.4 for the results of the analysis and a direct comparison of the General Plan and Specific Plan water demands; see Appendix A for a more detailed version of the analysis.

There may be a number of reasons as to why water demand increased from the General Plan to the Specific Plan. One reason may be that the SEDA boundary increased from that shown in the General Plan, indicated by the increased area of total land uses. The total area of the General

[24] West Yost Associates, "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report," "Table 2. Water Demand Comparison for General Land Use Plan Land Changes," January 21, 2013.
[25] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update," October 2020.

Plan land uses is 8,253.76 acres, while the total area of the Specific Plan land uses is 8,325.57 acres – an increase of approximately 72 acres. This increase will lend itself to an increase in water demand based on which land uses increased in area.

Another contributor to increased water demands is changes in land use classifications. For the most part, the land use classifications remained fairly similar in nature and category when transitioning from the General Plan to the Specific Plan. However, a few areas of land uses changed to different land uses that have larger water demand factors; these include "Public Facilities – School with Park," "Buffer," and some low density residential areas. Per the SEDA Specific Plan land use map, all but one area defined as "School with Park" in the General Plan land use map changed to the SEDA "Neighborhood Center" land use. Similarly, the areas denoted as "Buffer" land use in the General Plan changed to "Rural Cluster Residential" in the SEDA Specific Plan. To a lesser extent, some of the "Low Density" residential areas in the General Plan were changed to residential land uses with higher densities in the Specific Plan. These combined changes lead to cumulative increases in the water demand of the Plan Area.

Finally, many SEDA land uses increased in area from their General Plan counterparts seemingly due to the elimination of the "Open Space" land uses included in the General Plan for the Plan Area, which totaled approximately 617 acres. As shown in Figure 5.1 and Table 5.3, "Open Space," and "Community Park," were removed from the Plan Area, and those areas were absorbed by adjacent land uses, including various residential, mixed use, and employment land uses. Several Open Space land uses have a water demand factor of 0 gpd/ac, and many others have significantly smaller demand factors than other land uses; consequently, this means that some portion of the 617 acres were added to other land uses with larger water demand factors, thereby increasing the total water demand of the SEDA Plan Area when compared to the General Plan buildout condition.

Table 5.1 General Plan–SEDA–General Plan Equivalent Land Use Classifications

SEDA Specific Plan Land Use Classifications [A]	Equivalent General Plan Land Use Classification [B]	Water Demand Factor Category [C]
Residential – Mixed Residential	Residential – Urban Neighborhood	Residential – Medium High & High Density
Residential – Neighborhood Residential	Residential – Medium Density	Residential – Medium Density
Residential – Rural Residential	Residential – Low Density	Residential – Low Density
Residential – Rural Cluster Residential	Residential – Low Density	Residential – Rural Density
Employment – Office Center	Employment – Office	Commercial – Office
Employment – Flexible Research & Development	Employment – Business Park	Commercial – Professional Services Office
	Employment – Regional Business Park	Commercial – Regional
Employment – Institutional	Public Facilities – College	Public Facilities – College
Employment – Institutional	Public Facilities – School with Park	Public Facilities – SEGA School with Park
Mixed Use – Regional Center	Mixed Use – Regional Mixed Use	Residential – High Density, Commercial – Regional, & Public Facilities – Community Activity Center
Mixed Use – Community Center	Mixed Use – Corridor/Center Mixed Use	Public Facilities – Community Activity Center

SEDA Specific Plan Land Use Classifications [A]	Equivalent General Plan Land Use Classification [B]	Water Demand Factor Category [C]
Mixed Use – Neighborhood Center	Public Facilities – Neighborhood Center	Residential – Medium High Density, Commercial – Neighborhood, & Public Facilities – Neighborhood Center
Open Space – Flood Control Basin	Open Space – Ponding Basin	Open Space – Ponding Basin
Other	Streets/Railroad/Canals/Etc.	N/A

[A] City of Fresno, "Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California," February 22, 2022.

[B] City of Fresno, "Fresno General Plan," December 18, 2014.

[C] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update

Table 5.2 Metro Plan Update Water Demand Factors[26]

Water Demand Factor Category	Water Demand Factor (gpd/ac)
Residential	
Medium High & High Density	5,140 [A]
Medium Density	2,810
Low Density	2,050
Rural Density	1,415
Commercial	
Office	2,440
Professional Services Office	2,420
Regional	1,685
Public Facilities	
College	1,665
SEGA School with Park	2,895
High Density Residential, Regional Commercial, & Community Activity Center	2,106 [B]
Community Activity Center	1,930
Medium High Density Residential, Neighborhood Commercial, & Neighborhood Center	1,851 [C]
Open Space	
Ponding Basin	0
Other	
Railroad/Streets/Canals/Etc.	N/A

[A] Average of Medium High and High Density Residential Water Demand Factors

[B] Combination of High Density Residential, Regional Commercial, and Community Activity Center

[C] Combination of Medium High Density Residential, Neighborhood Commercial, and Neighborhood Center

[26] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update," October 2020.

Table 5.3 Specific Plan (SP) Anticipated Water Demand per Land Use Classification

GP Land Use Classification	SP Equivalent Land Use Classification	Water Demand Factor [A,B] (GPD/ac)	SP Area (ac)	SP Base Water (MGD)
Residential - Low Density	Residential - Rural Residential	2,050	2,037.69	4.18
Residential - Medium Density	Residential - Neighborhood Residential	2,810	1,434.91	4.03
Residential - Urban Neighborhood	Residential - Mixed Residential	5,140 [A]	1,026.26	5.27
Employment - Office	Employment - Office Center	2,440	154.47	0.38
Employment - Business Park	Employment - Flexible Research and Development	2,420	16.54	0.04
Employment - Regional Business Park		1,685	1,287.53	2.17
Mixed Use -Corridor/Center Mixed Use	Mixed Used - Community Center	1,930	273.88	0.53
Mixed Use - Regional Mixed Use	Mixed Use - Regional Center	2,106 [B]	291.71	0.61
Open Space - Open Space	N/A	865	0	0.00
Open Space - Community Park	N/A	2,620	0	0.00
Open Space - Ponding Basin	Other - Flood Control Basin	0	265.78	0.00
Public Facilities - College	Employment - Institutional	1,665	116.26	0.19
Public Facilities - School with Park		2,895	149.77	0.43
Public Facilities - School with Park	Mixed Use - Neighborhood Center	1,851 [C]	491.38	0.91
Buffer - Buffer	Residential - Rural Cluster Residential	1,415 [D]	766.47	1.08
Other - Street/Rail/ Canal, etc.	Other	0	12.94	0.00
Totals	-	-	8,325.57	19.83

[A] Average of Medium High and High Density Residential Water Demand Factors
[B] Combination of High Density Residential, Regional Commercial, and Community Activity Center
[C] Combination of Medium High Density Residential, Neighborhood Commercial, and Neighborhood Center
[D] Rural Density Water Demand Factor used for Rural Cluster Residential Land Use.

Table 5.4 Difference Between General Plan and Specific Plan Anticipated Water Demand

SEDA General Plan Total Base Water Demand (MGD)	SEDA Specific Plan Total Base Water Demand (MGD)	Usage Δ (MGD)	Usage Δ (%)
19.5	19.83	0.33	1.7%

CHAPTER 6
IMPACTS AND MITIGATION

6.1 SEDA Planning

Improvements within the Plan Area will require modifications to master planned potable water facilities and infrastructure.

A draft policy document has been completed for the SEDA Specific Plan (March 2022), which includes updated policies for the Plan Area, and proposed improvements to meet the chosen alternative for development of the area. Included among these are policies directly related to potable water in the Plan Area.[27] Refer to the SEDA Specific Plan policy document for details on policies related to potable water.

6.2 Impacts of Significance

The proposed Specific Plan would result in a significant impact if it would:

1. Require or result in the relocation or construction of new or expanded water or wastewater treatment facilities, the construction of which could cause significant environmental effects.

   The potential long-term impacts related to water supply, treatment, and distribution requirements of the General Plan versus the Specific Plan differ by 1.7%; the implementation of the proposed Specific Plan may result in the need for expansion of water supply and treatment facilities, and will require construction of new distribution facilities to serve future land uses in the Plan Area. Thus, development of the Plan Area could result in significant impacts to the existing water supply and distribution system. A summary of master planned proposed water supply, treatment, and distribution infrastructure that may accommodate future development associated with the Specific Plan include:

   - New municipal groundwater wells
     - Municipal wells with wellhead treatment as needed
   - Expansion of the NESWTF
   - Water storage tanks and booster pump stations
   - Extension of 48-inch diameter RTM
   - Transmission Grid Mains of various sizes
   - Recharge inter-ties to FMFCD basins.

   Potential environmental impacts associated with such improvements include but are not limited to: traffic, air emissions, noise, water quality, aesthetics, agricultural resources, biological resources, and cultural resources. The Specific Plan establishes mitigation measures for impacts in these areas associated with construction of expanded or new water infrastructure. These may include traffic control/management plans to address traffic impacts during construction, various capital improvement plans, and the reevaluation of water master plan documents. Without mitigation, the impacts would be significant.

2. Have insufficient water supplies available to serve the project reasonably for the foreseeable future development during normal, dry and multiple dry years.

[27] City of Fresno, "Southeast Development Area Specific Plan Policy Draft," March 2022.

As shown by the 1.7% increase in water demand, existing City of Fresno water supplies could be sufficient to supply the future development in SEDA in addition to the existing demands. Current City water supply sources are as follows:

Groundwater – The City owns and operates 270 municipal water wells with 202 active wells; projected groundwater supply for the City of Fresno in 2035 is 149,100 AFY (acre-ft per year).[28]

Surface Water – The City owns and operates two (2) surface water treatment facilities – the NESWTF and the SESWTF. The NESWTF has a design capacity of 30 MGD expandable to 60 MGD, and the SESWTF has a design capacity of 54 MGD expandable to 80 MGD. The surface water is obtained from the Kings River via an agreement with FID, and from the Friant-Kern Canal through an agreement with the USBR. Treated surface water is used for potable uses and groundwater recharge. The projected surface water supply for the City of Fresno in 2035 is 191,600 AFY (60,000 via USBR, 131,600 via FID).[28]

Recycled Water – The City owns and operates the Fresno-Clovis RWRF and the NFWRF, which collect and treat wastewater from City users to various levels of treatment for non-potable uses. The Fresno-Clovis RWRF produces undisinfected secondary-treated effluent for use as restricted irrigation water for farmland and for groundwater recharge via discharge into adjacent percolation ponds, and disinfected tertiary-treated effluent for distribution through the City's recycled water distribution system for non-potable uses, including landscape irrigation and industrial processes. The NFWRF collects and treats wastewater to a disinfected tertiary-treated level for use as landscape irrigation supply for the Copper River Ranch Golf Course. The projected supply of recycled water for the City of Fresno in 2035 is 5,910 AFY.[28]

The UWMP presents actual data available for water supply and demand for the year 2020, as well as projected water usage. For 2020, the actual total potable water demand for the City was 121,993 AF[28], and the projected potable water demand for the City in 2035 is 154,210 AF.[28] Additionally, the projected non-potable water demand for the City for groundwater recharge is 68,100 AF for 2035.[28]

The estimated groundwater yield for the City in 2035 was projected to be 149,100 AF[28], assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, indicating that groundwater alone will not be sufficient to meet future City demands, including those for SEDA. However, estimated surface water supplies for the City are projected to be 191,600 AF for 2035 (60,000 via USBR, 131,600 via FID) during normal water years, as well as 5,910 AF of recycled water.[28] Total projected water supply for the City in 2035 is 346,610 AF during normal water years and assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, and total projected demand is 222,310 AF. The estimated increase in total water use for SEDA in accordance with the Specific Plan selected alternative is 0.33 MGD, or 1.03 AF. This results in a modified projected potable demand for the City of 154,211 AF, with a total water demand (potable and non-potable) of 222,311 AF.

In the event of a single dry year, the projected water supply for 2035 is 200,862 AF assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, and the projected demand is 184,174 AF; Table 7-3 of the UWMP shows the projected water supplies and demands for multiple dry years.[28]

[28] City of Fresno, "2020 Urban Water Management Plan," July 2021.

The City Metro Plan Update will include proposed infrastructure improvements necessary to sustain development in SEDA, including the construction of new groundwater wells, surface water treatment plant expansions, and expansion of the Regional Transmission water distribution system. Impacts would be significant without mitigation measures. Since the increase in water demand for the Specific Plan Area is 1.7% from the General Plan condition, the impacts to water supply could be potentially significant; upon compliance with regulatory requirements, proposed policies for full implementation of the proposed Specific Plan, proposed mitigation measures, and construction of proposed water supply and distribution system infrastructure, the impact could be reduced. The normal water year supply projected for the City of Fresno in 2035 is 346,610 AF, and total projected demand is 222,310 AF. All water supply scenarios for dry years for 2035 are sufficient to accommodate the increase in water demand for the Specific Plan Area of 1.03 AF assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.

The City shall develop and implement water conservation measures to reduce the per capita water use, and continue to refine and implement water saving and conservation standards for new developments approved under the Specific Plan. The City shall complete these measures and standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated the refined measures and standards prior to issuing approval. The City shall also continue to implement the City of Fresno Water Conservation Program, as may be updated, and periodically update restrictions on water uses, and evaluate the feasibility of the conservation target identified as part of the Fresno General Plan MEIR. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

The City shall refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance (MWELO) and other state regulations. The City shall complete these standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

Additionally, the City shall evaluate the water supply system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would demand additional water until additional water sources are secured and provided. The City shall evaluate proposed water supply improvements for potential environmental impacts, and shall construct such improvements prior to exceedance of demand to accommodate full buildout of the Specific Plan.

6.3 Conclusions

City planning documents, including but not limited to the General Plan and the Metro Plan, will need to be updated to account for the development of the SEDA, and account for the policies and revisions present in the Specific Plan.

Mitigations for SEDA from the General Plan to the SEDA Specific Plan include:

a) Develop an update to the City General Plan
b) Develop an update to the City Metro Plan

c) Develop additional water conservation measures in accordance with the City Metro Plan
d) Construct new water supply infrastructure in the Plan Area
e) Construct new water distribution infrastructure in the Plan Area
f) Construct new water storage facilities in the Plan Area
g) Construct groundwater recharge facilities in the Plan Area
h) Construct water treatment facilities in the Plan Area
i) Expand water treatment facilities
j) Secure additional water sources for the City to support development in the Plan Area

Appendix A

Supporting Calculations

GP Land Use Classification	Abbrv.	GP Area (ac)	SP Equivalent Land Use Classification	Abbrv.	Water Demand Factor (GPD/ac)	SP Area (ac)	SP Base Water (MGD)
Residential - Low Density	RL	1,700.92	Residential - Rural Residential	RR	2,050	2,037.69	4.18
Residential - Medium Density	RM	1,473.32	Residential - Neighborhood Residential	NR	2,810	1,434.91	4.03
Residential - Urban Neighborhood	RUN	891.47	Residential - Mixed Residential	MR	5,140	1,026.26	5.27
Employment - Office	O	144.37	Employment - Office Center	OC	2,440	154.47	0.38
Employment - Business Park	BP	12.78	Employment - Flexible Research and Development	F	2,420	16.54	0.04
Employment - Regional Business Park	RBP	1,219.71	Employment - Flexible Research and Development	F	1,685	1,287.53	2.17
Mixed Use -Corridor/Center Mixed Use	CMX	315.41	Mixed Used - Community Center	CC	1,930	273.88	0.53
Mixed Use - Regional Mixed Use	RMX	209.77	Mixed Use - Regional Center	RC	2,106	291.71	0.61
Open Space - Open Space	OS	569.53	N/A	N/A	865	0	0.00
Open Space - Community Park	CP	47.46	N/A	N/A	2,620	0	0.00
Open Space - Ponding Basin	PB	263.32	Other - Flood Control Basin	POF	0	265.78	0.00
Public Facilities - College	C	116.26	Employment - Institutional	I	1,665	116.26	0.19
Public Facilities - School with Park	P	149.77	Employment - Institutional	I	2,895	149.77	0.43
Public Facilities - School with Park	P	413.45	Mixed Use - Neighborhood Center	NC	1,851	491.38	0.91
Buffer - Buffer	BUFFER	715.04	Residential - Rural Cluster Residential	RCR	1,415	766.47	1.08
Other - Street/Rail/ Canal, etc.	N/A	11.21	Other	N/A	0	12.94	0.00
Totals		8,253.76				8,325.57	19.83

SEDA Projected 2035 General Plan Water Demand [A]	21,843 AF/yr 19.50 MGD
SEDA Specific Plan Total Base Water Demand	19.83 MGD
Usage Δ	0.33 MGD
Usage Δ (%)	1.7%

[A] West Yost Associates, "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Updated for the Master Environmental Impact Report," Technical Memorandum, Table 2, "Water Demand Comparison for General Plan Land Use Changes," January 21, 2013.

Appendix B

City of Fresno Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update (Prepared by Akel Engineering, Inc.)

CITY OF FRESNO

Water and Wastewater Unit Factor Update

FOR

Metropolitan Water Resources Management Plan Update

PRELIMINARY

October 2020

AKEL
ENGINEERING GROUP, INC.

City of Fresno

Water and Wastewater Unit Factor Update

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Table 2 Sewer Flow Factors by Land Use Classification

Table 1 Water Demand Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update

City of Fresno

PRELIMINARY

(Revised October 2020)

	Land Use Classifications	Water Service Area[1,2,3] (acres)	2018 Water Demands[4] (mgd)	Recommended Water Demand Factors[5] (gpd/acre)	(ac-ft/yr/acre)
Residential					
1	Rural Density	746	0.85	1,415	1.59
2	Low Density	1,283	2.12	2,050	2.30
3	Medium Low Density	10,139	23.18	2,845	3.19
4	Medium Density	11,033	24.91	2,810	3.15
5	Medium High Density	1,953	6.94	4,425	4.96
6	High Density	1,314	6.19	5,855	6.56
	Subtotal - Residential	**26,467**	**64.18**		
Commercial					
7	Community	558	1.04	2,330	2.61
8	General Heavy	1,124	2.11	2,340	2.62
9	Neighborhood	530	1.08	2,525	2.83
10	Neighborhood Limited	0	0.00	-	-
11	Office	932	1.83	2,440	2.73
12	Professional Services Office	89	0.17	2,420	2.71
13	Regional	294	0.40	1,685	1.89
14	Recreational	109	0.23	2,575	2.88
15	Storage	273	0.07	335	0.38
	Subtotal - Commercial	**3,909**	**6.93**		
Public Facilities					
16	Airport	1,147	0.12	130	0.15
17	College	304	0.41	1,665	1.87
18	High School	505	0.60	1,485	1.66
19	Elementary and High School	141	0.21	1,825	2.04
20	Middle School	305	0.43	1,765	1.98
21	Elementary and Middle School	191	0.30	1,930	2.16
22	Elementary School	792	1.53	2,405	2.69
23	Special School	52	0.05	1,110	1.24
24	SEGA School with Park	6	0.01	2,895	3.24
25	Cemetery	159	0.10	810	0.91
26	Church	662	0.81	1,525	1.71
27	Community Activity Center	11	0.02	1,930	2.16
28	Neighborhood Center	10	0.01	795	0.89
29	Convention Center	17	0.03	1,955	2.19
30	Fairgrounds	90	0.09	1,290	1.45
31	Fire Station	15	0.02	1,855	2.08
32	Government Offices	162	0.26	1,985	2.22
33	Court House Central Area	19	0.15	9,590	10.74
34	Hospital	189	0.76	5,005	5.61
35	Medical Center	20	0.02	1,385	1.55
36	Convalescent Hospital	119	0.39	4,080	4.57
37	Military	55	0.01	170	0.19
38	Mobile Home Park	274	0.49	2,225	2.49
39	Municipal Service Center	37	0.07	2,200	2.46
40	Post Office	30	0.02	750	0.84
41	Public Facility	7	0.01	1,010	1.13
42	Public/Quasi-Public Facility	46	0.10	2,670	2.99
43	Fresno County Jail	3	0.19	80,765	90.47

Table 1 Water Demand Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update

City of Fresno

PRELIMINARY

(Revised October 2020)

Land Use Classifications		Water Service Area[1,2,3] (acres)	2018 Water Demands[4] (mgd)	Recommended Water Demand Factors[5] (gpd/acre)	(ac-ft/yr/acre)
44	Pump Station	9	0.01	805	0.90
	Subtotal - Public Facility	**5,376**	**7.19**		
Industrial					
45	Light Industrial	2,301	3.42	1,850	2.07
46	Heavy Industrial	1,905	5.91	3,860	4.32
	Subtotal - Industrial	**4,206**	**9.34**		
Open Space					
47	Open Space	177	0.12	865	0.97
48	Recreational Use/Clear Zone	15	0.00	-	-
49	Ag	1,531	0.00	-	-
50	Canal	20	0.00	-	-
51	Community Park	24	0.05	2,620	2.93
52	Golf Course	662	0.23	435	0.49
53	Lake or Pond	54	0.00	-	-
54	Multi-Use	0	0.00	-	-
55	Neighborhood Park	218	0.62	3,510	3.93
56	Recreational Park	97	0.15	1,980	2.22
57	Recreational Use	17	0.02	1,235	1.38
58	Regional Park	436	0.18	525	0.59
59	Recreational Commercial	0	0.00	-	-
60	Environmental Education Area	0	0.00	-	-
61	Gravel Mining	0	0.00	-	-
62	Parking	48	0.00	-	-
63	PGE Sub Station	102	0.00	-	-
64	Ponding Basin	236	0.00	-	-
65	Ponding Basin/Park	128	0.16	1,535	1.72
	Subtotal - Open Space	**3,764**	**1.53**		
Total					
	Subtotal - Residential	**26,467**	**64.18**		
	Subtotal - Commercial	**3,909**	**6.93**		
	Subtotal - Public Facility	**5,376**	**7.19**		
	Subtotal - Industrial	**4,206**	**9.34**		
	Subtotal - Open Space	**3,764**	**1.53**		
	Total	**43,722**	**89.17**		

AKEL ENGINEERING GROUP, INC.

10/2/2020

Notes:

1. Source: Land use and acreages based on City of Fresno parcel shapefile downloaded July 16, 2019.
2. Acreages exclude Bakman, Pinedale, and CSU Fresno service areas.
3. Acreages reflect demand generating parcels only.
4. Demand based on 2018 annual metered consumption records.
5. Recommended Water Demand Factors include the following adjustments:
   - Demand Factors normalized to 2018 production to account for system losses
   - Demand Factors increased to account for City-wide vacancy rate of 8.1% based on CA Department of Finance population estimat

Table 2 Sewer Flow Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update
City of Fresno

PRELIMINARY

	Land Use Classifications	Sewer Service Area[1,2,3] (acres)	Return to Sewer Ratio	Unadjusted Wastewater Unit Factor[4] (gpd/acres)	Estimated Sewer Flow (mgd)	Recommended Wastewater Unit Factor[5] (gpd/acres)
Residential						
1	Rural Density	714	0.20	227	0.16	250
2	Low Density	1,063	0.35	577	0.61	625
3	Medium Low Density	9,875	0.40	915	9.03	990
4	Medium Density	11,001	0.50	1,129	12.42	1,225
5	Medium High Density	1,950	0.55	1,956	3.81	2,115
6	High Density	1,314	0.60	2,825	3.71	3,055
				Subtotal - Residential Flow	**29.75**	
Commercial						
7	Community	558	0.80	1,497	0.84	1,620
8	General Heavy	1,124	0.80	1,504	1.69	1,630
9	Neighborhood	530	0.80	1,623	0.86	1,755
10	Neighborhood Limited	0	0.00	0	0.00	0
11	Office	932	0.80	1,567	1.46	1,695
12	Professional Services Office	89	0.80	1,556	0.14	1,685
13	Regional	294	0.80	1,084	0.32	1,175
14	Recreational	109	0.30	621	0.07	675
15	Storage	273	0.80	213	0.06	235
				Subtotal - Commercial Flow	**5.43**	
Public Facility						
16	Airport	1,147	0.80	81	0.09	90
17	College	304	0.70	937	0.29	1,015
18	High School	505	0.70	835	0.42	905
19	Elementary and High School	141	0.70	1,026	0.14	1,110
20	Middle School	305	0.70	993	0.30	1,075
21	Elementary and Middle School	191	0.70	1,087	0.21	1,175
22	Elementary School	792	0.70	1,354	1.07	1,465
23	Special School	52	0.70	625	0.03	680
24	SEGA School with Park	6	0.80	1,860	0.01	2,015
25	Cemetery	159	0.25	163	0.03	180
26	Church	662	0.80	981	0.65	1,065
27	Community Activity Center	11	0.80	1,241	0.01	1,345
28	Neighborhood Center	10	0.80	510	0.00	555
29	Convention Center	17	0.80	1,258	0.02	1,360
30	Fairgrounds	90	0.80	827	0.07	895
31	Fire Station	15	0.80	1,192	0.02	1,290
32	Government Offices	162	0.80	1,277	0.21	1,385
33	Court House Central Area	19	0.80	6,169	0.12	6,670
34	Hospital	189	0.80	3,219	0.61	3,480
35	Medical Center	20	0.80	889	0.02	965
36	Convalescent Hospital	119	0.80	2,624	0.31	2,840
37	Military	55	0.80	109	0.01	120
38	Mobile Home Park	274	0.60	1,072	0.29	1,160
39	Municipal Service Center	37	0.80	1,415	0.05	1,530
40	Post Office	30	0.80	480	0.01	520
41	Public Facility	7	0.80	649	0.00	705
42	Public/Quasi-Public Facility	46	0.80	1,716	0.08	1,855
43	Fresno County Jail	3	0.80	51,972	0.15	56,185
44	Pump Station	9	0.00	0	0.00	0
				Subtotal - Public Facility Flow	**5.24**	

Table 2 Sewer Flow Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update
City of Fresno

PRELIMINARY

	Land Use Classifications	Sewer Service Area[1,2,3] (acres)	Return to Sewer Ratio	Unadjusted Wastewater Unit Factor[4] (gpd/acres)	Estimated Sewer Flow (mgd)	Recommended Wastewater Unit Factor[5] (gpd/acres)
Industrial[6]						
45	Light Industrial	2,301	0.80	1,190	2.74	1,290
46	Heavy Industrial	1,905	0.80	2,484	4.73	2,690
				Subtotal - Industrial Flow	**7.47**	
Open Space						
47	Open Space	177	0.00	0	0.00	0
48	Recreational Use/Clear Zone	15	0.00	0	0.00	0
49	Ag	1,531	0.00	0	0.00	0
50	Canal	20	0.00	0	0.00	0
51	Community Park	24	0.00	0	0.00	0
52	Golf Course	525	0.30	104	0.05	115
53	Lake or Pond	54	0.00	0	0.00	0
54	Multi-Use	0	0.00	0	0.00	0
55	Neighborhood Park	218	0.00	0	0.00	0
56	Recreational Park	97	0.00	0	0.00	0
57	Recreational Use	17	0.00	0	0.00	0
58	Regional Park	436	0.00	0	0.00	0
59	Recreational Commercial	0	0.00	0	0.00	0
60	Environmental Education Area	0	0.00	0	0.00	0
61	Gravel Mining	0	0.00	0	0.00	0
62	Parking	48	0.00	0	0.00	0
63	PGE Sub Station	102	0.00	0	0.00	0
64	Ponding Basin	236	0.00	0	0.00	0
65	Ponding Basin/Park	128	0.00	0	0.00	0
				Subtotal - Open Space Flow	**0.05**	
Non-Metered[7,8,9]						
	Pinedale Public Utilities	-	-	-	0.63	
	Pinedale County Water District	-	-	-	0.46	
	Tarpey Village	-	-	-	0.37	
	Bakman	-	-	-	1.82	
	Clovis	-	-	-	0.20	
	City of Clovis	-	-	-	5.12	
	CSU Fresno	-	-	-	0.13	
				Subtotal - Non-Metered Flow	**8.73**	
Total						
				Subtotal - Residential Flow	**29.75**	
				Subtotal - Commercial Flow	**5.43**	
				Subtotal - Public Facility Flow	**5.24**	
				Subtotal - Industrial Flow	**7.47**	
				Subtotal - Open Space Flow	**0.05**	
				Subtotal - Non-Metered Flow	**8.73**	
				Total Balanced WWTP Flow	**56.68**	
				2018 WWTP Average Annual Flow[10]	**56.81**	

AKEL ENGINEERING GROUP, INC.

10/2/2020

Notes:

1. Source: Land use and acreages based on City of Fresno parcel shapefile downloaded July 16, 2019.
2. Acreages exclude Bakman, Pinedale, and CSU Fresno service areas.
3. Acreages reflect flow generating parcels only and do not account for Septic Users.
4. Demand based on 2018 annual metered consumption records.
5. Wastewater Unit Factors increased to account for City-wide vacancy rate of 8.1% based on CA Department of Finance population estimates.
6. Industrial flow does not exclude the City's top industrial users (Foster Farms, Cal Dairies, Gallo, and Cargil Beef).
7. Development information for non-metered areas provided by City Staff.
8. City of Clovis BWF extracted from City of Fresno Wastewater Collection System Master Plan Update (September 2015).
9. CSU Fresno flows extracted from flow meter data provided by City Staff on April 30, 2019.
10. Historical WWTP flows provided by City Staff on February 13, 2019.

Appendix C

Water Technical Report for the City of Fresno General Plan Update MEIR (Prepared by Blair, Church & Flynn), City of Fresno Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Updated for the Master Environmental Impact Report Technical Memorandum (Prepared by West Yost Associates)

Water Technical Report

for the

City of Fresno General Plan Update MEIR

June 18, 2013

Introduction

The City of Fresno (City) is in the process of developing their General Plan Update. The last update to the City's General Plan was in 2002. The General Plan Update, in part, encourages infill projects and facilitates revitalization. The Master Environmental Impact Report evaluates the impacts associated with the General Plan Update and proposes mitigation measures. West Yost Associates (West Yost) has analyzed the impacts associated with the General Plan Update and prepared recommendations to meet increased demand and additional storage requirements. West Yost's analysis is summarized in their Technical Memorandum entitled "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report" (Technical Evaluation), attached as Appendix A. The recommendations included in the Technical Evaluation are based on general land use data available as part of the General Plan Update. See Figure 5 in the Technical Report for proposed water infrastructure improvements. As actual development projects are proposed with more specific information, additional evaluation will be required to confirm that the local distribution system and infrastructure are sufficient to meet the City minimum service requirements for service to the end users.

Summary of Analysis

The Technical Evaluation used the land use data obtained from the City's General Plan Update as contained in Geographic Information System geodatabase files provided by the City's Planning and Development Department. These General Plan Update land uses were used, together with appropriate water duty factors to calculate the water demand. Tables 1 and 2 in the Technical Evaluation include the water duty factors per customer class and the calculated water demand, respectively. The calculated water demand as a result of the General Plan Update is 243,570 acre-feet per year (af/yr) and exceeds the water demand projected in the 2012 City of Fresno Metropolitan Water Resources Management Plan by 10,170 af/yr. In order to meet this higher water demand, additional groundwater pumpage or combination of groundwater pumpage and increased surface water treatment capacity will be required. An additional 10,170 af/yr of intentional groundwater recharge, via an additional 210 acres of new recharge basins, would be required to balance the additional groundwater pumpage.

Potable water storage requirements were considered in the Technical Evaluation. The total storage required to meet the daily water demand that is projected to be generated by the 2035 General Plan Update land uses is 250.7 million gallons, see Table 4 in the Technical Evaluation. The storage requirement exceeds the 2025 general plan update storage requirement by 10.1 million gallons. The Technical Evaluation, in Figure 5, indicates proposed locations for the additional storage. The next water master plan update should include recommendations for overall water system improvements, including recommendations for storage improvements.

The West Yost Technical Evaluation indicates that the water infrastructure recommended in the 2012 City of Fresno Metropolitan Water Resources Management Plan is adequate to convey the peak hourly plus fire flow for the General Plan Update land uses and meets the City's service criteria. Therefore, no previously unplanned conveyance or pump systems are needed for that reason.

Additionally, West Yost has analyzed the impacts to the downtown area. West Yost's analysis is summarized in their Technical Memorandum entitled "Hydraulic Evaluation of the Proposed Fulton Corridor Specific Plan Project", attached as Appendix B.

Mitigations (Existing Condition to 2025 General Plan)

a. Construct an 80 million gallon per day (MGD) surface water treatment plant near the intersection of Fowler and Olive Avenues, in accordance with Chapter 9 and Figure 9-1 of the City of Fresno Metropolitan Water Resources Management Plan Update Phase 2 Report, January 2012 (2012 Metro Plan Update).

b. Construct a 30 MGD expansion of the existing northeast surface water treatment plant for a total capacity of 60 MGD, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

c. Construct a 20 MGD surface water treatment plant in the southwest portion of the City, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

d. Construct 65 new groundwater wells, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

e. Construct a 2.0 million gallon potable water reservoir (Reservoir T2) near the intersection of Clovis and California Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

f. Construct a 3.0 million gallon potable water reservoir (Reservoir T3) near the intersection of Temperance and Dakota Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

g. Construct a 3.0 million gallon potable water reservoir (Reservoir T4) in the downtown area, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

h. Construct a 4.0 million gallon potable water reservoir (Reservoir T5) near the intersection of Ashlan and Chestnut Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

i. Construct a 4.0 million gallon potable water reservoir (Reservoir T6) near the intersection of Ashlan Avenue and Highway 99, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

j. Construct 50.3 miles of regional water transmission mains ranging in size from 24-inch to 48-inch, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

k. Construct 95.9 miles of 16-inch transmission grid mains, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

l. Develop additional water conservation measures in accordance with Chapter 4 of the 2012 Metro Plan Update.

m. Implement groundwater objectives, goals and policies as described in Chapter 5 of the 2012 Metro Plan Update.

n. Implement surface water objectives, goals and policies as described in Chapter 6 of the 2012 Metro Plan Update.

o. Implement recycled water objectives, goals and policies as described in Chapter 7 of the 2012 Metro Plan Update.

Mitigations (2025 General Plan to General Plan Update)

a. Construct a 4.0 million gallon potable water reservoir (SEGA Reservoir 1) within the northern part of the Southeast Growth Area.

b. Construct a 4.0 million gallon potable water reservoir (SEGA Reservoir 2) within the southern part of the Southeast Growth Area.

c. Develop an update to the water master plan.

Appendix A

WEST YOST ASSOCIATES
Consulting Engineers



TECHNICAL MEMORANDUM

DATE: January 21, 2013 Project No.: 439-00-12-11

TO: Brock Buche, City of Fresno Water Division Project Manager

CC: Martin Querin, City of Fresno Assistant Public Utilities Director—Water Division
Keith Bergthold, City of Fresno Assistant Director of Development and Resource Management

FROM: Brenda Estrada, Project Engineer, R.C.E. #67062

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SUBJECT: Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report

INTRODUCTION

The purpose of this technical memorandum (TM) is to present West Yost Associates' (West Yost's) evaluation of the potential hydraulic impacts on the City of Fresno (City) water system of the proposed 2035 General Plan Land Use Update (2035 GP) for the Master Environmental Impact Report (MEIR). As described in this TM, West Yost has used the City's water system hydraulic model to evaluate the ability of the City's existing and proposed water system to provide minimum required pressures and flows under the future, projected demands associated with the update to land use. Our evaluation findings and recommendations to serve the 2035 GP are described below.

PROJECT BACKGROUND AND DESCRIPTION

The City has begun the process of updating their General Plan which was last updated in 2002. The previous General Plan included land use development projections to the year 2025. The 2035 GP will create a blueprint for development over the next 20 years to 2035. The changes in the 2035 GP look to facilitate revitalization, infill, transit-oriented development and more sustainable development practices. The MEIR evaluates the impacts to City infrastructure associated with the proposed changes to development.

The City has performed extensive planning for the future water system as documented in the Metropolitan Plan Update (Metro Plan Update). The Metro Plan Update used the City's 2025 General Plan Land Use Update (2025 GP) land use to project future water demands. These demands are the basis for the City's proposed supply portfolio and transmission pipeline grid developed in the Metro Plan Update to meet the City's future needs. Updates to the proposed land use impacts the City's overall system demands. This TM evaluates how the changes to demands impact the planned infrastructure for the City's water system.

PROJECTED WATER DEMANDS

The City has been using water demands developed in the Metro Plan Update to plan for the future water system infrastructure and supply needs. As described in detail in the Metro Plan Update, West Yost obtained future land use data from the City's GIS, which used land use designation adopted as part of the City's 2025 GP. West Yost consolidated the various land use designations from the City's 2025 GP into the City's Water Division's five existing customer classes (single family residential, multi-family residential, commercial/institutional, industrial, and landscape irrigation) to facilitate development of unit factors. In addition to these five existing customer classes, West Yost had added a sixth customer class category for the Southeast Growth Area (SEGA) which had recently been added to the City's Sphere of Influence (SOI) at the time the Metro Plan Update was developed.

The 2035 GP updates the land use designation for several locations within the City's SOI including detailed land use information for the SEGA. The 2035 GP also includes new land use designations which include mixed use for areas outside of the Downtown Central Area. The main change to the land use designations occur along Blackstone Avenue corridor, Shaw Avenue corridor, SEGA, and the southwest section of the City SOI. Figure 1 shows the parcels within the City's SOI where the planned land use designations were updated in the 2035 GP.

The new mixed use designations required the development of new water customer classes to account for the change in anticipated water use. The mixed use designations combine commercial, office and residential land uses on a single parcel. For the downtown mixed use designated parcels, the water duty factor is higher than for the areas outside of downtown. The mixed use planned in the Downtown Central Area is expected to be high densification of residential, commercial, and office in multiple story buildings. It is anticipated the mixed use downtown will include greater square footage of office and commercial as well as higher density residential than the areas outside of downtown and therefore, different water duty factors were developed for the two areas.

The Metro Plan Update used the assumption that open space land designations did not require irrigation. Since the Metro Plan Update, additional evaluation on how open space area is irrigated within the City has resulted in the development of water duty factors to account for irrigation of turf areas within an open space designated parcel. Depending on the primary purpose of the open space, new park, nature preserve, flood control, or greenbelt, a percentage of the parcel is now assumed to be irrigated.

Table 1 provides a summary of the water duty factors used for the different water customer classes and the land use code for the evaluation.

Table 1. Summary of Unit Water Use Factors

Water Customer Class	Land Use Code	Water Duty Factor[(a)], afa/ac
Single Family Residential	rl, rm, rml, run	3.2
Multi-Family Residential	rh, rmh	6.2
Commercial/Institutional	cbp, cc, cgh, cms, co, cr, crbp, hwy, il, pf, pfs, pqch, pse, psm, psp, pss	1.9
Industrial	Ih	1.9
Landscape Irrigation	ccr, orbp, orp, orpr	2.9
Open Space[(b)] • New parks • Nature preserve park • Ponding basin/Regional flood control • SEGA open space	obp, os	 3.4 (80% of area) 3.4 (15% of area) 0 3.4 (47% of area)
Mixed Use Downtown	Cce	7.5
Mixed use Outside of Downtown	cmx, nmx, rmx	6.6
No Water Use[(c)]	ag, rail, road	0

(a) Assumes water conservation achieved through water conservations implemented by the City and single family meter implementation program.
(b) Open space designations assumed to have a percentage of area irrigated based on type of open space use.
(c) No water use includes roadways, railroads, and agricultural land use designations. The eastside agricultural buffer for SEGA is assumed to have no water use.

Demands were calculated for the parcels with a change in land use. Table 2 provides a comparison of the calculated water demand for the 2025 GP land use and the 2035 GP land use for parcels with a change to its land use designation. Parcels without a land use designation change are assumed to have no change in demands. Demand changes to the downtown area are based on work West Yost has conducted based on densification of the proposed mixed use parcels in the downtown area, as well as specific demand for the Fulton Corridor Specific Plan developed by Sherwood Design Engineers.

For purposes of West Yost's hydraulic evaluation of the demand changes due to the 2035 GP, the water demands associated with the parcels having a change in land use were updated in the hydraulic model. The projected demands for the SEGA are decreased from what was projected as part of the Metro Plan Update. However, the downtown area and the remainder of the City demands increase. The calculated demands show an overall increase for the City due to the changes in the 2035 GP land use of 10,170 acre-feet/year (afa). Figure 2 shows how the changes to demands are spatially located throughout the City.

Table 2. Water Demand Comparison for General Plan Land Use Changes[a]

Water Customer Category	Water Duty Factor	2025 General Plan		2035 General Plan		Difference (2035-2025)	
		Area, acres	Annual Water Demand, afa	Area, acres	Annual Water Demand, afa	Area, acres	Annual Water Demand, afa
Downtown Area[b]							
Commercial/Institutional	1.9	2,179	4,140	1,699	3,229	-480	-911
Commercial/Mixed Use[c]	7.5	0	0	480	3,600	480	3,600
Industrial	1.9	237	450	237	450	0	0
Landscape Irrigation	2.9	185	537	185	537	0	0
Multi-Family Residential	6.2	367	2,278	367	2,278	0	0
No Water Use	0.0	83	0	83	0	0	0
Open Space[d]	2.9	65	0	65	188	0	188
Single Family Residential	3.2	1,851	5,923	1,851	5,923	0	0
Increase for Fulton Corridor[e]	-	-	0	-	1,020	-	1,020
Subtotal Downtown Area		*4,967*	*13,329*	*4,967*	*17,225*	*0*	*3,896*
SEGA							
South East Growth Area	3.2	8,227	26,328	0	0	-8,227	-26,328
Commercial/Institutional	1.9	0	0	1,715	3,258	1,715	3,258
Irrigated School Parks	3.4	0	0	354	1,204	354	1,204
Industrial	1.9	0	0	0	0	0	0
Landscape Irrigation	2.9	0	0	34	97	34	97
Multi-Family Residential	6.2	0	0	0	0	0	0
No Water Use	0.0	0	0	733	0	733	0
Open Space[d]	0.0	0	0	0	0	0	0
Regional Flood Control[f]	0.0	0	0	269	0	269	0
SEGA Open Space[g]	3.4	0	0	564	901	564	901
Single Family Residential	3.2	0	0	4,039	12,924	4,039	12,924
Mixed Use[h]	6.6	0	0	524	3,460	524	3,460
Subtotal SEGA		*8,227*	*26,328*	*8,230*	*21,843*	*3*	*-4,485*
Remainder of City							
Commercial/Institutional	1.9	6,131	11,650	3,309	6,287	-2,822	-5,362
Industrial	1.9	3	7	121	230	118	223
Landscape Irrigation	2.9	157	455	257	745	100	290
Multi-Family Residential	6.2	884	5,482	372	2,307	-512	-3,175
No Water Use	0.0	8	0	31	0	23	0
Open Space[d]	0.0	280	0	0	0	-280	0
New Parks[i]	3.4	0	0	359	977	359	977
Nature Preserve[j]	3.4	0	0	135	69	135	69
Ponding Basin[k]	0.0	0	0	56	0	56	0
Regional Flood Control(f)	0.0	0	0	32		32	
Single Family Residential	3.2	3,699	11,838	3,874	12,397	175	558
Mixed Use[h]	6.6	0	0	2,603	17,180	2,603	17,180
Subtotal Remainder of City		*11,163*	*29,431*	*11,150*	*40,192*	*-13*	*10,761*
Total		***24,358***	***69,088***	***24,348***	***79,260***	***-10***	***10,172***

[a] Demands shown for parcels with a change in Land Use from the 2025 General Plan to the 2035 General Plan Update.

[b] Demands for the Downtown Area based on increase in densification to mixed use land use designation and Fulton Corridor Specific Plan detailed demand use.

[c] Downtown Commercial/Mixed Use water duty factor based on densification of mixed use within the downtown area and proposed population increases. Downtown Area commercial/mixed use assumed to contain a greater building square footage than mixed use in other parts of the City and therefore, a larger water duty factor is applied to the Downtown Commercial/Mixed Use land categories.

[d] Open Space water duty factor developed for original Metro Plan demand projections assumed 0 water usage. Additional research on the type of irrigation needs for various open space uses has resulted in new water duty factors for the 2035 General Plan land use.

[e] Demands for Fulton Corridor Specific Plan are based on building type and proposed square footage as provided by Sherwood Engineering. Demands for Fulton Corridor are not tied to a specific land use type.

[f] The water duty for the Open Space land use areas planned to be used as Regional Flood Control facilities is assumed to be 0 afa. A total of 300.7 acres is planned with a majority of the land use within SEGA.

[g] SEGA open space/mixed vegetation area is assumed to be approximately 47 percent irrigated. This assumes 263.6 acres of the total 563.6 acres of open space will require irrigation.

[h] Mixed Use land designations outside of the downtown area are assumed to contain less square footage than mixed use within the Downtown Area. Mixed use water duty factor is based on assumptions for building and population projections for SEGA.

[i] Open Space land uses assumed to be used as new parks are assumed to be 80 percent irrigated. A total of 359.3 acres of new park is planned for the remainder area of the City.

[j] The water duty for the Open Space land use area planned to be used as a nature preserve type park located in the northwest part of the City is assumed to be 15 percent irrigated. A total of 135.1 acres is currently planned.

[k] The water duty for the Open Space land use areas planned to be used as Ponding Basis facilities is assumed to be 0 afa. A total of 56.4 acres is currently planned.

WATER SUPPLY

As described in the City's Metro Plan Update, the City's Water Master Plan, the City's 2010 Urban Water Management Plan (2010 UWMP) and West Yost's March 2009 TM "Hydraulic Evaluation of the Downtown Central Area," the City's available water supplies are confined to a finite quantity and are extremely limited. Therefore, water supplies to meet the projected increase in water demand must come from within the City's existing, limited water supply portfolio. The availability and reliability of the City's water supplies to meet the City's projected water demands under various hydrologic conditions were evaluated in the City's 2010 UWMP which was adopted by City Council in November 2012.

The projected water demands in the 2010 UWMP were based on the City's anticipated compliance with adopted per capita water use targets in accordance with the Water Conservation Act of 2009 (SBx7-7) and the projected City population in 2035[1]. As documented in the 2010 UWMP, the City population in 2035 is projected to be 786,000 (this is based on the Fresno Council of Governments estimate of 1,290,000 people countywide in 2035, with 61 percent of the population residing in the City of Fresno). Assuming that the land use changes proposed for the 2035 General Plan do not result in an increase in the total projected City population, but instead result in an increased densification of population in some parts of the City and reduced densification in other parts of the City, the projected water demand per SBx7-7, based on per capita consumption, in 2035 (220,100 af) would be unchanged as a result of the proposed land use changes.

The projected water supplies in the 2010 UWMP were calculated using land-use based water demand projection using the 2025 General Plan land uses (shifted out 10 years to 2035 to account for the slowdown in development in the City) and assuming water conservation by all users. This land use-based water demand projection (233,400 af) is higher than the SBx7-7 water demand projection (220,100 af) and is more conservative for water supply planning purposes as it provides for additional water supplies in the event that the City were not able to comply with the SBx7-7 requirements. With the land use changes proposed for the 2035 General Plan, this 2035 water demand estimate would increase to 243,570 af (233,400 af + 10,170 af). This increased land use-based water demand projection is shown on Figure 3.

To meet this higher land use-based water demand projection in 2035, additional water supplies would be required. The City's water supply portfolio in 2035 is projected to include treated surface water supplies, groundwater supplies and recycled water supplies (see Figure 3). Supplies to meet additional water demands would likely be derived from additional groundwater pumpage in conjunction with additional intentional groundwater recharge. The groundwater pumpage projected for 2035 in the 2010 UWMP (85,000 af) would increase to 95,170 af (85,000 af + 10,170 af) with the land use changes proposed for the 2035 General Plan. This increase in groundwater pumpage would require a like amount of additional intentional groundwater recharge to keep the City's groundwater operations in balance. As described in the City's 2010 UWMP, the projected future increase in intentional groundwater recharge is assumed to occur due to the increased use of existing recharge basins, construction of new recharge basins, and/or development of a groundwater bank and maximizing the use of available surface water supplies[2].

[1] See Chapter 6 of the City of Fresno 2010 Urban Water Management Plan dated November 2012.
[2] See Section 4.2.3 of the City's 2010 Urban Water Management Plan dated November 2012.

An additional 210 acres[3] of new recharge basins (beyond those previously identified) would be required to balance the additional required groundwater pumpage of 10,170 af associated with the 2035 General Plan.

EVALUATION CRITERIA

The planning and modeling criteria used for this evaluation are based on West Yost's recent work with the City. The August 2008 verified hydraulic model of the City's water distribution system was used as the basis for the evaluation. The hydraulic model has been updated since 2008 to account for the updates to demand within the Downtown Central Area.

Planning and Modeling Criteria

The criteria used to evaluate the potential impacts to the City's existing water system are as follows:

- Minimum peak hour demand pressure 40 pounds per square inch (psi);
- Maximum allowable velocity is 7 feet per second (fps) during a peak hour condition for distribution pipelines and 5 fps during a peak hour condition for transmission pipelines;
- Maximum allowable head loss rate is 10 feet per 1,000 feet during any condition[4];
- Any new, required pipelines will be modeled with a roughness coefficient (C-factor) of 130; and
- Assumed peaking factors for maximum day and peak hour demand conditions are consistent with the City's adopted peaking factors and are as follows:
  - Maximum Day Demand = 2.0 times Average Day Demand
  - Peak Hour Demand = 2.9 times Average Day Demand

Fire Flow Requirements

As a purveyor of water, the City is responsible for providing a realistic water supply to meet fire flow requirements. The City's Fire Department establishes minimum water flows and pressures required for firefighting purposes. The Fire Department uses the 2007 California Fire Code (CFC) (*Table B105.1 – Minimum Required Fire-Flow and Flow Duration for Buildings*) to assist them in establishing minimum fire flows and durations for individual structures.

The fire flow requirements based on land use type are presented in Table 3. Fire flow requirements do not change significantly due to the 2035 GP land use change. Figure 4 shows how the land use changes impact the required fire flow. The most significant change is to the SEGA area. Prior to having a land use plan for SEGA, the area was assigned a conservative fire flow requirement of 4,000 gpm. Therefore, the fire flow in SEGA have been adjusted to reflect

[3] Based on a recharge rate of 0.2 acre-feet per acre per day over a 10-month per year operational cycle (per the Metropolitan Water Resources Management Plan Phase 2 Report (Chapter 5), January 2011) plus 25 percent to account for inactive portions of the recharge area (setbacks and roadways within the recharge areas).

[4] This criteria was developed primarily for new development; ability to meet this criteria within existing distribution systems (such as that in the City's downtown area) can be difficult due to existing small diameter pipelines and aging pipelines.

the proposed land use designations and results in a reduction to projected fire flow requirements for most of the area.

Although these criteria have been established, and used to size new pipelines, the existing system should be evaluated using pressure as the primary criterion. Secondary criteria, such as velocity, head loss, age, and material type, are used as indicators for areas of the water system that also may need improvements, but may not be required as part of this evaluation.

Table 3. Recommended Fire Flow Requirements[a,b]

Designation	Non-Sprinklered		Sprinklered[c,d,e]	
	Fire Flow, gpm	Duration, hours	Fire Flow, gpm	Duration, hours
Single Family Residential	2,000	2	—	—
Multi-Family Residential	3,000	3	—	—
Commercial/Institutional	6,000	4	3,500	4
Industrial	8,000	4	4,500	4

(a) Construction type and fire area are not generally known during the development of a master plan; consequently, fire flow requirements set forth in this table are based on previous estimates for these land use types and similar communities.
(b) Unique projects or projects with alternate materials may require higher fire flows and will be reviewed by the City's Fire Marshal on a case-by-case basis (e.g., proposed commercial/industrial areas and schools).
(c) The City's Fire Marshal normally allows up to a 50 percent reduction in fire flows if a building is sprinklered. However, the CFC also requires that no fire flow be less than 1,000 gpm for single family residential or 1,500 gpm for all other building types. For a more conservative fire flow estimate, single family and multiple family buildings were considered non-sprinklered for this evaluation.
(d) Specific fire flows were determined from Table B105.1 of the 2007 CFC, and depend on construction type and fire area. These fire flow requirements are based on buildings being fully sprinklered.
(e) Fire flow includes a 500 gpm demand for on-site sprinkler flow.

WATER SYSTEM FACILITY ASSUMPTIONS

The City's hydraulic model was verified for August 2008 operating conditions. Since the initial verification and allocation of existing and proposed demands, West Yost has prepared several evaluation of the proposed infrastructure required to meet future demands.

Recommendations from Previous Evaluations

In March 2009, West Yost completed a hydraulic evaluation of the Downtown Central Area to evaluate available supplies in the City's downtown area and address the loss of supply in the downtown area due to aging wells and water quality issues[5]. This evaluation also considered changes to demands in the downtown area based on densification of the mixed use land designations. Based on population projections, projected per capita water demand factors, and proposed land use designations for the downtown Central Area, a unit water demand factor was calculated for mixed use designations. The calculated mixed use water duty factor is used in the evaluation for 2035 GP land use changes.

[5] "Hydraulic Evaluation of the Downtown Central Area", TM, prepared by West Yost, March 12, 2009.

In May 2011, West Yost conducted a re-evaluation of the Downtown Central Area to determine what potential alternatives existed other than the March 2009 recommendation for increasing the pumping capacity of Well 172[6]. The recommendations of the May 2011 evaluation were to make distribution pipeline improvements to improve flow from Well 172 (as recommended in the March 2009 evaluation), but instead of upgrading the pumping capacity of Well 172, distribution system improvements should be made to convey supplies from Well 313 to the Downtown Central Area.

In July 2011, West Yost conducted additional evaluation of the downtown area to determine the impacts of proposed demands for the Fulton Corridor Specific Plan Project.

For purposes of this evaluation, it has been assumed that the pipeline and storage infrastructure recommendations from these prior hydraulic evaluations will be implemented by the City and will be available to serve the 2035 GP requirements.

Specific System Assumptions

The following specific assumptions have been made related to available water system facilities within the City's service area:

- The Northeast Surface Water Treatment Facility (SWTF) has a future production capacity of 60 million gallons per day (mgd) and a firm capacity of 54 mgd to serve maximum day and peak hour demands;
- The proposed Southeast SWTF has a production capacity of 80 mgd and a firm capacity of 72 mgd to serve maximum day and peak hour demands;
- The City's proposed future groundwater production capacity is assumed to be approximately 549 mgd with a firm capacity of 439 mgd to supplement the surface water supplies during maximum day and peak hour demand conditions, as calculated in the Metro Plan Update Phase 2;
- For peak hour demands, the City will supplement surface and groundwater supplies with existing and proposed storage tank capacity;
    - Northeast SWTF Clearwell (1.5 MG existing + 4.5 MG proposed)
    - T-1 and T-2 Southeast Tanks (2.0 MG existing + 2.0 MG proposed)
    - T-3 Tank (3.0 MG existing)
    - Southeast SWTF Clearwell (8.0 MG proposed)
    - T-4 Downtown Tank (3.0 MG proposed)
    - SEGA Tanks (2- 4.0 MG proposed)
    - T-5 Tank (3.0 MG proposed)
    - T-6 Tank (3.0 MG proposed)

[6] "Hydraulic Re-Evaluation of the Downtown Central Area Water Distribution System", TM, prepared by West Yost, May 10, 2011.

- Major regional transmission mains and transmission grid mains (TGMs) as recommended in the Metro Plan Update Phase 3 report are assumed to be active for the 2035 GP evaluation.

The City's planned water system facilities based on the 2025 GP are shown on Figure 5.

EVALUATION SCENARIOS

To evaluate the adequacy of the City's water system to serve the Proposed 2035 GP land use changes, West Yost has evaluated the City's system at buildout (2035) under the following two demand conditions:

- A future maximum day demand condition concurrent with fire flow demand while maintaining a minimum residual system pressure of 20 psi along the corridors with significant changes to future demands; and
- A peak hour demand condition while maintaining a minimum system pressure of 40 psi.

Figure 6 shows how the demands are changed based on the proposed 2035 GP land use for maximum day demands for the City. Figure 7 shows how the demands are changed based on the proposed 2035 GP land use for peak hour demands for the City.

EVALUATION FINDINGS

Storage Capacity Evaluation

Treated water storage capacity requirements for the City were evaluated based on the following three components: operational storage, emergency storage and fire storage. The principal advantage that storage provides is to equalize demands on supply sources and production facilities.

Table 4 shows the storage requirement calculated for the 2025 GP land use demands, the incremental increase to storage requirements based on the demand changes for the 2035 GP land use designations, and the available system storage and storage credits.

Table 4. City of Fresno Storage Requirements

Storage Component	Required Storage, MG
Required Storage - 2025 GP Land Use Demands	
Operational[(a)]	62.5
Emergency[(b)]	177.1
Fire Flow[(c)]	1.0
Subtotal 2025 GP Land Use	**240.6**
Required Storage - 2035 GP Incremental Increase	
Operational[(d)]	2.7
Emergency[(e)]	7.4
Fire Flow[(f)]	—
Subtotal 2035 GP Incremental Increase	10.1
Total System Storage 2035 GP Land Use	**250.7**
Available Storage and Storage Credits	
Planned Reservoir Capacity[(g)]	38.0
Emergency Storage Credit[(h)]	92.6
Operational Storage Credit[(i)]	60.9
Surface Storage Credit[(j)]	60.0
Total Available Storage and Storage Credits	**251.6**
Future System Storage Needs	
Total System Storage 2035 GP Land Use	250.7
Total Available Storage and Storage Credit	251.6
Future Storage Surplus (Deficit)[(k)]	**0.9**

(a) Based on 15 percent maximum day demand (MDD = 416.7 million gallons per day (mgd).
(b) Based on 85 percent of an average day demand (ADD = 208.4 mgd).
(c) Based on a fire flow of 4,000 gallons per minute (gpm) multiplied by a 4 hour duration.
(d) Based on 15 percent of maximum day demand resulting from change in demand due to 2035 General Plan Land Use update (MDD = 12,605 gpm).
(e) Based on 85 percent of an average day demand resulting from change in demand due to 2035 General Plan Land Use update (ADD = 6,033 gpm).
(f) Fire flow already accounted for in City-wide storage calculations and not needed for the incremental land use change.
(g) Assumes the following for reservoir capacity: 6.0 Million Gallons (MG) Northeast SWTF (1.5 MG existing + 4.5 MG future); 4.0 MG T-1 and T-2 Southeast Tank (2.0 MG existing + 2.0 MG future); 3.0 MG T-4 Downtown Tank; 8.0 MG SEGA Proposed; 8.0 MG Southeast SWTF; 3 MG Existing T-3; 3.0 MG Proposed T-5; and, 3.0 MG Proposed T-6.
(h) Equal to the sum of the groundwater pumping capacity of active wells with backup power. Minimum credit is zero, and the maximum credit is the recommended emergency storage capacity.
(i) 56 percent of the difference between the firm groundwater capacity and a maximum day demand. Minimum credit is zero and the maximum credit is the recommended operational storage capacity. Firm groundwater pumping capacity assumes 20 percent of groundwater production capacity is out of service (FPC = 522 mgd) Draft Chapter 4 in the Water Master Plan further defines operational storage credit assumptions.
(j) Equal to the capacity of the smallest surface water treatment facility.
(k) Equal to the difference between total available storage and storage credits, and the total required storage.

MG = Million Gallons

The City's Water Master Plan is evaluating the overall system and will make recommendations for overall system improvements, including recommendations for storage improvements. As shown in Table 4, the preliminary storage calculations indicate the City has planned for adequate storage to include the proposed 2035 GP land use changes.

Distribution System Evaluation

The impacts from the 2035 GP land use changes on the water system infrastructure proposed for the 2025 GP land use was evaluated using the City's hydraulic model. Scenarios were run for 2025 GP demands and 2035 GP demands under maximum day plus fire flow and peak hour conditions. The ability to maintain system pressure, velocity, and available fire flow criteria for the increase in demands due to the land use changes was evaluated. The evaluation results are described below.

Maximum Day Plus Fire Flow for 2025 GP Land Use

As discussed under the fire flow requirements section, the SEGA area was initially evaluated using a conservative fire flow of 4,000 gpm prior to a detailed land use plan being available. The required fire flow for the land use plan for the 2035 GP shows a reduction in the required fire flow for this area. Due to this conservative approach taken initially, it is assumed, for this evaluation, that the SEGA area has been adequately planned to meet fire flow requirements. In addition, the downtown area has been evaluated for fire flow requirements as part of the densification in the Central Area and the Fulton Corridor Specific Plan hydraulic analysis performed. Therefore, the maximum day plus fire flow evaluation for this TM examines the corridors along Blackstone Avenue, Shaw Avenue, and the southwest section of the City where demands are shown to increase due to the proposed change in land use.

The results of the maximum day demand plus fire flow condition for the system with the 2025 GP land use are shown on Figure 8. The available flow at nodes along Blackstone Avenue, Shaw Avenue, and the southwest corridors in the hydraulic model are shown assuming that a minimum system pressure residual of 20 psi is maintained. Nodes that are shown in "green" have available flows of 3,500 gpm or more, indicating that they meet the fire flow requirement. Nodes shown in "red" have available flows that are less than 3,500 gpm, indicating that they do not meet the fire flow requirement for the 2025 GP land use. As shown, a node along Blackstone Avenue near Shields Avenue does not meet the minimum of 3,500 gpm (see "red" node on Figure 8). The inability of this node to meet the required 3,500 gpm fire flow is due to the age and small diameter of the pipeline at this location. Therefore, specific infrastructure improvements to meet required fire flow in older areas of the City with small diameter pipelines are addressed as part of the system's rehab and replacement program for aging infrastructure.

It should be noted that the City's pipeline velocity criteria of a maximum of 10 fps during a simulated fire flow condition was not used as a constraint for this evaluation. Typically, the pipeline velocity criteria for fire flow conditions is used for planning and design of new pipelines, and not for evaluation of existing pipeline systems due to the fact that new criteria standards might have been put in place since the construction of these existing pipelines.

Maximum Day Plus Fire Flow for 2035 GP Land Use

The hydraulic model was used to run the maximum day plus fire flow for the updated demands based on the 2035 GP land use changes. The initial run for this scenario assumed no changes to infrastructure or operations of the City's system to assess whether required fire flow was impacted by the increased system demands. Results indicated additional locations were not able to meet the 3,500 gpm fire flow. However, the reduction in available fire flow was mitigated in the hydraulic model by adjusting the operational settings for wells. An additional six wells in the vicinity of Blackstone Avenue and Shaw Avenue were assumed to be active for the maximum day plus fire flow scenario with the increased demands. As shown on Figure 9, the changes to operational settings were able to mitigate the reduction in available fire flow.

The results for the maximum day plus fire flow scenarios for the change in demands indicate the infrastructure recommendations for the 2025 GP land use is adequate to convey the additional demand. Mitigation through operation of system wells addresses any reduction in available fire flow.

Peak Hour Demands for 2025 GP Land Use

The results of the peak hour demand condition for the buildout with the 2025 GP demands are shown on Figure 10. Figure 10 shows the system pressure at each node in the hydraulic model based on peak hour demand conditions. As shown, system pressures throughout most of the City are above the minimum pressure criteria of 40 psi (indicated by the "green" nodes). One location, in the northwest part of the City indicates pressures drop below the minimum pressure of 40 psi (indicated by the "red" nodes). This location is a subzone within the City's system and there are constraints to how water is conveyed to this area. Improvement options are being evaluated to determine how to best improve pressures to this area. The City's minimum peak hour pressure criterion is being met throughout the rest of the City with the infrastructure being proposed for the 2025 GP land use demands.

Peak Hour Demands for 2035 GP Land Use

The results of the peak hour demand condition for the buildout with the 2035 GP demands are shown on Figure 11. Figure 11 shows the system pressure at each node in the hydraulic model based on peak hour demand conditions. As shown, system pressures throughout most of the City are able to meet the minimum pressure criterion. The results indicate the area in the northwest is still below criteria but the remainder of the City is above the minimum criterion of 40 psi. Like the maximum day demand plus fire flow scenario, operational adjustments were made for the peak hour demand scenario to mitigate areas where pressure in the system had dropped due to the increase demands. An additional five wells were activated in the southwest area of the City to ensure the minimum pressure criterion was being met for this area. The operation of these additional wells was confirmed to be within the firm pumping capacity for groundwater for the City's supply availability. Therefore, no specific improvements are required for the peak hour demand condition based on the increase in demands due to the 2035 GP changes.

EVALUATION RECOMMENDATIONS

As indicated through the results from the system evaluations, the infrastructure recommended in the Metro Plan Update reports is adequate to convey the increased demands throughout the system. However, operational changes are needed to maintain system pressure and velocity criteria. In order to maintain pressure in the southwest area during peak hour conditions, the City will need to operate additional wells without exceeding the firm production capacity of their groundwater supply. For maximum day demand plus fire flow conditions the City will also need to rely on additional wells to provide required fire flow to the corridors where demands have been increased.

This evaluation looked at the impact of the increased demands due to the 2035 GP land use changes on the City's infrastructure's ability to maintain minimum system service standards. The evaluation did not look at specific recommendations for distribution system infrastructure improvements to address localized pressure or available fire flow conditions. The City's Water Master Plan is evaluating the overall system and will make recommendations for overall system improvements, including recommendations to address localized areas of concern such as pipeline rehab and replacement for older areas of the City. Generally, however, the existing and planned infrastructure improvements are capable of meeting 2035 GP demands.

The recommendations in this TM are based on the general land use data available for the 2035 GP. As projects develop with more specific information, additional evaluation will need to be conducted to confirm the local distribution system and infrastructure is adequate to maintain the City system criteria.

2035 GENERAL PLAN LAND USE

Residential
- Low Density (1-3 D.U./acre)
- Medium Low Density (3.5-6 D.U./acre)
- Medium Density (5.0 - 12 D.U./acre)
- Medium High Density (12-16 D.U./acre)
- Urban Neighborhood (16-30 D.U./acre)
- High Density (30-45 D.U./acre)

Industrial
- Light Industrial
- Heavy Industrial

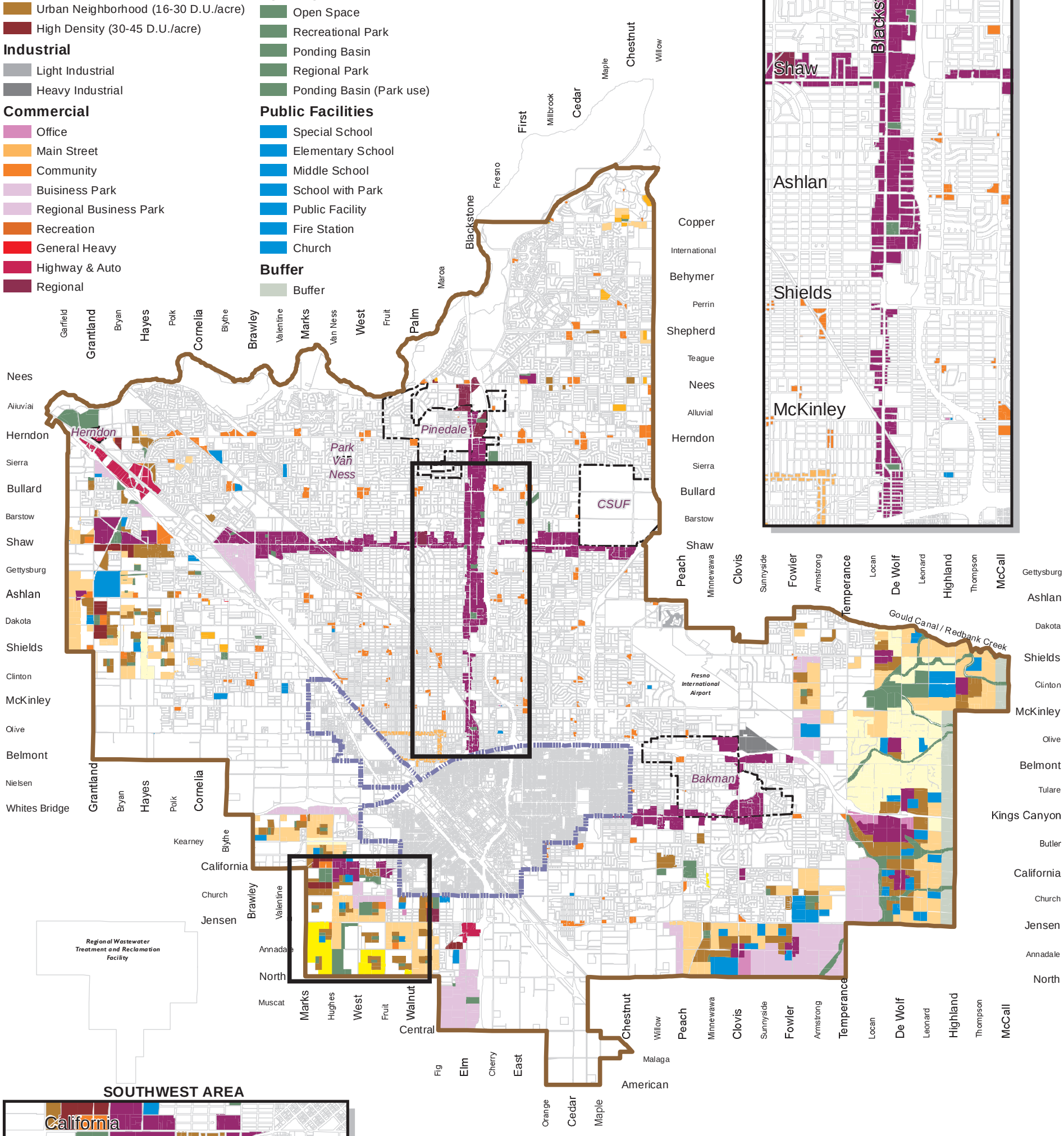
Commercial
- Office
- Main Street
- Community
- Buisiness Park
- Regional Business Park
- Recreation
- General Heavy
- Highway & Auto
- Regional

Mixed Use
- Corridor/Center Mixed Use
- Regional Mixed Use
- Neighborhood Mixed Use

Open Space
- Open Space
- Recreational Park
- Ponding Basin
- Regional Park
- Ponding Basin (Park use)

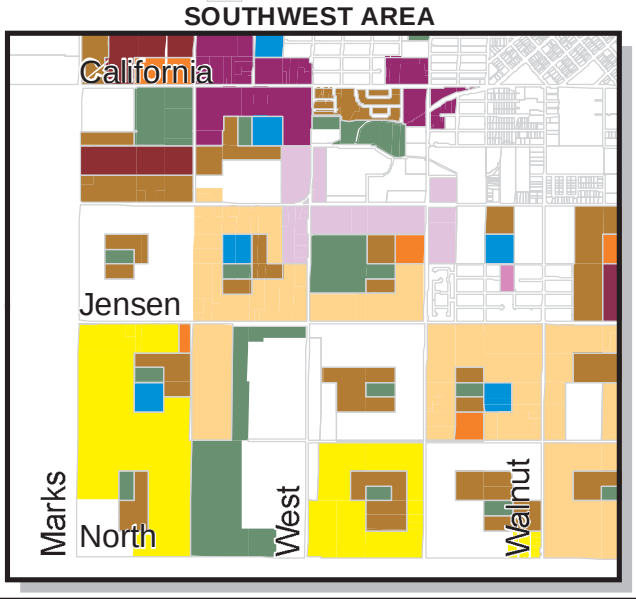
Public Facilities
- Special School
- Elementary School
- Middle School
- School with Park
- Public Facility
- Fire Station
- Church

Buffer
- Buffer



BLACKSTONE AREA

SOUTHWEST AREA



Note:
- Land use only shown for areas where 2035 General Plan Update is proposing a change to the 2025 General Plan Land use.
- Downtown Area land use expected to be refined through specific and community plans.
- Areas with land use change based on GIS data provided by the City.

LEGEND
- Independent Water System
- Downtown Boundary
- Sphere of Influence

N

0 1 2
Miles

FIGURE 1

City of Fresno
General Plan Land Use Change Evaluation

2035 GENERAL PLAN LAND USE CHANGE AREAS

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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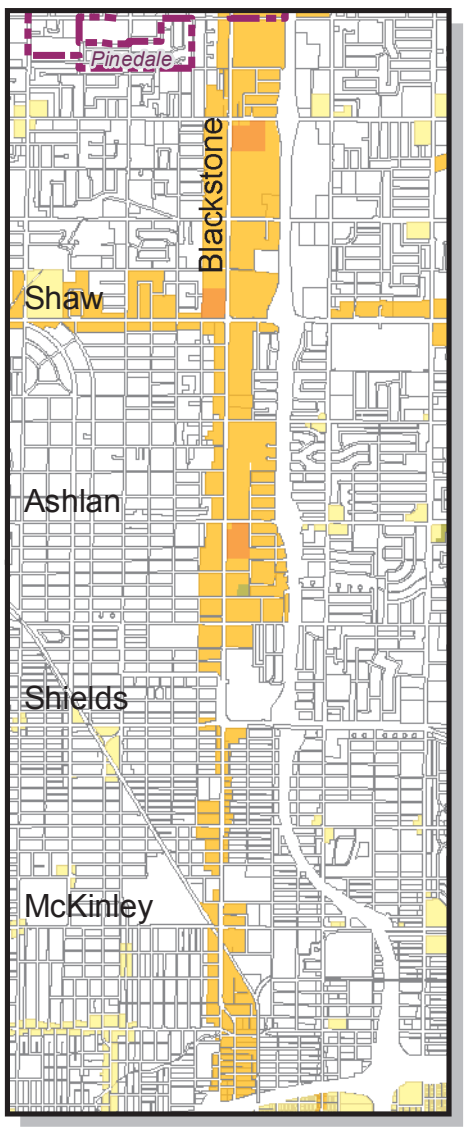
Last Saved: 12/11/2012 10:23:18 AM bestrada: N:\Clients\439 Fresno\00-12-11 MEIR Support\GIS\Figures\Fig2 Annual Demand.mxd

Annual Demand Comparison

- -232 to -100 afa (decrease)
- -100 to -50 afa (decrease)
- -50 to 0 afa (decrease)
- 0 afa (no change)
- 0 to 50 afa (increase)
- 50 to 100 afa (increase)
- 100 to 375 afa (increase)

Blackstone Area

- 2025 General Plan Demands = 1,567 afa
- 2035 General Plan Demands = 4,410 afa
- Difference in Demands = 2,844 afa



Southwest Area

- California on North, North on South, Marks on West, and Walnut on East
- 2025 General Plan Demands = 2,746 afa
- 2035 General Plan Demands = 3,403 afa
- Difference in Demands = 657 afa

Note:

- Demand change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to demands shown on a per parcel basis calculated based on parcel acreage.
- Planned land use changes for 2035 General Plan result in an overall system increase of 10,172 afa (Downtown Area, not shown, increase of 3,896 afa, SEGA decrease of 4,485, and remainder area of the City increase of 10,761 afa.)

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

N

0 1 2

Miles

FIGURE 2

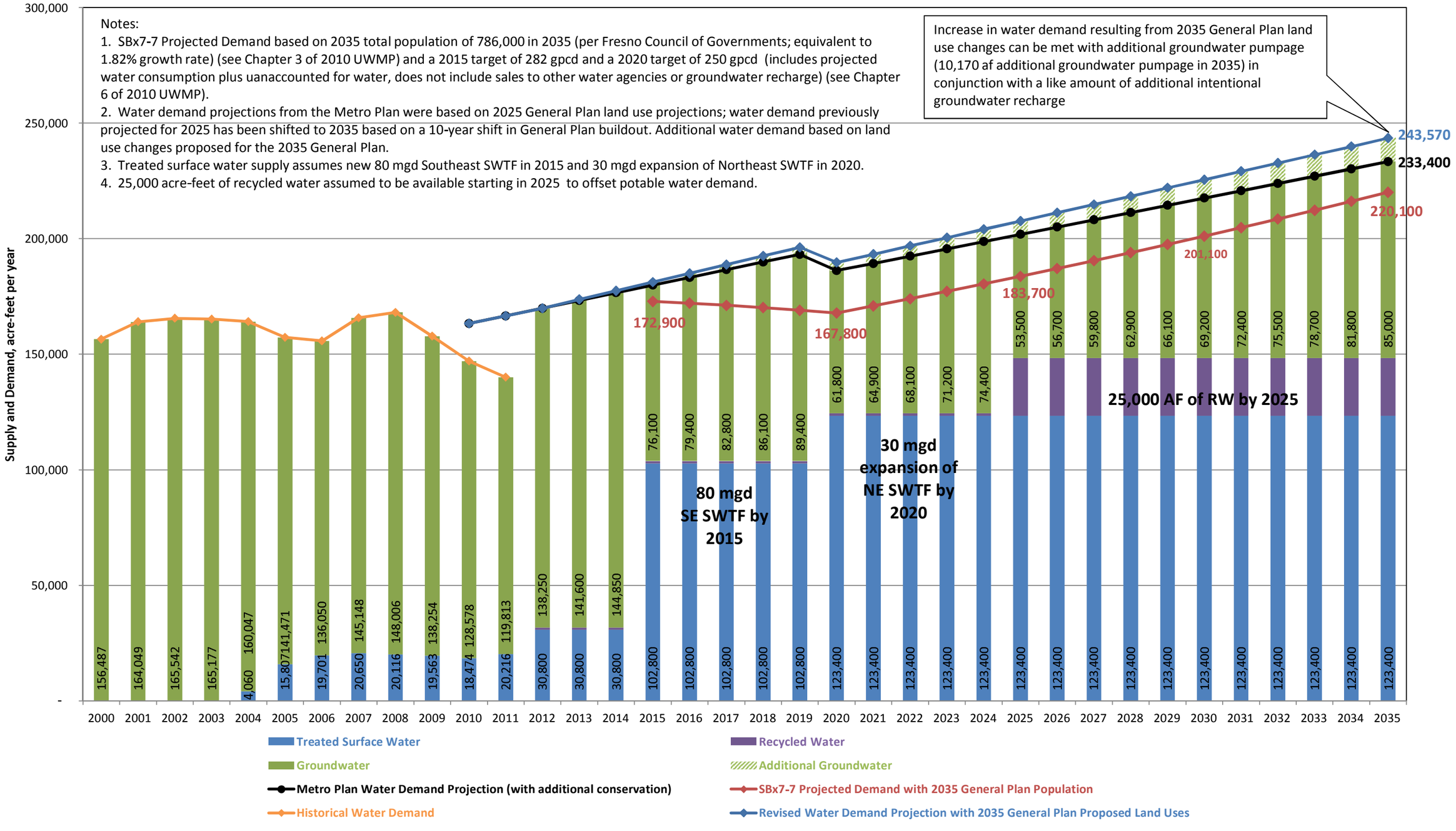
City of Fresno General Plan Land Use Change Evaluation

CHANGES TO ANNUAL DEMANDS

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

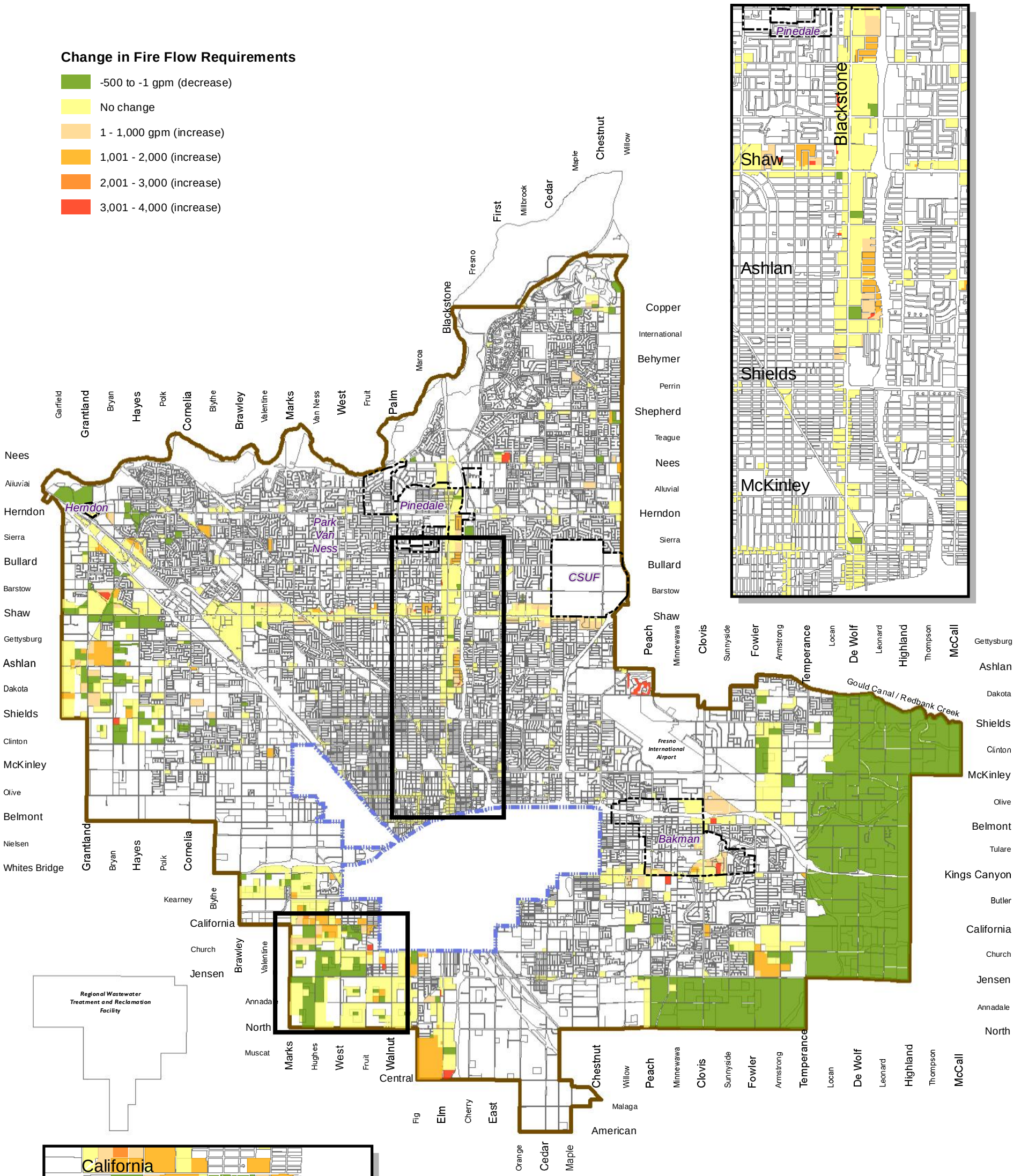
Figure 3. Changes to Future Supply and Demand



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Change in Fire Flow Requirements

- -500 to -1 gpm (decrease)
- No change
- 1 - 1,000 gpm (increase)
- 1,001 - 2,000 (increase)
- 2,001 - 3,000 (increase)
- 3,001 - 4,000 (increase)



Note:
- Fire Flow requirement change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to fire flow requirements shown on a per parcel basis
- Fire flow demand requirements based on 20 psi residual:
  Single family residential = 2,000 gpm (2 hours)
  Multi-family residential = 3,000 gpm (3 hours)
  Commercial/Institutiional = 3,500 gpm (4 hours)
  Industrial = 4,000 gpm (4 hours)

FIGURE 4

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

N

0 1 2

Miles

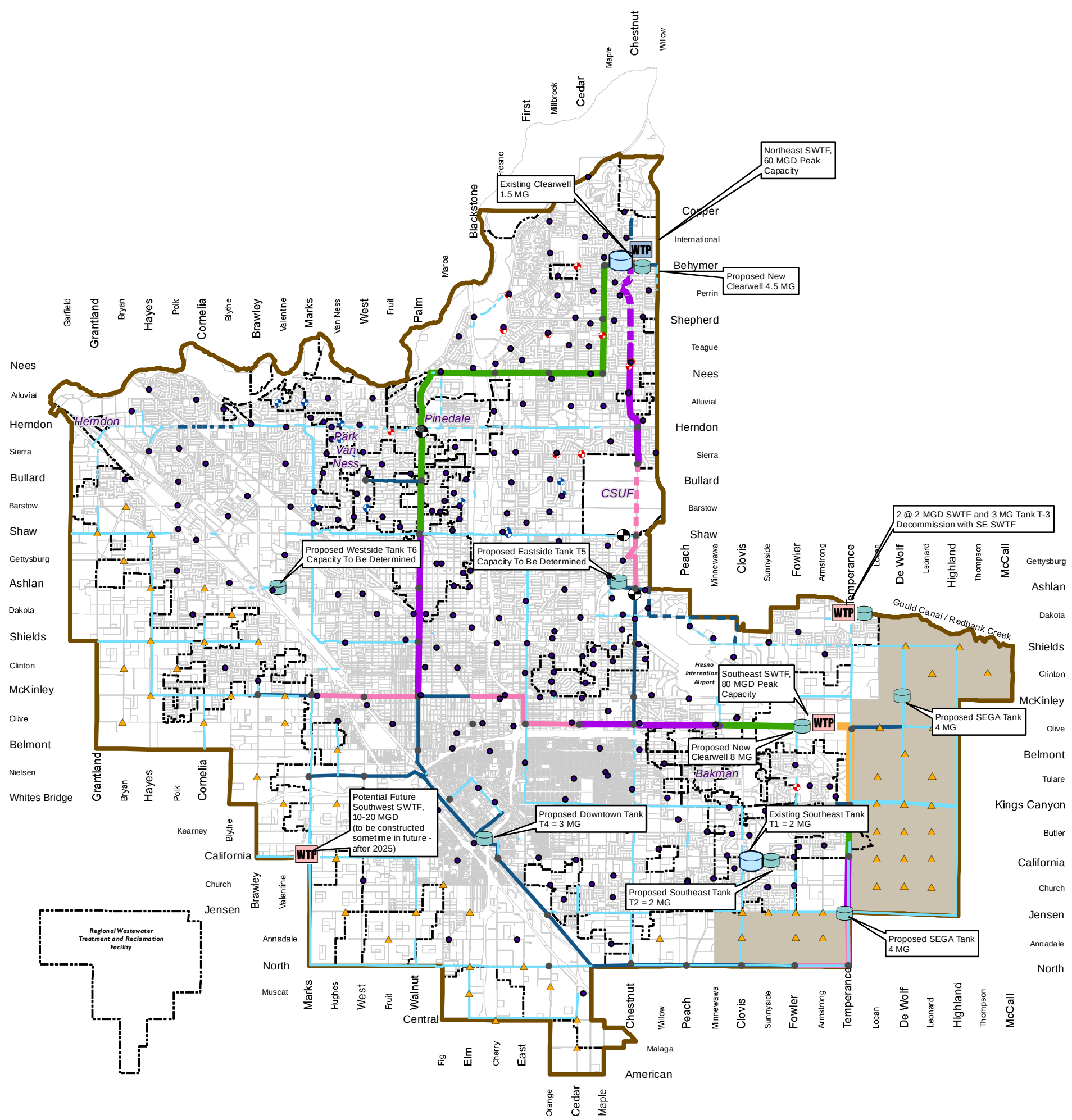
City of Fresno
General Plan Land Use Change Evaluation

CHANGES TO FIRE FLOW REQUIREMENTS

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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LEGEND

- WTP — Existing Water Treatment Plant
- Proposed Tank Site
- WTP — Future Water Treatment Plant
- Future Pressure Reducing Valve
- TGM Tie-in Location
- Existing Well
- Future Well 2010-2025
- Existing City Limit
- Sphere of Influence
- Independent Water System
- Southeast Growth Area
- 16-inch Diameter
- 24-inch Diameter
- 30-inch Diameter
- 36-inch Diameter
- 42-inch Diameter
- 48-inch Diameter

Note:
- Dashed line indicates an existing pipeline
- Infrastructure shown proposed in the Metro Plan Update Phase 3.
- New well locations shown are for display purposes. The City will conduct well siting studies to determine actual well locations.

N

0 1 2
Miles

FIGURE 5

City of Fresno General Plan Land Use Change Evaluation

2025 PROPOSED REGIONAL AND TGM INFRASTRUCTURE

City of FRESNO

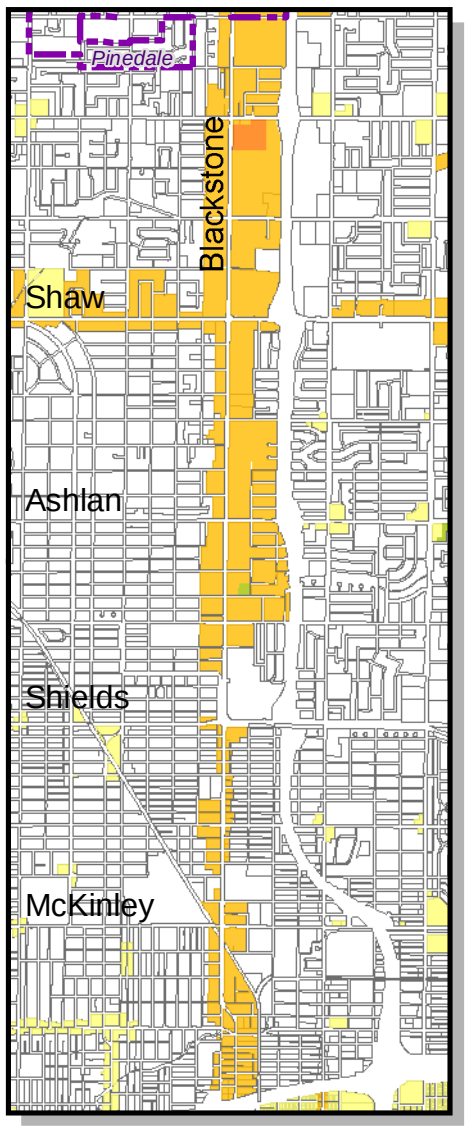
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Consulting Engineers

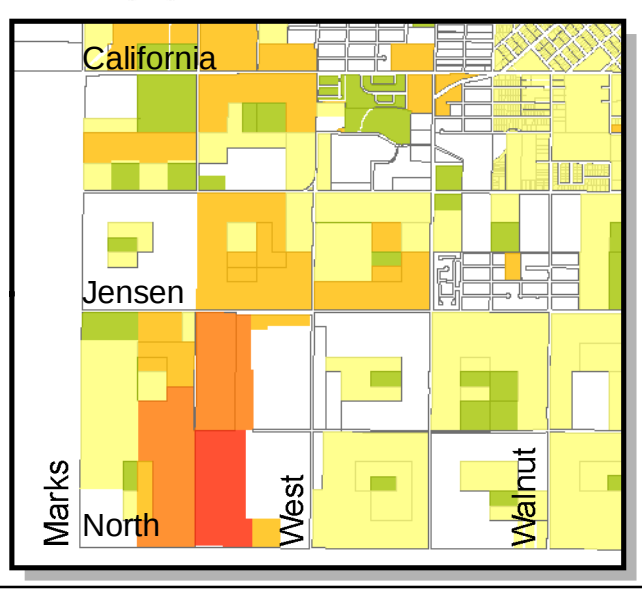
Maximum Day Demand Comparison

- -288 to -150 gpm (decrease)
- -150 to -75 gpm (decrease)
- -75 to 0 gpm (decrease)
- 0 gpm (no change)
- 0 to 75 gpm (increase)
- 75 to 150 gpm (increase)
- 150 to 465 gpm (increase)

Blackstone Area

- 2025 General Plan Demands = 1,942 gpm
- 2035 General Plan Demands = 5,466 gpm
- Difference in Demands = 3,524 gpm





Southwest Area

- 2025 General Plan Demands = 3,403 gpm
- 2035 General Plan Demands = 4,216 gpm
- Difference in Demands = 813 gpm

Note:

- Demand change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to demands shown on a per parcel basis calculated based on parcel acreage.
- Planned land use changes for 2035 General Plan result in an overall system increase of 12,605 gpm for maximum day demands.

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

0 1 2 Miles

FIGURE 6

City of Fresno General Plan Land Use Change Evaluation

CHANGES TO MAX DAY DEMANDS

City of FRESNO

WEST YOST ASSOCIATES Consulting Engineers

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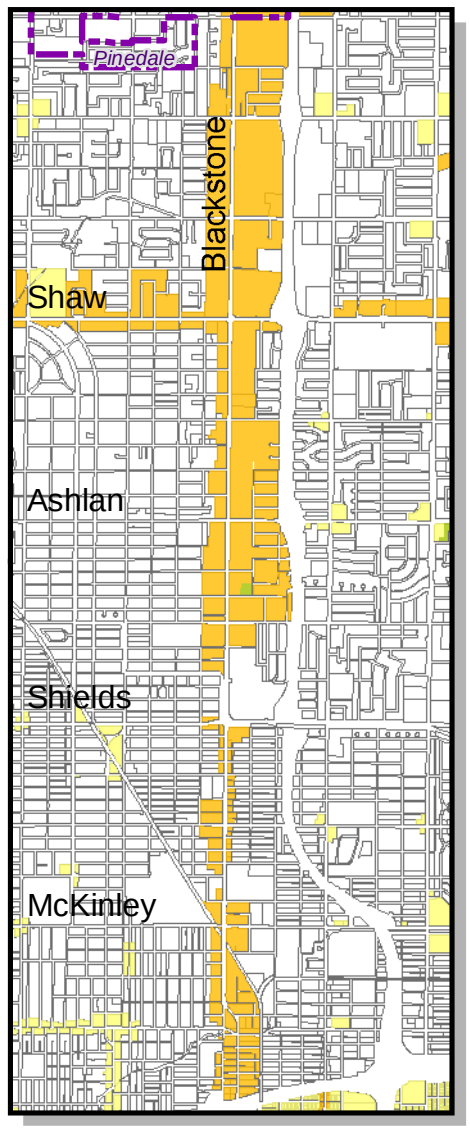
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Peak Hour Demand Comparison

- -418 TO -300 gpm (decrease)
- -300 to -150 gpm (decrease)
- -150 to 0 gpm (decrease)
- 0 gpm (no change)
- 0 to 150 gpm (increase)
- 150 to 300 gpm (increase)
- 300 to 674 gpm (increase)

Blackstone Area

- 2025 General Plan Demands = 2,816 gpm
- 2035 General Plan Demands = 7,926 gpm
- Difference in Demands = 5,110 gpm



Southwest Area

- 2025 General Plan Demands = 4,934 gpm
- 2035 General Plan Demands = 6,114 gpm
- Difference in Demands = 1,180 gpm

Note:

- Demand change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to demands shown on a per parcel basis calculated based on parcel acreage.
- Planned land use changes for 2035 General Plan result in an overall system increase of 18,278 gpm for peak hour demands.

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

Proposed Transmission Pipelines

- 16-inch Diameter
- 24-inch Diameter
- 30 to 36-inch Diameter
- 42 to 48-inch Diameter

N

0 1 2

Miles

FIGURE 7

City of Fresno General Plan Land Use Change Evaluation

CHANGES TO PEAK HOUR DEMANDS

City of FRESNO

WEST YOST ASSOCIATES Consulting Engineers

Note:
- Demand based on proposed 2025 General Plan land use
- Availalbe fire flow shown for 20 psi residual

LEGEND

Required Fire Flow (2025 GP)
- No Fire Flow
- 2,000 gpm
- 3,000 gpm
- 3,500 gpm
- 4,000 gpm

Available Fire Flow
- Less than 3,500 gpm
- 3,500 gpm and Greater
- Distribution Pipeline
- Transmission Pipeline

0 1 2
Miles

FIGURE 8

City of Fresno General Plan Land Use Change Evaluation

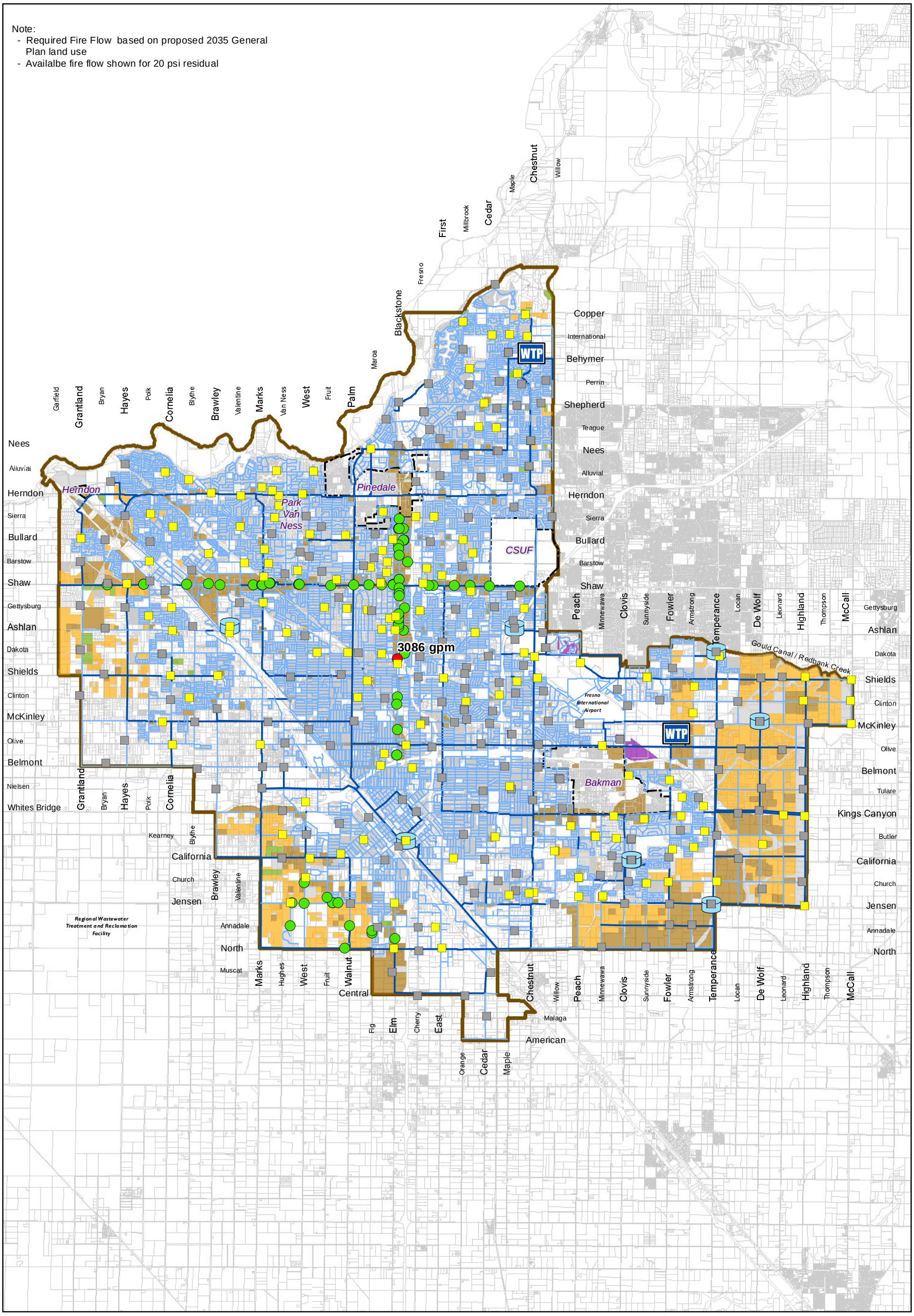
2025 GENERAL PLAN AVAILABLE FIRE FLOW

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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Note:
- Required Fire Flow based on proposed 2035 General Plan land use
- Availalbe fire flow shown for 20 psi residual



LEGEND

Required Fire Flow (2035 GP)
- No Fire Flow
- 2,000 gpm
- 3,000 gpm
- 3,500 gpm
- 4,000 gpm

Available Fire Flow
- Less than 3,500 gpm
- 3,500 gpm and Greater
- Distribution Pipeline
- Transmission Pipeline

N

0 1 2
Miles

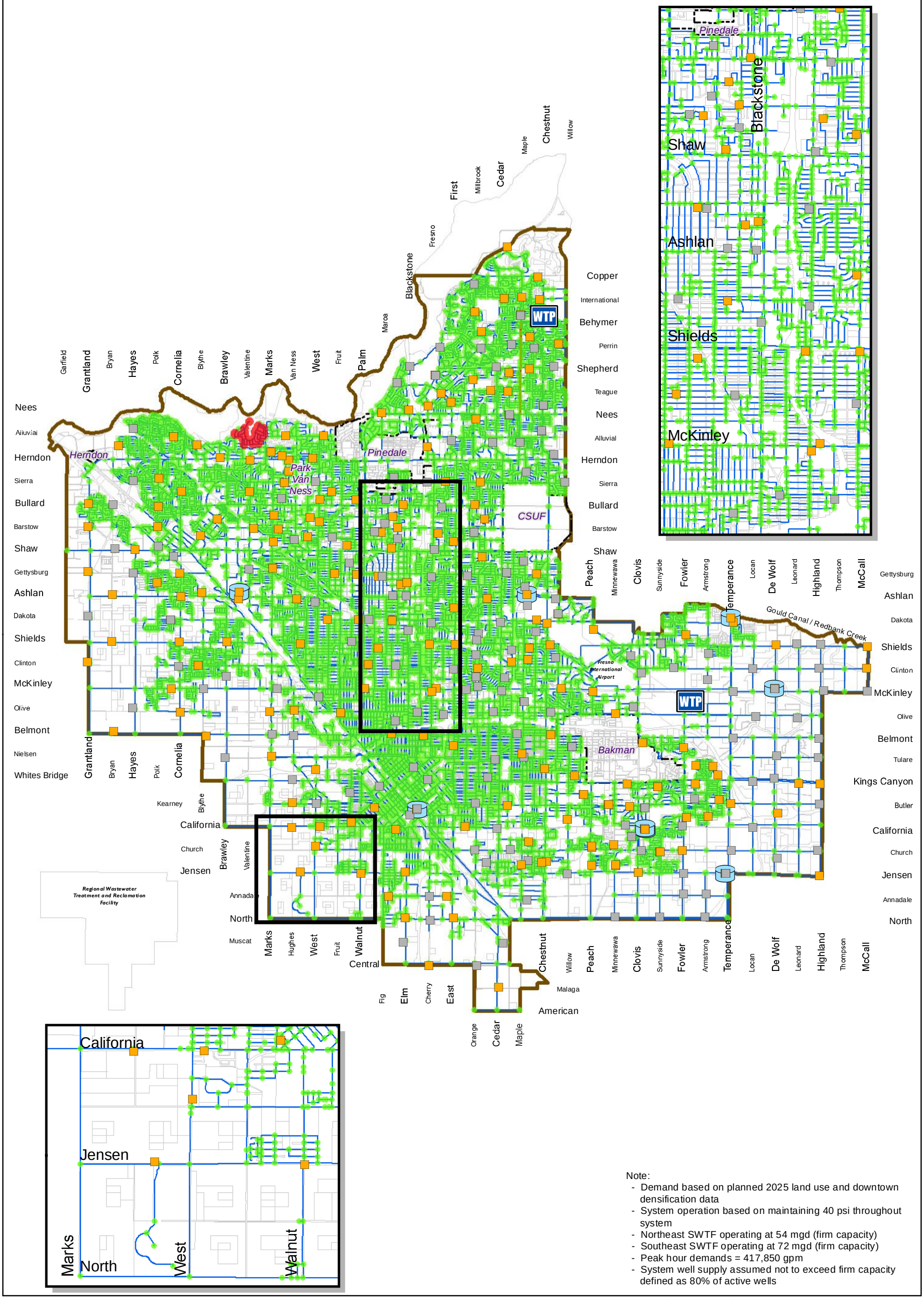
FIGURE 9

City of Fresno
General Plan Land Use Change Evaluation
2035 GENERAL PLAN AVAILABLE FIRE FLOW

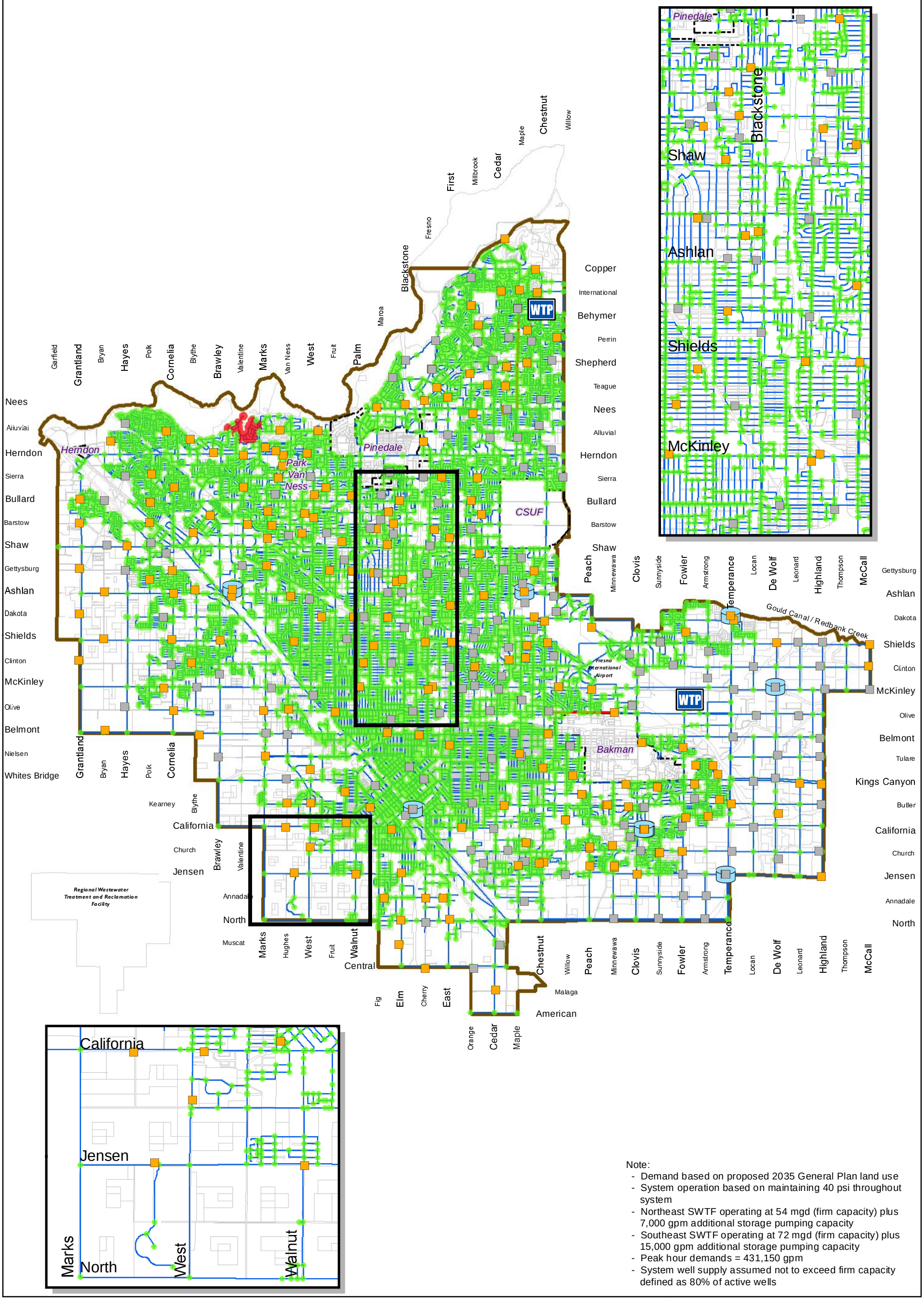
City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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Note:
- Demand based on proposed 2035 General Plan land use
- System operation based on maintaining 40 psi throughout system
- Northeast SWTF operating at 54 mgd (firm capacity) plus 7,000 gpm additional storage pumping capacity
- Southeast SWTF operating at 72 mgd (firm capacity) plus 15,000 gpm additional storage pumping capacity
- Peak hour demands = 431,150 gpm
- System well supply assumed not to exceed firm capacity defined as 80% of active wells

LEGEND

System Pressure
- Less than 40 psi (Below Criteria)
- 40 psi and Greater

Pump Status
- Inactive
- Active

Distribution Pipeline (Less than 18")
- 7 fps or Less
- Greater than 7 fps

Transmission Pipeline (18" and greater)
- 5 fps or Less
- Greater than 5 fps

N

0 1 2
Miles

FIGURE 11

City of Fresno General Plan Land Use Change Evaluation

2035 GENERAL PLAN PEAK HOUR RESULTS

City of FRESNO

WEST YOST ASSOCIATES Consulting Engineers

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Appendix B

WEST YOST ASSOCIATES



TECHNICAL MEMORANDUM

DATE: July 22, 2011 Project No.: 439-02-10-07

TO: Brock Buche, City of Fresno Water Division Project Manager
Martin Querin, City of Fresno Assistant Public Utilities Director—Water Division

FROM: Brenda Estrada, Project Engineer, R.C.E. #67062
Elizabeth Drayer, Project Engineer, R.C.E. #46872

REVIEWED BY: Charles Duncan, Project Manager, R.C.E. #55498

SUBJECT: Hydraulic Evaluation of the Proposed Fulton Corridor Specific Plan Project

INTRODUCTION

The purpose of this memorandum is to present West Yost Associates' (West Yost's) evaluation of the potential hydraulic impacts on the City of Fresno (City) water system of the proposed Fulton Corridor Specific Plan Project (Proposed Project) located in the City's downtown area. As described in this memorandum, West Yost has used the City's water system hydraulic model to evaluate the ability of the City's existing water system to provide minimum required pressures and flows under the future, projected demands associated with the buildout of the Proposed Project. Our findings and recommendations for water system infrastructure improvements to serve the Proposed Project are described below.

PROJECT DESCRIPTION

The Proposed Project is located in the City's Downtown area and encompasses several distinct center city areas (districts) including the Central Business District, the Cultural Arts District, the South Stadium zone, and Chinatown. As shown on Figure 1, the approximate boundaries of the Proposed Project are East Divisadero Street to the north, N and O Streets to the east, Highway 41 to the south, and Highway 99 to the west. In all, the combined Proposed Project area comprises approximately 440 acres and includes a mix of multi-family residential, industrial mixed use, office and retail land uses.

As described below, three different land use development scenarios for the Proposed Project have been evaluated by Sherwood Design Engineers (Sherwood) based on a range of Floor Area Ratio (FAR) assumptions. The total building area for the three development scenarios ranges from 5.2 million square feet for the minimum proposed FAR scenario to 14.1 million square feet for the maximum proposed FAR scenario.

PROJECTED WATER DEMANDS

The analysis of the potable water demand within the Proposed Project was performed by Sherwood[1]. The demand analysis utilized the proposed building areas and FARs as developed by Moule & Polyzoides (M&P) and the Project planning team. The water demands were calculated for each development scenario using water demand rates based on built area per land use types. Unit water use factors were based on the increased densification and proposed land uses for underutilized parcels included in each district within the Proposed Project area and were taken from Sherwood's existing internal data/research and cross-referenced with the City of Oakland's land use demand values[2]. Proposed average daily flow rates per district were calculated as weighted averages based on M&P's distribution of land uses within each district.

Table 1 provides a summary of the unit water use factors used by Sherwood for each district for the evaluation.

Table 1. Summary of Unit Water Use Factors Used for Proposed Project

District	Unit Water Use Factor, gallons per day per 1,000 square feet
Central Business District 1 (CBD1)	204
Central Business District 2 (CBD2)	202
Civic Center	210
Chinatown District	196
Cultural Arts/South Stadium District	192
Chinatown Industrial District	150
Town Center	210
Neighborhood General	200
Neighborhood General Preservation	200
Special District	130

Source: Sherwood Design Engineers Water Demand Calculations received May 23, 2011 (FCSP_Water_Analysis_110513.pdf) (Water_Flow_SP.xlsx).

Three development scenarios were evaluated by Sherwood:

- A minimum buildout scenario (minimum FAR),
- A median buildout scenario (median FAR), and
- A maximum buildout scenario (maximum FAR).

---

1 Sherwood Design Engineers Water Demand Calculations received May 23, 2011 (FCSP_Water_Analysis_110513.pdf) (Water_Flow_SP.xlsx).

2 The data available for the City of Oakland was based on estimated wastewater flows for various types of development. To back-calculate water use based on this data, the estimated wastewater flows were multiplied by a factor of 1.20 to account for consumptive water uses which do not result in wastewater flows.

Table 2 provides a summary of the calculated water demands for the three development scenarios evaluated by Sherwood for the Proposed Project. Demands were calculated for underutilized parcels within the Proposed Project area, such that the calculated additional demand represents the projected demand associated with the Proposed Project for various FAR scenarios. Based on the current land use of the underutilized parcels, the existing demand was estimated at 170,822 gallons per day (gpd), or 191 acre-feet per year (af/yr). The estimated water demands on other parcels within the Proposed Project were assumed not to change. A copy of Sherwood's water demand calculation spreadsheet showing the calculated water demand for each underutilized parcel for each development scenario is provided in Attachment 1.

Table 2. Summary of Projected Water Demand for Various Development Scenarios

Development Scenario	Total Projected Building Area on Underutilized Parcels, square feet	Existing Demand on Underutilized Parcels, gpd	Additional Demand on Underutilized Parcels as a result of Proposed Project, gpd	Total Demand on Underutilized Parcels within Proposed Project Area, gpd	Total Existing Demand on All Parcels within Proposed Project Area, gpd	Total Demand within Proposed Project Area, gpd
		[1]	[2]	[3] = [1] + [2]	[4]	[5] = [2] + [4]
Minimum Buildout Scenario (Minimum FAR)	5,240,428	170,822	870,835	1,041,656	683,983	1,554,818
Median Buildout Scenario (Median FAR)	9,572,280	170,822	1,733,744	1,904,565	683,983	2,417,727
Maximum Buildout Scenario (Maximum FAR)[(a)]	14,123,642	170,822	2,637,503	2,808,324	683,983	3,321,486

Source: Sherwood Design Engineers Water Demand Calculations received May 23, 2011 (FCSP_Water_Analysis_110513.pdf) (Water_Flow_SP.xlsx).

[(a)] The Maximum Buildout Scenario (Maximum FAR) is the basis for West Yost's analysis.

For purposes of West Yost's hydraulic evaluation of the Proposed Project, West Yost has evaluated the water demands associated with only the maximum buildout (maximum FAR) development scenario which equate to an additional average day demand of approximately 2.6 million gallons per day, which equals an additional annual demand of 2,955 af/yr.

Figure 2 shows the projected demands by parcel within the Proposed Project area for the maximum buildout development scenario.

WATER SUPPLY

As described in the City's Metro Plan Update, the City's Water Master Plan, and West Yost's March 2009 Technical Memorandum "Hydraulic Evaluation of the Downtown Central Area," the City's available water supplies are limited to a finite quantity and are extremely limited. As shown in Table 2, the estimated annual demand for the maximum buildout scenario for the Proposed Project will further increase required water supplies by an additional 2,955 af/yr. Water supplies to meet this estimated additional demand must come from within the City's existing, limited water supply portfolio and may need to be "imported" from other parts of the City and/or require reduced water use (additional water conservation) in other parts of the City.

Water supplies for the Proposed Project will probably need to be evaluated as part of an SB 610 Water Supply Assessment to evaluate the availability and reliability of the City's water supplies to meet the projected increased water demands of the Proposed Project under various hydrologic conditions and whether these demands were anticipated as part of the City's most recent Urban Water Management Plan.

EVALUATION CRITERIA

Planning and Modeling Criteria

The planning and modeling criteria used for this evaluation are based on West Yost's recent work with the City. The August 2008 verified hydraulic model of the City's water distribution system was used as the basis for the evaluation. The criteria used to evaluate the potential impacts to the City's existing water system are as follows:

- Minimum peak hour demand pressure 40 pounds per square inch (psi);
- Maximum allowable velocity is 7 feet per second (fps) during a peak hour condition;
- Maximum day plus fire flow residual pressure at the flowing hydrant must be equal to or greater than 20 psi;
- Maximum allowable velocity is 10 fps during the simulated fire flow condition[3];
- Maximum allowable head loss rate is 10 feet per 1,000 feet during any condition[4];
- Any new, required pipelines will be modeled with a roughness coefficient (C-factor) of 130;

[3] This criteria was developed primarily for new development; ability to meet this criteria within existing distribution systems (such as that in the City's downtown area) can be difficult due to existing small diameter pipelines and aging pipelines.

[4] This criteria was developed primarily for new development; ability to meet this criteria within existing distribution systems (such as that in the City's downtown area) can be difficult due to existing small diameter pipelines and aging pipelines.

- Assumed peaking factors for maximum day and peak hour demand conditions are consistent with the City's adopted peaking factors and are as follows:
  - Maximum Day Demand = 2.0 times Average Day Demand
  - Peak Hour Demand = 2.9 times Average Day Demand

Fire Flow Requirements

Fire flow requirements based on proposed land use for each parcel were determined by Sherwood and were based on the California Building Code (CBC) and the 2007 California Fire Code (CFC) (Table B105.1). Sherwood assumed maximum potential building footprints for each parcel and assumed CBC construction type (IA, IIIB, etc.) for each land use zone based on the building type with the maximum FAR. Based on this methodology, fire flow requirements of up to 6,250 gallons per minute (gpm) for a four-hour duration were identified for some of the parcels. The projected fire flow requirements by parcel are shown on Figure 3. A copy of Sherwood's fire flow calculation spreadsheet showing the calculated fire flow requirement by parcel is provided in Attachment 2.

Some of the larger buildings included in the Proposed Project will be fully sprinklered which results in a reduction of the required fire flow. Therefore, based on direction received from Byron Beagles (City of Fresno Fire Prevention Engineer), a fire flow requirement of 3,500 gpm for a four-hour duration with a minimum 20 psi residual pressure will be assumed for the Proposed Project[5].

It should be noted that evaluated fire flows and residual pressures are based on ground surface elevations, and do not account for required minimum water service pressures on higher floors in multi-story buildings. As such, utility system designs for some buildings within the Proposed Project may require the provision of booster pumps to provide adequate water service pressures on higher floors and for fire suppression systems.

Although these criteria have been established, and used to size new pipelines, the existing system in the City's downtown area should be evaluated using pressure as the primary criterion. Secondary criteria, such as velocity, head loss, age, and material type, are used as indicators for areas of the water system that also may need improvements, but may not be required as part of this evaluation.

[5] February 6, 2011 e-mail from Byron Beagles to Brock Buche, re: Fire Flow Requirements.

WATER SYSTEM FACILITY ASSUMPTIONS

Recommendations from Previous Evaluations

In March 2009, West Yost completed a hydraulic evaluation of the Downtown Central Area to evaluate available supplies in the City's downtown area and address the loss of supply in the downtown area due to aging wells and water quality issues[6]. The following recommendations for water system improvements were made:

- Additional storage to increase system reliability during peak hour and fire flow conditions;
- Replacement or rehabilitation of Wells 1A and 21A;
- Upgrade of Well 172 pumping capacity along with associated distribution system improvements from Well 172 to the City's downtown area; and
- Addition of 24-inch and 16-inch diameter pipelines through the Central Area to support integrating surface water supply from the east and continuing the City's goal of developing opportunities to transition their predominate groundwater supply to a more balanced conjunctive use system.

In May 2011, West Yost conducted a re-evaluation of the Downtown Central Area to determine what potential alternatives existed other than the March 2009 recommendation for increasing the pumping capacity of Well 172[7]. The recommendations of the May 2011 evaluation were to make distribution pipeline improvements to improve flow from Well 172 (as recommended in the March 2009 evaluation), but instead of upgrading the pumping capacity of Well 172, distribution system improvements should be made to convey supplies from Well 313 to the Downtown Central Area.

For purposes of this evaluation, it has been assumed that the pipeline and storage infrastructure recommendations from these prior hydraulic evaluations of the Downtown Central Area without the pumping capacity increase of Well 172 will be implemented by the City and will be available to serve the Proposed Project.

Specific Facility Assumptions

The following specific assumptions have been made related to available water system facilities and other water demands within the City's service area:

- Wells 1A and 21A in the City's downtown area (located just northeast of the Proposed Project) area are assumed to be inactive;

[6] "Hydraulic Evaluation of the Downtown Central Area", Technical Memorandum, prepared by West Yost Associates, March 12, 2009.

[7] "Hydraulic Re-Evaluation of the Downtown Central Area Water Distribution System", Technical Memorandum, prepared by West Yost Associates, May 10, 2011.

- New Well 1B (located just outside the City's downtown area) is assumed to be operational and active (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area as a replacement for Wells 1A and 21A);
- The new 3.0 million gallon (MG) Downtown tank and associated pipelines (along Nielsen Avenue and G Street) (currently under design) are assumed to be operational (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area);
- The distribution system improvements from Well 172 to the Central Area are assumed to be operational. The associated distribution system improvements include a new 16-inch diameter pipeline south along Hughes Avenue and a new 24-inch diameter pipeline along Nielsen Avenue to convey supplies from Well 172 to the Central Area (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area);
- A 12-inch diameter connection at West Avenue to the 24-inch diameter pipeline in Nielsen Avenue to convey supplies from Well 313 to the Central Area is assumed to be operational (recommended as part of West Yost's May 2011 Hydraulic Re-Evaluation of the Downtown Central Area Water Distribution System);
- New 24-inch and 16-inch diameter pipelines through the Central Area along G Street, Ventura Street, O Street and Stanislaus Street are assumed to be operational to support integrating surface water supply from the east and continuing the City's goal of developing opportunities to transition their predominate groundwater supply to a more balanced conjunctive use system (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area);
- The new Chestnut Avenue transmission pipeline from the City's Northeast Surface Water Treatment Facility (SWTF) is assumed to be operational;
- The regional Transmission Grid Mains (TGMs) are included and assumed to be operational;
- Future water demands in the southwest part of the City service area are included (per June 8, 2011 e-mail from Brock Buche, the City's Development Department has indicated that development in the southwest part of the City will occur concurrently with the Proposed Project);
- The proposed new Southeast SWTF is <u>not</u> included; and
- Future water demands associated with the Southeast Growth Area (SEGA) are <u>not</u> included.

The City's assumed water system facilities available to serve the Proposed Project in the downtown area are shown on Figure 4.

EVALUATION SCENARIOS

As described above, only the maximum buildout (maximum FAR) development scenario of the Proposed Project has been analyzed by West Yost for this evaluation; no other development scenarios or phasing plans were evaluated.

To evaluate the adequacy of the City's water system to serve the Proposed Project, West Yost has evaluated buildout of the Proposed Project under the following two demand conditions:

- A future maximum day demand condition concurrent with a 3,500 gpm fire flow demand while maintaining a minimum residual system pressure of 20 psi; and
- A peak hour demand condition while maintaining a minimum system pressure of 40 psi.

EVALUATION FINDINGS

Storage Capacity Evaluation

Treated water storage capacity requirements for the City were evaluated based on the following three components: operational storage, emergency storage and fire storage. The principal advantage that storage provides is to equalize demands on supply sources and production facilities. The City's Metro Plan Update and Water Master Plan both indicate a need for water storage in the City's downtown area.

West Yost's March 2009 evaluation of the City's Central Area recommended that approximately 3 million gallons (MG) of storage be constructed in the City's Central Area to increase system reliability during peak hour and fire flow conditions. As described above, a new 3 MG Downtown Tank is currently under design and is assumed to be operational for the purposes of this evaluation. However, the required storage capacity previously calculated for the City's Central Area did not take into account the increased densification associated with the Proposed Project. This increased densification will increase the need for storage in the City's Downtown area. Table 3 shows the increased storage requirement attributed to the increased demands associated with the Proposed Project.

Table 3. Additional Storage Required Due to Densification Associated with Proposed Project

Storage Component	Required Storage based on Current Buildout of Fulton Corridor Area without Proposed Project, MG	Required Storage based on Current Buildout of Fulton Corridor Area with Proposed Project, MG	Increased Storage Requirement Attributed to Proposed Project, MG
Operational: Equal to 25% of the Maximum Day Demand	1.17	1.65	0.48
Emergency: Equal to Average Day Demand	2.33	3.30	0.96
Fire Flow: Equal to the highest fire flow demand for an area multiplied by the required duration.	0.84	0.84	0.00
Total	4.34[(a)]	5.78	1.45

[(a)] The storage requirement shown for buildout of the Fulton Corridor Area without the Proposed Project (4.34 MG) is part of required storage previously calculated for the Downtown Central Area. As described in West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area, required storage within the Downtown Central Area was previously calculated to 8.3 MG, which will be met by a combination of groundwater credits (5.2 MG) and a new Downtown storage tank (3.0 MG). These previous storage calculations for the Downtown Central Area did not include the Proposed Project described in this technical memorandum.

As shown in Table 3, the additional storage requirement resulting from the increased densification associated with the Proposed Project is 1.45 MG.

As described in West Yost's March 2009 evaluation of the City's Central Area, water storage within the City is considered on a regional basis with the water storage requirements for the downtown area being a portion of the overall system requirements. The City's Water Master Plan is evaluating the overall system and will make recommendations for overall system improvements, including recommendations for storage improvements. The 3.0 MG Downtown tank (currently being designed) does not provide adequate capacity for the additional storage required for the Proposed Project, therefore additional operational and emergency storage will need to be provided within the City's overall system to meet the storage needs for the Proposed Project.

Pumping Capacity Evaluation

Along with the increased storage due to the demand densification, the City will require additional pumping capacity for the Proposed Project to meet operational demands. The operational pumping requirements are used to help meet the City's performance criteria during peak demand conditions. The pumping capacity for fire flow has been accounted for on a regional basis and will not increase as a result of the densification. Emergency pumping capacity is based on an average day demand and is generally met by wells and pump stations equipped with auxiliary power. The recommended pumping required to serve the operational needs of the Proposed Project is approximately 1.44 mgd (1,000 gpm). This increased pumping capacity will need to be added within the City's overall system to meet peak demand operations.

Distribution System Evaluation

The City's existing water system hydraulic model was modified by West Yost to be representative of the projected water demands associated with the maximum buildout (maximum FAR) development scenario of the Proposed Project. The estimated future demands were distributed throughout the Proposed Project area, as appropriate, according to the proposed development plans.

The future buildout system with the Proposed Project, and the previously recommended Downtown Central Area water system infrastructure improvements described above, was evaluated under maximum day demand plus fire flow conditions and peak hour demand conditions. The evaluation results are described below.

The results of the maximum day demand plus fire flow condition for the future buildout system with the Proposed Project are shown on Figure 5. Figure 5 shows the available flow at each node in the hydraulic model assuming that a minimum system pressure of 20 psi is maintained. Nodes that are shown in "green" have available flows of 3,500 gpm or more, indicating that they meet the fire flow requirement for the Proposed Project. Nodes shown in "red" have available flows that are less than 3,500 gpm, indicating that they do not meet the fire flow requirement for the Proposed Project. As shown, in the northern part of the Proposed Project area, there are several locations where available flows are below the required minimum of 3,500 gpm (see "red" nodes on Figure 5); the lowest available flow in this area is 1,617 gpm. Similarly, there are several locations in the southern part of the Proposed Project area where available flows are below the required minimum of 3,500 gpm (see "red" nodes on Figure 5); the lowest available flow in this area is 1,497 gpm. It should also be noted that the City's pipeline velocity criteria of a maximum of 10 fps during a simulated fire flow condition is not being met in many locations within the Proposed Project area; however, this is expected due to the age and small diameter size of the existing pipelines in the downtown area. Therefore, infrastructure improvements will be required to meet the City's fire flow pressure and flow criteria (these recommendations are described below).

The results of the peak hour demand condition for the future buildout with the Proposed Project are shown on Figure 6. Figure 6 shows the system pressure at each node in the hydraulic model based on peak hour demand conditions. As shown, system pressures throughout most of the Proposed Project area are between 40 and 50 psi under buildout peak hour demand conditions (indicated by the "green" nodes), and some are between 50 to 60 psi (indicated by the "blue" nodes). Therefore, the City's minimum peak hour pressure criteria of 40 psi is being met throughout the Proposed Project area and no specific improvements are required for the peak hour demand condition.

EVALUATION RECOMMENDATIONS

Figure 7 shows the following recommended infrastructure improvements to resolve the fire flow deficiencies described above as a result of the increased water demands associated with the Proposed Project. The recommended improvements include the replacement of existing smaller diameter pipelines with 8-inch diameter pipelines (approximately 1,400 linear feet in total) and the installation of new 8-inch diameter pipelines where pipelines did not previously exist

(approximately 7,660 linear feet in total). A table listing the proposed pipeline improvements by street is provided as Attachment 3.

Also, as described below, West Yost recommends that an additional 1.5 MG of storage be located within the City's overall water system to meet the operational and emergency storage needs of the Proposed Project.

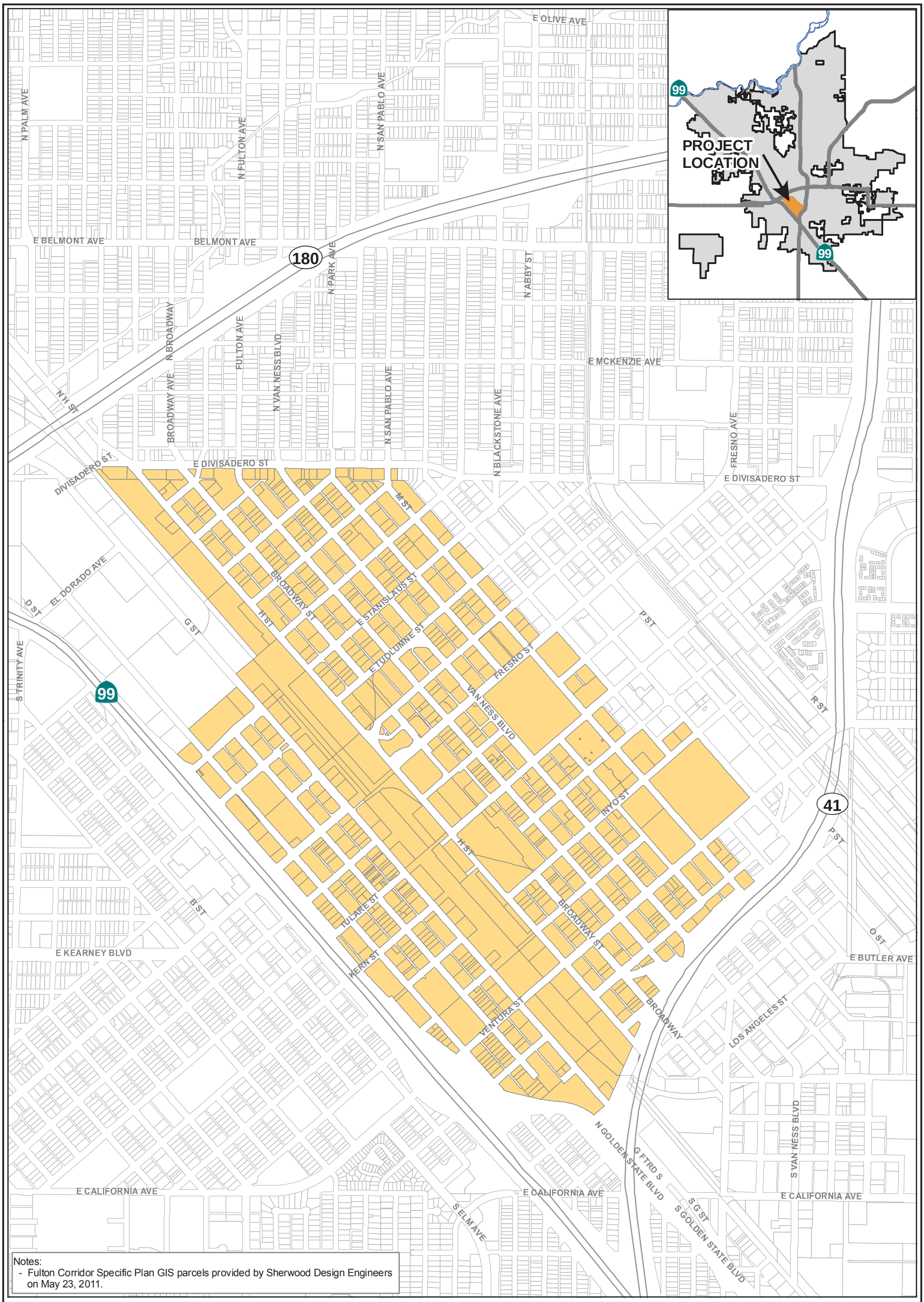
Figure 8 shows the maximum day demand plus fire flow scenario with the Proposed Project with the recommended pipeline improvements as listed above. As shown, with the recommended improvements, the fire flow requirement of 3,500 gpm is met throughout the entire Proposed Project area, with the exception of the following two locations:

- G Street (just north of Stanislaus Street): The available fire flow at this location is 1,972 gpm. This node is located at the end of an approximately 440 foot long, 8-inch diameter pipeline (which appears to be a hydrant lateral). Flows from this location could be combined with flows from other nearby hydrants to provide the fire flow requirement of 3,500 gpm for the Proposed Project.
- Mono Street (just east of E Street): The available fire flow at this location is 2,140 gpm. This location has smaller parcels and no proposed multi-story buildings, therefore, this available fire flow appears to be adequate for this area. Also, flows from this location could be combined with flows from other nearby hydrants to provide the fire flow requirement of 3,500 gpm for the Proposed Project.

It should be noted that the City's pipeline velocity criteria of a maximum of 10 fps during a simulated fire flow condition is still not being met in many locations within the Proposed Project area, even with the recommended improvements described above and shown on Figure 7; however, this is expected due to the age and small diameter size of the existing pipelines in the downtown area. Because fire flow pressure and flow requirements are being met, this velocity criteria, by itself, is not considered as being critical enough to require replacement of additional existing pipelines with larger diameter pipelines in the downtown area.

Figure 9 shows the peak hour demand scenario with the Proposed Project with the recommended improvements. As noted above, no specific improvements were required for the peak hour demand condition for the Proposed Project. Similar to the peak hour results shown in Figure 6, the minimum peak hour system pressure of 40 psi is met throughout the entire Proposed Project area.

An estimation of probable construction costs for these recommended water system infrastructure improvements to serve the Proposed Project was not included in West Yost's Scope of Work for this evaluation. However, these cost estimates can be provided if requested and if a budget augmentation is approved by the City.



Notes:
- Fulton Corridor Specific Plan GIS parcels provided by Sherwood Design Engineers on May 23, 2011.

LEGEND

Fulton Corridor Specific Plan

N

0 500 1,000

Scale in Feet

FIGURE 1

City of Fresno

Fulton Corridor Hydraulic Analysis

PROJECT LOCATION

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 1 Location.mxd 6/28/2011



Notes:
- Demand projections based on Sherwood Design Engineers provided data (5/13/2011).
- Shown demands are based on the maximum proposed FAR.
- Proposed densification demands are only calculated for underutilized parcels. All other parcels are assumed not to change.

LEGEND

Fulton Corridor Projected Demands

- 0 - 5,000 gpd
- 5,001 - 10,000 gpd
- 10,001 - 20,000 gpd
- 20,001 - 30,000 gpd
- 30,001 - 286,209 gpd

N

0 500 1,000

Scale in Feet

FIGURE 2

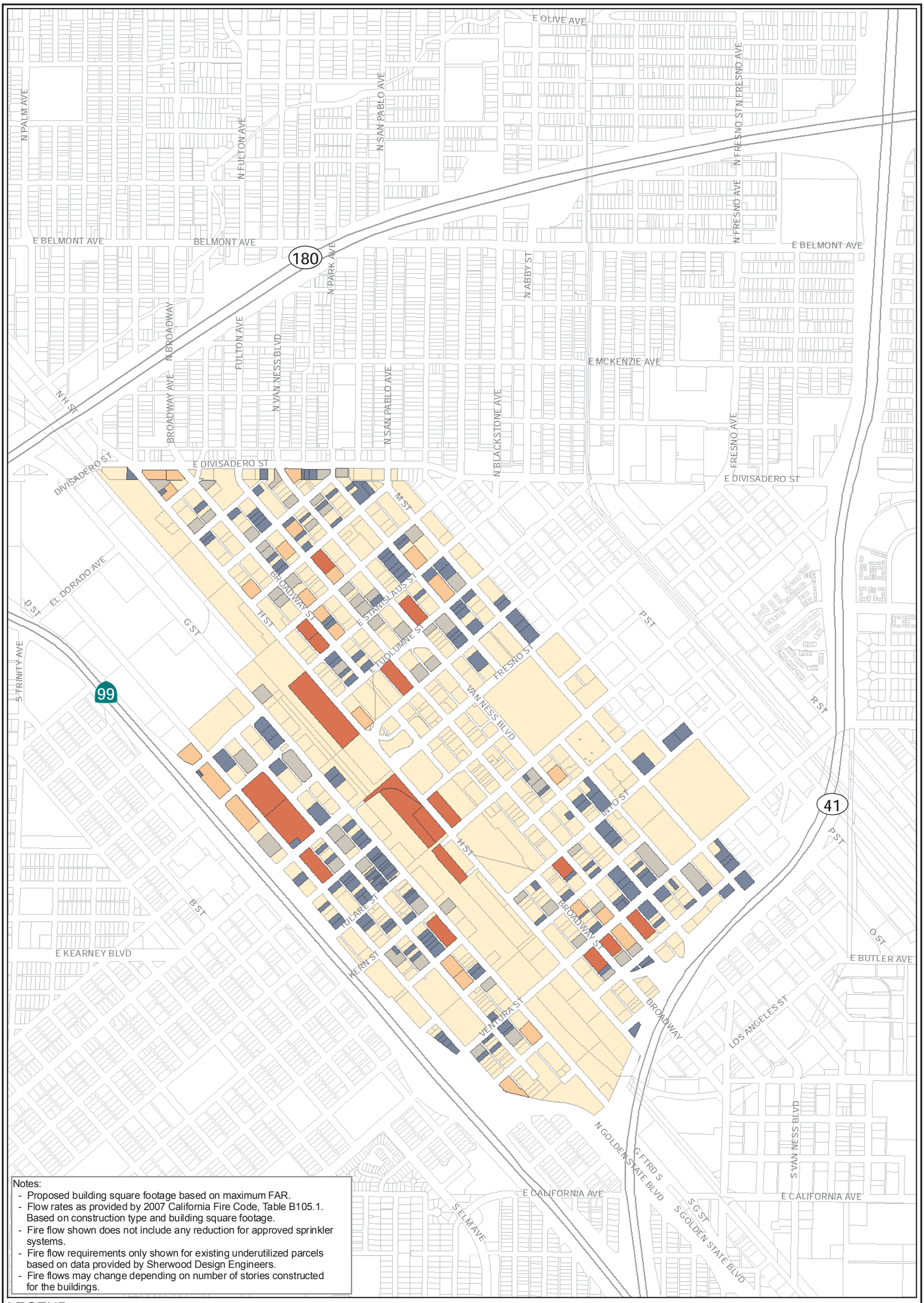
City of Fresno

Fulton Corridor Hydraulic Analysis

PROJECTED DEMAND DENSIFICATION

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 2 Ex System.mxd 6/28/2011



Notes:
- Proposed building square footage based on maximum FAR.
- Flow rates as provided by 2007 California Fire Code, Table B105.1. Based on construction type and building square footage.
- Fire flow shown does not include any reduction for approved sprinkler systems.
- Fire flow requirements only shown for existing underutilized parcels based on data provided by Sherwood Design Engineers.
- Fire flows may change depending on number of stories constructed for the buildings.

LEGEND

Underutilized Parcel Fire Flow

- 1,500 - 3,000 gpm
- 3,001 - 4,000 gpm
- 4,001 - 5,000 gpm
- 5,001 - 6,500 gpm
- Fire Flow not updated

N

0 500 1,000

Scale in Feet

FIGURE 3

City of Fresno

Fulton Corridor Hydraulic Analysis

PROJECTED FIRE FLOW REQUIREMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 3 Projected Fire Flow.mxd 6/28/2011

WELL 010A
WELL 018A
WELL 066
WELL 002B
WELL 050A
WELL 021A
WELL 001A
WELL 022A
WELL 009A
WELL 003A
WELL 16A
3 MG Downtown Storage Tank and Booster Pump Station
E BELMONT AVE
BELMONT AVE
N PALM AVE
N FULTON AVE
N SAN PABLO AVE
N FRESNO ST
N PARK AVE
N ABBY ST
E MCKENZIE AVE
N BROADWAY
FULTON AVE
N VAN NESS BLVD
N H ST
E DIVISADERO ST
M ST
BROADWAY ST
EL DORADO AVE
D ST
G ST
E LUDLOW ST
FRESNO ST
P ST
R ST
VAN NESS BLVD
H ST
TULARE ST
KERN ST
VENTURA ST
O ST
E BUTLER AVE
LOS ANGELES ST
E KEARNEY BLVD
E CALIFORNIA AVE
N GOLDEN STATE BLVD
S GOLDEN STATE BLVD
S VAN NESS BLVD
S TRINITY AVE
S ELM AVE
180
99
41

Notes:
- Downtown tank and transmission pipeline along G Street currently under design.
- Planned transmission pipeline recommendations based on the City of Fresno Metropolitan Plan to supply surface water throughout the City.

LEGEND

- Existing Pipelines
- **Planned Transmission Pipelines**
  - 12 inch diameter
  - 16 inch diameter
  - 24 inch diameter
  - 30 inch diameter
- Well/Pump Station
- Inactive Well
- Storage Tank
- Fulton Corridor SP

N

0 500 1,000

Scale in Feet

FIGURE 4

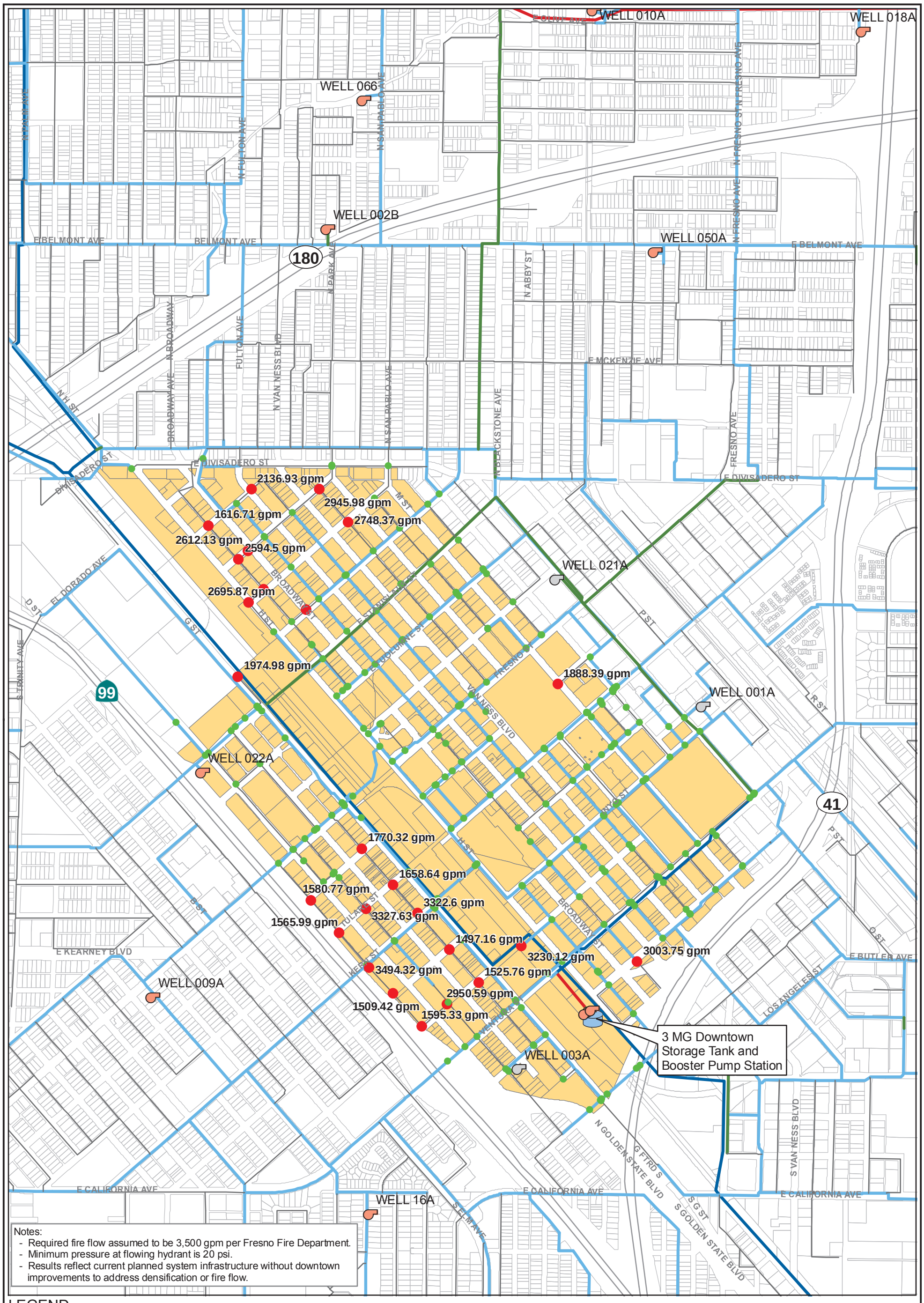
City of Fresno

Fulton Corridor Hydraulic Analysis

PLANNED BUILDOUT FACILITIES

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan Water Infrastructure Evaluation\GIS\Figures\Figure 4 Bo System.mxd 7/1/2011



Notes:
- Required fire flow assumed to be 3,500 gpm per Fresno Fire Department.
- Minimum pressure at flowing hydrant is 20 psi.
- Results reflect current planned system infrastructure without downtown improvements to address densification or fire flow.

LEGEND

Available Flow @ 20 psi
- Less than 3,500 gpm
- Greater than 3,500 gpm
- Well/Pump Station
- Inactive Well
- Storage Tank

Pipe Diameters
- 6 to 8 inch
- 10 to 12 inch
- 14 to 16 inch
- 24 inch
- 30 inch

N

0 500 1,000

Scale in Feet

FIGURE 5

City of Fresno

Fulton Corridor Hydraulic Analysis

PROPOSED Ddensification FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 5 Sw System FF.mxd 7/1/2011

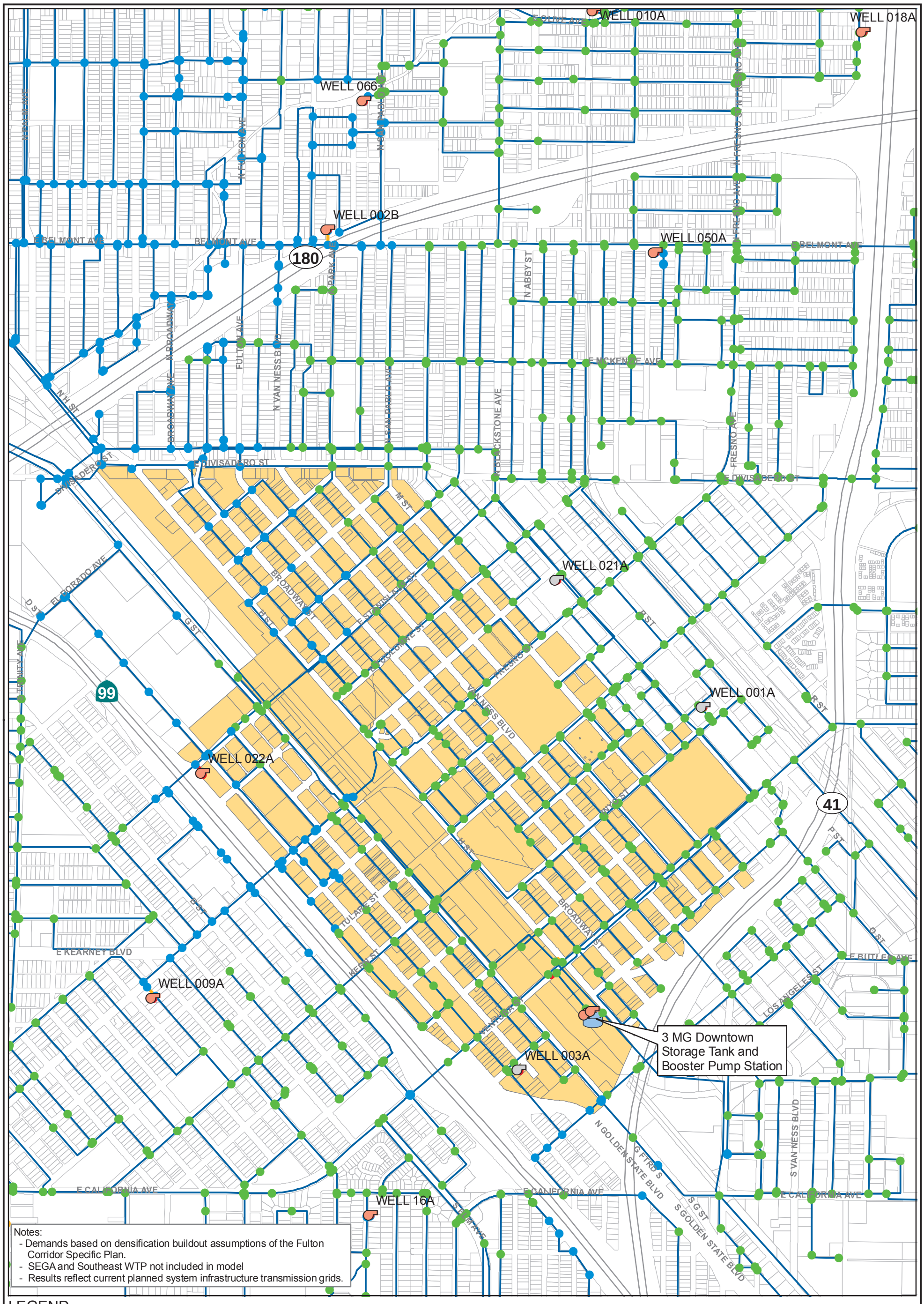


FIGURE 6

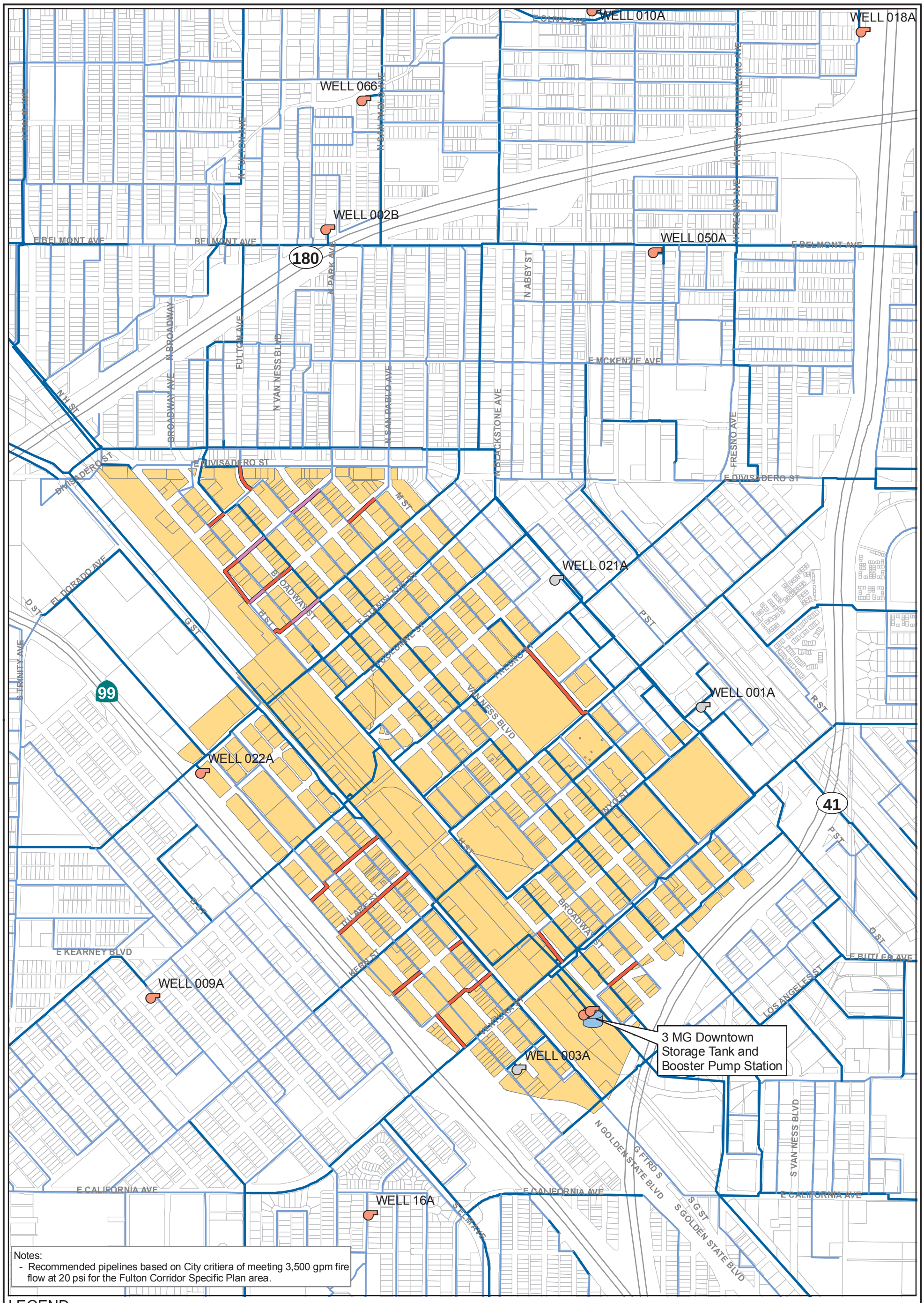
City of Fresno

Fulton Corridor Hydraulic Analysis

PROPOSED Ddensification PEAK HOUR

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 6 Sw System Peak hour.mxd 7/1/2011



Notes:
- Recommended pipelines based on City critiera of meeting 3,500 gpm fire flow at 20 psi for the Fulton Corridor Specific Plan area.

LEGEND

Recommended Improvements
- New Pipeline (8 inch)
- Replacement Pipeline (8 inch)
- Well/Pump Station
- Inactive Well
- Storage Tank

Existing/Planned Pipeline
- Distribution (less than 12 inch)
- Transmission (12 inch and greater)

N

0 500 1,000
Scale in Feet

FIGURE 7

City of Fresno
Fulton Corridor Hydraulic Analysis
RECOMMENDED PIPELINE IMPROVEMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 7 Sw System Improvements.mxd 6/30/2011

WELL 010A
WELL 018A
WELL 066
WELL 002B
WELL 050A
WELL 021A
WELL 001A
WELL 022A
WELL 009A
WELL 003A
WELL 16A
1,972 gpm
2,140 gpm
3 MG Downtown Storage Tank and Booster Pump Station
E BELMONT AVE
N FULTON AVE
N SAN PABLO AVE
N FRESNO ST
N ABBY ST
N PARK AVE
N BROADWAY
FULTON AVE
N VAN NESS BLVD
E MCKENZIE AVE
N BLACKSTONE AVE
FRESNO AVE
E DIVISADERO ST
M ST
BROADWAY ST
EL DORADO AVE
D ST
G ST
H ST
I ST
P ST
R ST
O ST
S TRINITY AVE
FRESNO
VAN NESS BLVD
E KEARNEY BLVD
E BUTLER AVE
LOS ANGELES ST
N GOLDEN STATE BLVD
S GOLDEN STATE BLVD
S VAN NESS BLVD
E CALIFORNIA AVE
SELMA AVE
180
99
41

Notes:
- Required fire flow assumed to be 3,500 gpm per Fresno Fire Department.
- Minimum pressure at flowing hydarnt is 20 psi.
- Results reflect current planned system infrastructure plus the recommended improvements to address densification fire flow.

LEGEND

Available Flow @ 20 psi
- Less than 3,500 gpm
- Greater than 3,500 gpm
- Well/Pump Station
- Inactive Well
- Storage Tank

Pipe Diameters
- 6 to 8 inch
- 10 to 12 inch
- 14 to 16 inch
- 24 inch
- 30 inch

N

0 500 1,000
Scale in Feet

FIGURE 8

City of Fresno
Fulton Corridor Hydraulic Analysis
DENSIFICATION FIRE FLOW IMPROVEMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan Water Infrastructure Evaluation\GIS\Figures\Figure 8 Sw System FF Improvements.mxd 6/30/2011

WELL 010A
WELL 018A
WELL 066
WELL 002B
WELL 050A
WELL 021A
WELL 001A
WELL 022A
WELL 009A
WELL 003A
WELL 16A
3 MG Downtown Storage Tank and Booster Pump Station
E OLIVE AVE
N FULTON AVE
N SAN PABLO AVE
N FRESNO ST
E BELMONT AVE
BELMONT AVE
N PARK AVE
N ABBY ST
N BROADWAY
FULTON AVE
N VAN NESS BLVD
E MCKENZIE AVE
N H ST
FRESNO ST
E DIVISADERO ST
M ST
N BLACKSTONE AVE
BROADWAY ST
E STANISLAUS ST
H ST
TUOLUMNE ST
FRESNO
VAN NESS BLVD
P ST
R ST
D ST
EL DORADO AVE
G ST
TRINITY AVE
99
180
41
E KEARNEY BLVD
TULARE ST
WEST ST
MERCED ST
E BUTLER AVE
LOS ANGELES ST
N GOLDEN STATE BLVD
G FTRD S
S VAN NESS BLVD
E CALIFORNIA AVE
S G ST
S GOLDEN STATE BLVD
S E M AVE

Notes:
- Demands based on densification buildout assumptions of the Fulton Corridor Specific Plan.
- SEGA and Southeast WTP not included in model.
- Results reflect current planned system infrastructure transmission grids plus recommended improvements in the Fulton Corridor Specific Plan.

LEGEND

System Pressure
- Less than 35 psi
- 35 to 40 psi
- 40 to 50 psi
- 50 to 60 psi
- 60 psi and Greater

Pipeline Velocity
- Less than 6 fps
- 6 to 7 fps
- 7 fps and Greater
- Well/Pump Station
- Inactive Well

Storage Tank

N

0 500 1,000

Scale in Feet

FIGURE 9

City of Fresno

Fulton Corridor Hydraulic Analysis

DENSIFICATION PEAK HOUR IMPROVEMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan Water Infrastructure Evaluation\GIS\Figures\Figure 9 Sw System Peak hour Improvements.mxd 6/30/2011

Appendix D

City of Fresno 2020 Urban Water Management Plan

City of FRESNO
Department of Public Utilities

2020 Urban Water Management Plan

Final

JULY 2021

CITY OF FRESNO



Photo Credit: Downtown Fresno Partnership

City of FRESNO
Department of Public Utilities

CITY OF FRESNO

Final 2020 Urban Water Management Plan

JULY 2021



Prepared by Water Systems Consulting, Inc.

WSC

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ACRONYMS & ABBREVIATIONS

°F	degrees Fahrenheit
1,2,3-TCP	1,2,3-trichloropropane
AF	acre-feet
AFY	acre-feet per year
AMI	advanced metering infrastructure
AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
BP04	Booster Pump 4
CII	Commercial, Institutional, and Industrial
CIMIS	California Irrigation Management Information System
City	City of Fresno
COG	Council of Governments
CPC	California Plumbing Code
CSUF	California State University Fresno
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVWAC	Central Valley Water Awareness Committee
CWC	California Water Code
CY	Calendar Year
DBCP	1,2-dibromo-3-chloropropane
DMM	Demand Management Measures
DDW	Department of Drinking Water
DPU	Department of Public Utilities
DRA	Drought Risk Assessment
DWR	Department of Water Resources
EDB	ethylene dibromide or 1,2-dibromoethane
ETo	Evapotranspiration
FID	Fresno Irrigation District
FMFCD	Fresno Metropolitan Flood Control District
GIS	Geographic Information System
GPCD	gallons per capita per day
GSA	Groundwater Sustainability Agency

GSP	Groundwater Sustainability Plan
HCF	hundred cubic feet
IGSM	Integrated Groundwater and Surface Water Model
Metro Plan	Fresno Metropolitan Water Resource Management Plan
mgd	million gallons per day
NESWTF	Northeast Surface Water Treatment Facility
NFWRF	North Fresno Wastewater Reclamation Facility
NKGSP	North Kings Groundwater Sustainability Plan
NRDC	Natural Resources Defense Council
PCE	perchloroethylene or tetrachloroethylene
PEIR	Programmatic Environmental Impact Report
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
RHNA	Regional Housing Needs Allocation
RWMP	Recycled Water Master Plan
RWRF	Regional Wastewater Reclamation Facility
SB	Senate Bill
SBx7-7	Senate Bill x 7-7
SESWTF	Southeast Surface Water Treatment Facility
SGMA	Sustainable Groundwater Management Act
SOI	Sphere of Influence
sq mi	square miles
SWTF	Surface Water Treatment Facility
T-3 SWTF	T-3 Water Storage and Modular Surface Water Treatment Facility
TCE	trichloroethylene
TDS	total dissolved solids
TTDF	Tertiary Treatment and Disinfection Facility
USBR	United States Bureau of Reclamation
UV	ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act
WSCP	Water Shortage Contingency Plan
WSIP	Water Storage Investment Program
WY	Water Year

CITY OF FRESNO

Executive Summary

This section summarizes the 2020 Urban Water Management Plan (UWMP) for the City of Fresno (City). It provides a lay description of the 2020 UWMP in a manner that is accessible to non-technical readers. This summary describes the fundamental purposes of the UWMP, including water service reliability, future challenges, and strategies for managing water reliability risks.

UWMPs are updated every five years and outline each suppliers' long-term water resource planning to ensure there is enough water to meet both existing and future demands. They set the roadmap for how the City will use water over the coming years.

The original Fresno water system began operations in 1876 as a non-profit organization established by a group of public-minded citizens. Today, the City covers approximately 115 square miles (sq mi) (73,500 acres) consisting largely of single-family residential, commercial, public, and industrial development. The City's General Plan projects buildout of the 106,000 acres planning area in 2056. This UWMP addresses the City's water service reliability, future challenges, and strategies for managing risks to water reliability through 2045. The City's Fresno Metropolitan Water Resource Management Plan (Metro Plan), which is currently being prepared, addresses a 50-year horizon – through 2070.

IN THIS SECTION

- Service Area Description
- Water Use
- Water Sources
- Water Supply Reliability

Purpose and Organization of the Plan

This plan comprises the 2020 UWMP for the City, as required by the California Urban Water Management Planning Act, which requires all urban water suppliers with more than 3,000 connections or distributing more than 3,000 acre-feet per year (AFY) to complete an UWMP every five years. As of the close of the 2020 calendar year, the City has over 139,500 residential, commercial, industrial, and institutional water service connections and produced nearly 122,000 acre-feet (AF) of water. As a result, the City is required to prepare and adopt an UWMP and submit it to the Department of Water Resources (DWR) by the July 1, 2021, due date.

Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

The UWMP is a valuable planning document used for multiple purposes:

- Serves as a valuable resource to the community and other interested parties regarding water supply and demand, conservation, and water related information
- Meets a statutory requirement of the California Water Code (CWC)
- Provides a key source of information for water supply assessments and written verifications of water supply
- Supports regional long-range planning, including City and County General Plans
- Provides a standardized methodology for water utilities to assess their water resource needs and availability
- Provides a resource for regional involvement in the California Water Plan
- Provides for a plan during water drought situations

Outreach and Engagement

The City has coordinated the preparation of its 2020 UWMP with its water suppliers, Fresno County, the City of Clovis, nearby water agencies, and community members to develop a UWMP that adheres to the requirements of the CWC and plans for a resilient water future. In total, the City has coordinated preparation of the 2020 UWMP and solicited participation and comments with the following agencies**:**

- Bakman Water Company
- City of Clovis
- County of Fresno
- Fresno Irrigation District
- Fresno Metropolitan Flood Control District
- Friant Water Authority
- Garfield Water District
- Malaga County Water District
- Pinedale County Water District
- North Kings Groundwater Sustainability Agency
- US Bureau of Reclamation

Service Area Description

The City's General Plan planning area covers approximately 106,000 acres comprised of approximately 73,500 acres of incorporated land and 32,500 acres of unincorporated land. The City's water service area covers 70,400 acres consisting largely of single-family residential, commercial, public, and industrial development, shown in **Figure ES-6** (located at the end of the Executive Summary). The service area excludes areas served by the Bakman Water Company, Pinedale County Water District, Park Van Ness Mutual Water Company, California State University Fresno, and private groundwater users located within Fresno County islands. The City will eventually serve out to the Sphere of Influence (SOI) boundary adopted in the 2014 General Plan and includes all lands planned to be annexed by the City at the projected 2056 buildout of the General Plan, summarized in **Table ES-1**.

Table ES-1. Existing and Future Water Service Area

LAND USE CATEGORY	2020 WATER SERVICE AREA		2056 WATER SERVICE AREA	
	ACRES	PERCENT	ACRES	PERCENT
Single-Family Residential	27,700	39.3%	40,000	47.4%
Multifamily Residential	3,700	5.3%	3,800	4.5%
Commercial	4,500	6.4%	8,600	10.2%
Public Facility	5,600	8.0%	7,200	8.5%
Industrial	4,500	6.4%	9,300	11.0%
Open Space/ Landscape Irrigation	13,100	18.6%	11,000	13.0%
Mixed Use	0	0%	3,900	4.6%
Downtown	0	0%	600	0.7%
Vacant / Partially Vacant	11,300	15.9%	0	0%
TOTAL	**70,400**	**100%**	**84,400**	**100%**

Note: Acreage from City GIS Shapefile of Land Uses and aligns with the General Plan for buildout in year 2056.

Population Projections

The City experienced rapid growth since it was founded by the Central Pacific Railroad in 1872 up through the mid-1990s, when the City's annual growth rate was typically greater than 2%. From 1995 to 2015, the annual growth rate has decreased to an average of 1.3%, and since 2015, the rate has not surpassed 1.0%. Achieving General Plan buildout population estimates requires an average annual growth rate of 1.44% from 2020 to 2056. The City's water service area population is anticipated to continue to grow along with the City, with some slightly higher growth years anticipated in the next 10 years due to multiple large developments planned for completion in the near term. As a result, population growth, shown in **Figure ES-1** on the following page, occurs at an annual rate of ranging from 1.1–2.1% between 2020 and 2056.

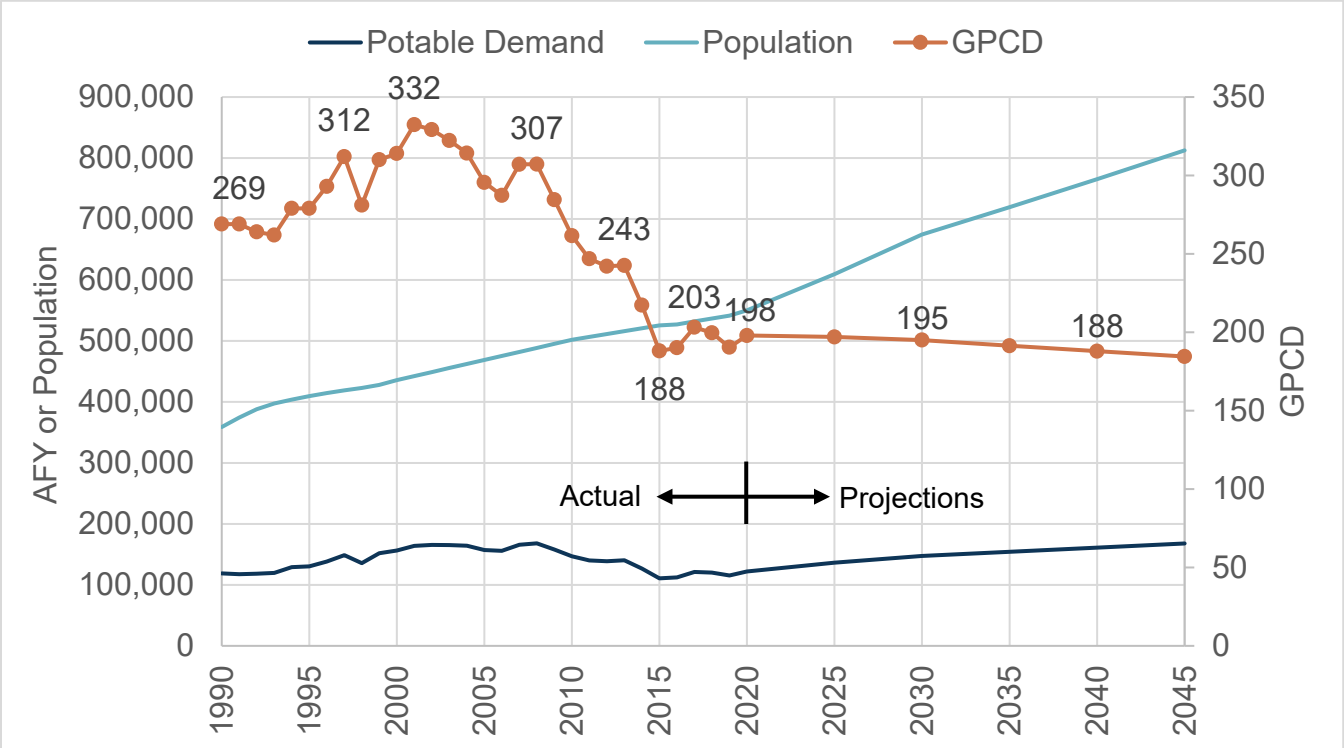
Water Use

Water consumption in the City is characterized by the typical demand sectors of residential, commercial, institutional, industrial, and irrigational. The difference between production and consumption is losses, which may be attributed to system leaks, meter inaccuracies, fire flows, theft, unmetered use, or other factors.

As shown in **Figure ES-1**, the City's water demand has decreased even as the City has grown over the past several decades, and demands are projected to grow slower than population growth. This trend is captured by the City's daily per capita water use, measured as gallons per capita per day (GPCD). For 2020, the City's water use averaged 198 GPCD based on 121,993 AF of water production and a service area population of 550,217. The City is far below its 2020 daily per capita water use target of 247 GPCD due to the extensive conservation efforts implemented by the City in the past decade.

The City also diverts raw surface water obtained from the United States Bureau of Reclamation (USBR) and the Fresno Irrigation District (FID) to recharge basins throughout the service area. The City coordinates with FID for the delivery of the recharge water, utilizing FID's existing system of channels and pipelines to covey the raw water, and with Fresno Metropolitan Flood Control District (FMFCD) to deliver water to FMFCD's stormwater retention and recharge basins or the City's own recharge basins. The raw surface water recharges the groundwater basin to sustain the groundwater supply for the City. The groundwater recharge volume can vary based on surface water supply availability and is represented as an addition to annual groundwater supplies. In addition, the City serves a limited number of customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively.

Figure ES-1. City of Fresno Demand Projections



The City's per capita water usage is projected to continue to decline through 2045 due to more water efficiency in future construction and passive conservation; however, due to the increase in population the demand is expected to slowly increase in the next 25 years. The potable demand projections for normal water use are based on land use where future land use areas are expected to be more water efficient than existing land uses and buildings due to the California Plumbing Code (CPC) and use of higher efficiency appliances and landscapes. Demand for existing land uses is also expected to slowly reduce over time due to passive conservation, which includes the replacement of older water fixtures and appliances with more efficient types now required as part of the CPC.

Water Sources

The City relies on groundwater from the North Kings Subbasin; surface water from Central Valley Project (CVP), through a contract with the USBR; Kings River water, through a contract with FID; and recycled water. Water production in the City has consisted of 100% groundwater prior to the commissioning of the City's first surface water treatment facility (SWTF) in 2004. Since 2004, the City has invested in expanding its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demands in the service area.

Groundwater

The City overlies the Kings Subbasin, which is part of the greater San Joaquin Valley Groundwater Basin. The City is one of many water purveyors that use groundwater from the Kings Subbasin. The City has a network of over 270 municipal wells and currently operates approximately 202 municipal supply wells within the Kings Subbasin.

The City was a founding member of the North Kings Groundwater Sustainability Agency (North Kings GSA), which was formed following passage of the Sustainable Groundwater Management Act (SGMA) of 2014. This legislation created a statutory framework for groundwater management in California that can be sustained during the planning and implementation horizon without causing undesirable results. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040. The Kings Subbasin was designated a critically overdrafted basin by DWR and the North Kings GSA is working within the SGMA framework to reach groundwater sustainability.

Due to the City's investments in other supplies – surface water, recycled water, and conservation – groundwater levels beneath the City have already begun to recover from low levels experienced during the recent drought. The City plans to continue to use groundwater within a larger conjunctive use program that maximizes its existing water rights and surface water supply sources.

Surface Water

With the completion and operation of the Southeast Surface Water Treatment Facility (SESWTF), surface water is now a primary water supply used to meet potable demands within the City. The City contracts with FID for Kings River water and with USBR for CVP water from the Friant-Kern Canal. The surface water supply is used either for potable uses through treatment and distribution or delivery to recharge basins for groundwater recharge. The City has historically not used all its available FID allocation in any given year, although it pays a flat rate for its total allocation regardless of use. Water unused by the City is reallocated by FID to its other customers.

The City, through an agreement originally executed in 1961, secured a surface water supply from USBR CVP Friant Division for an annual water supply of 60,000 AF of Class 1 water. The agreement was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement, which ended an 18-year legal dispute over the operation of Friant Dam brought by a coalition of conservation and fishing groups. The projected surface water available for the City from USBR is based on USBR simulations for the 2006 Settlement Agreement. Average simulated delivery is 53,680 AFY and the median simulated delivery is 60,000 AFY. However, very dry years have previously resulted in substantial reductions as demonstrated by the zero allocations that occurred in 2014 and 2015.

FID is one of 28 agencies that receives an entitlement of water from the Kings River through the Kings River Water Association. The City executed its most recent agreement with FID in 2016. The 2016 agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly every year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID, and is roughly 200,000 acres. As the City incorporates new users and the water service area expands, the percentage of FID supply increases. However, the 2016 FID Agreement sets the City's maximum percentage of FID's Kings River water as 29.0%, which is expected to be reached between 2025 and 2030.

The City's potential supply from FID was projected using actual Kings River deliveries for 1964–2019. The average FID Kings River delivery over that time was 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29.0% City supply percentage. The projected City percentage of FID supplies was estimated based on City's water service area growth projections through buildout in 2056.

Recycled Water

The Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) has developed from what was once a sewer farm to what is now a state-of-the-art wastewater treatment facility. The RWRF treats flows from not only the City, but also sewered County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District. Flows received at this facility peaked at 81,100 AF in 2006 and have been steadily decreasing since, with the average influent flow about 63,000 AF over the last five years.

The City has three primary means of effluent disposal from the RWRF:

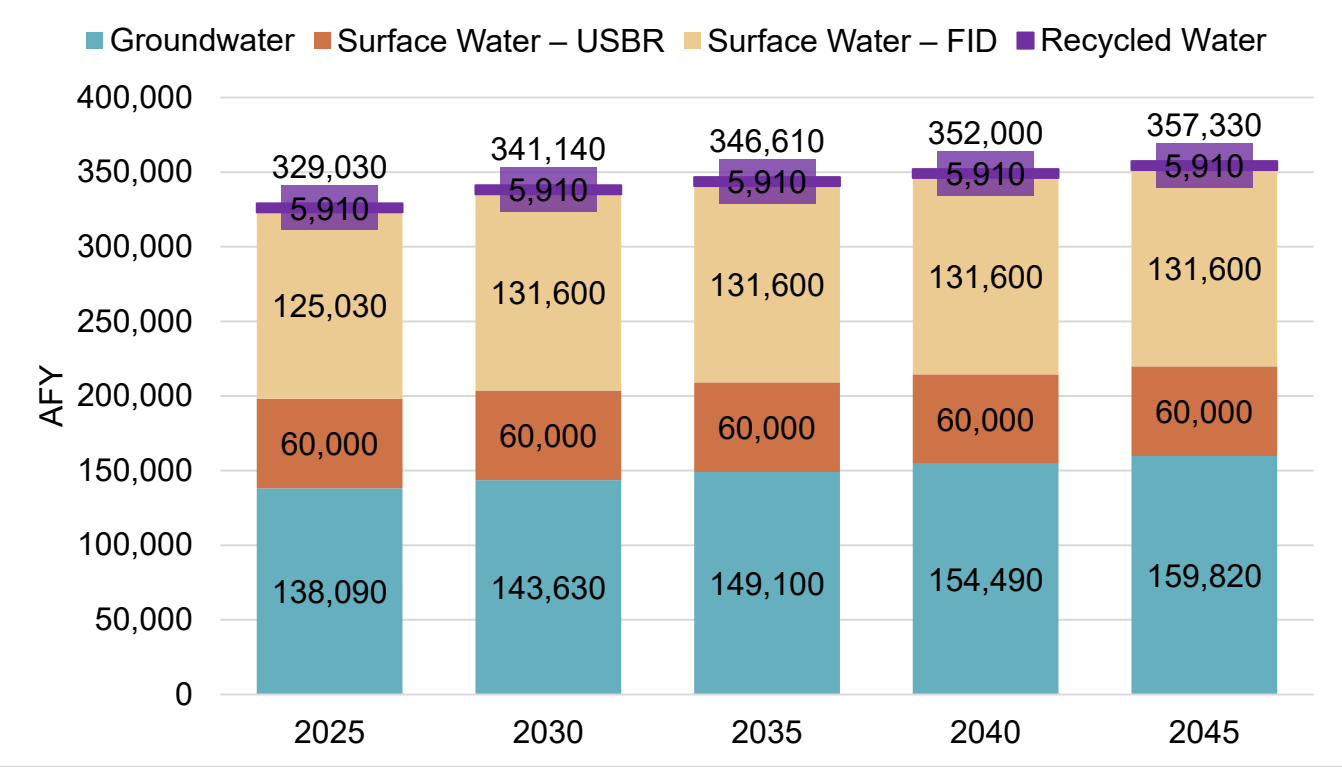
1. Undisinfected secondary effluent to on-site and off-site farmland for restricted irrigation
2. Undisinfected secondary effluent to percolation ponds
3. Disinfected tertiary effluent to the recycled water distribution system

The percolated effluent has been deemed equivalent to tertiary treated water by the State and the City has been extracting this water for reuse in areas within and surrounding the RWRF, as well as to FID's canals, through an exchange agreement for delivery to FID agricultural customers. The City recently constructed the Tertiary Treatment and Disinfection Facility (TTDF) at the RWRF and has constructed most of the southwest recycled water system, which is projected to increase deliveries from roughly 1,000 AFY today to eventually meet 5,800 AFY of non-potable demands. In addition, the City uses recycled water from the North Fresno Wastewater Reclamation Facility (NFWRF) to irrigate Copper River Ranch Golf Course.

Summary of Supplies

The City currently balances its surface water supplies and groundwater based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes and prevent their spread. The minimum operation conditions typically occur in the low-demand winter months, and the City can increase surface water production during peak demand months when surface water is available. In normal and wet years, the City intends to rely on more surface water supply and recharge raw surface water to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will ramp up well production to meet demands. The City is expected to continue this supply management strategy in the future. **Figure ES-2** shows the City's annual average projected water supplies through 2045.

Figure ES-2. Projected Water Supplies



Water Supply Reliability

The City currently manages its surface water and groundwater supply by maximizing surface water for potable use and intentional recharge during wet and normal years, while relying on groundwater during dry years. The City is currently updating its Metro Plan, which will recommend projects and programs to optimize the use of its supply portfolio and further improve supply resilience. Supply management tools are an expected outcome of the Metro Plan update; however, the City's ongoing supply management is intended to maximize local supplies and improve the groundwater basin storage. Current actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

Normal water year, single dry water year, and five-year consecutive drought period supply projections were made based on historic water allocations for surface water supplies, sustainable yield for groundwater, and projected utilization for recycled water. For surface water, the single dry year is based on 2015 allocations and the five-year drought is based on 2012 to 2016. Groundwater supplies, due to intentional recharge augmentation, remain reliable in all hydrologic conditions.

Despite severe reductions of surface water supplies during recent dry years, sufficient good-quality water was available to operate the SWTFs. The projected supplies and demands for a normal year, single dry year, and five-year consecutive drought, shown in **Figure ES-3** through **Figure ES-5** on the next page and in **Table 7-1** through **Table 7-3** in **Section 7.1.4**, demonstrate that the City is projected to have greater than 100,000 AF of available supply after meeting demands in normal years; the City's surface water supplies are reduced in a single dry year, but all potable demands are met and groundwater recharge of raw surface water is reduced; and the City is projected to meet all demands during a five-year drought with its existing supplies with reduced groundwater recharge in years three and four of a five-year drought to accommodate low surface water allocations.

Managed recharge of surface water is an essential component of the City's groundwater supply and the City must average 60,000 AFY to 70,000 AFY of recharge with surface water to meet the projections. This highlights the City's priority of recharging available surface water in the coming years.

Figure ES-3. Normal Year Supply vs. Demand

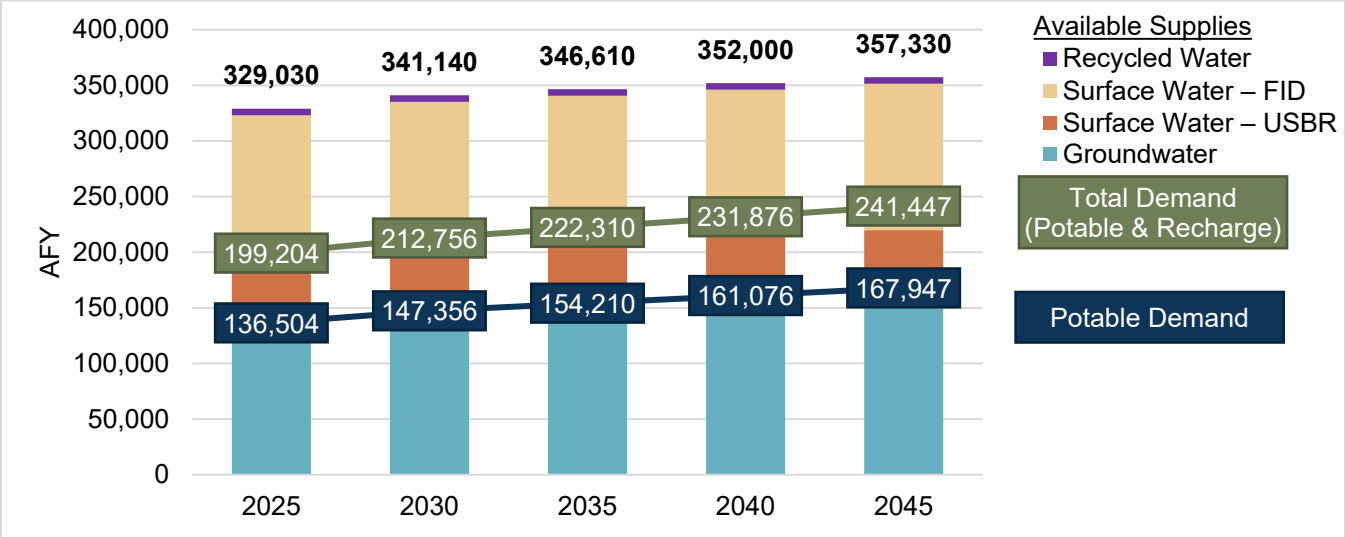


Figure ES-4. Single Dry Year Supply vs. Demand

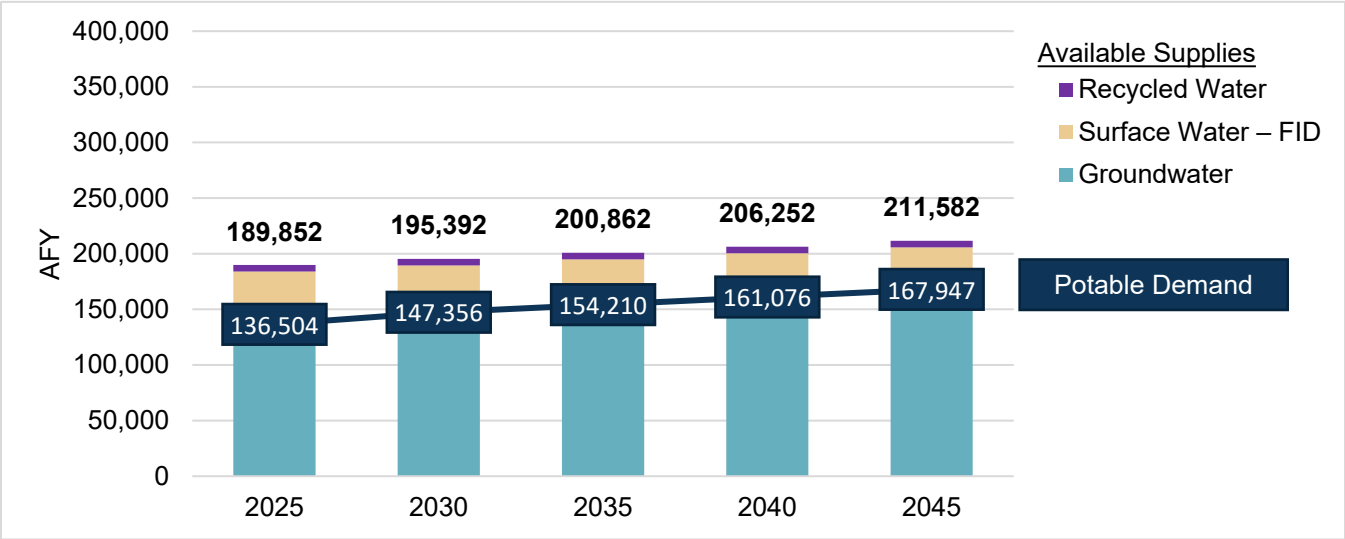
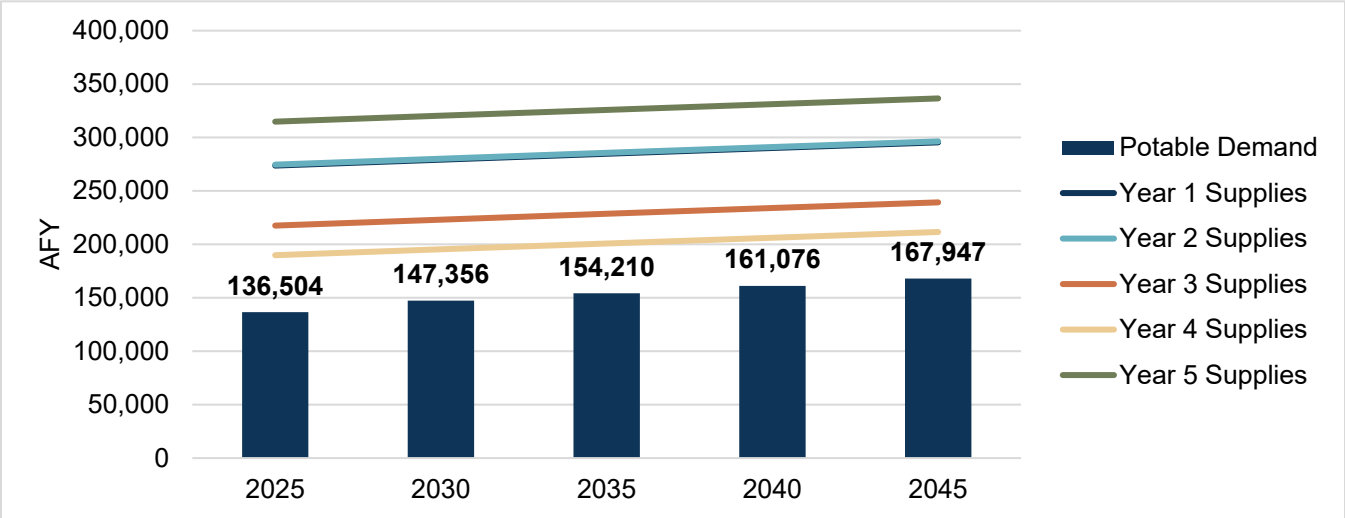


Figure ES-5. Multiple Dry Years Supply vs. Demand



2021-2025 Drought Risk Assessment

A new provision of the Water Code directs Suppliers to prepare a Drought Risk Assessment (DRA), assuming a drought period lasting five consecutive years, starting from the year following the year when the assessment is conducted. The DRA analysis allows the City to examine the management of its supplies during stressed hydrologic conditions and an opportunity to evaluate whether the City may need to enact its Water Shortage Contingency Plan (WSCP) during the next actual drought period lasting at least five years. The projected gross water use for the five-year DRA is based on unrestricted potable demand, a reduction in raw-water demand for intentional recharge in years three and four of the five-year drought, and unrestricted recycled water demand. Surface water supply availability is based on actual allocations during the previous drought – from 2012 to 2016.

Table ES-2 compares the total projected supply and demand for the five-year DRA for 2021 through 2025. As shown, the City does not expect to enact its WSCP for a five-consecutive-year drought based on the unrestricted potable demand projections and the reliability of the current supply portfolio. Available surface water supplies during this period would be utilized for groundwater recharge to sustain the groundwater basin.

Table ES-2. Five-Year Drought Risk Assessment

WATER USE TYPE	2021	2022	2023	2024	2025
Groundwater	133,602	134,724	135,846	136,968	138,090
Surface Water – USBR	30,000	37,200	0	0	45,000
Surface Water – FID	93,354	83,085	65,425	40,776	111,911
Recycled Water	1,912	2,911	3,911	4,910	5,910
TOTAL SUPPLY	**258,868**	**257,920**	**205,181**	**182,655**	**300,911**
Potable Demand	124,910	127,827	130,745	133,662	136,504
Non-Potable Demand	60,000	60,000	48,287	22,260	60,000
TOTAL DEMAND	**184,910**	**187,827**	**179,032**	**155,922**	**196,504**
AVAILABLE SUPPLIES	**73,958**	**70,093**	**26,149**	**26,732**	**104,407**

Water Shortage Contingency Plan

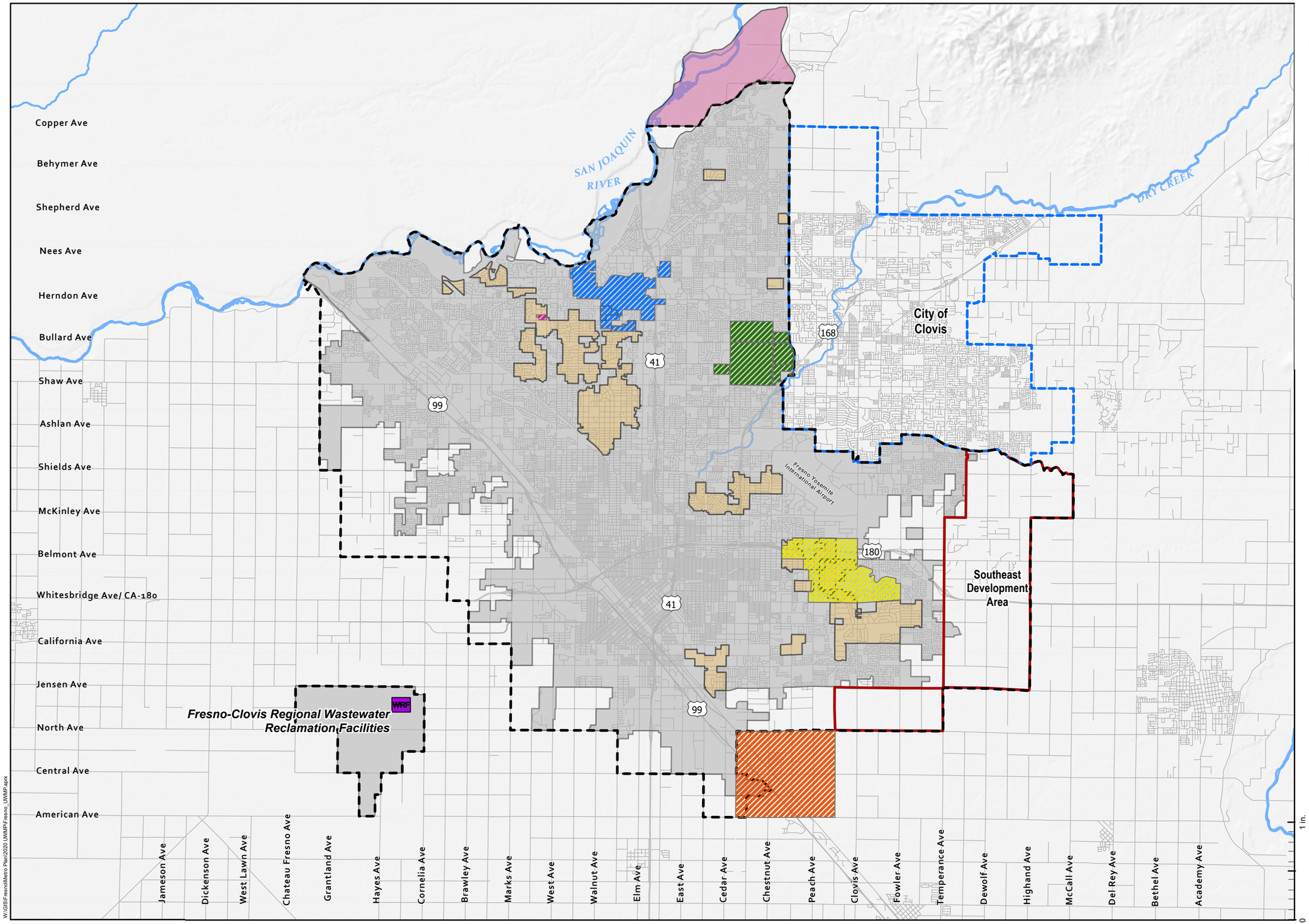
This WSCP is a detailed plan for how the City intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time.

The WSCP is used to provide guidance to the City's governing body, staff, and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

The WSCP describes the following:

- Water Supply Reliability Analysis
- Annual Water Supply and Demand Assessment Procedures
- Six Standard Shortage Stages
- Shortage Response Actions
- Communication Protocols
- Compliance and Enforcement
- Legal Authority
- Financial Consequences of WSCP Implementation
- Monitoring and Reporting
- WSCP Refinement Procedures
- Special Water Features Distinctions
- Plan Adoption, Submittal, and Availability

The 2020 WSCP is a standalone document that can be modified as needed and is included as **Appendix J** in the 2020 UWMP.



Legend

- Fresno Sphere of Influence
- Clovis Sphere of Influence
- Fresno City Limits
- County Islands
- North Area
- Southeast Development Area
- Wastewater Reclamation Facility
- Streets

Areas Served Water by Others

- Bakman Water District
- Malaga Water District
- Park Van Ness Mutual Water District
- Pinedale County Water District
- CA State University, Fresno

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Prepared by: WSC

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References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure ES-6. City Service Area

1 CITY OF FRESNO Introduction

This plan comprises the 2020 Urban Water Management Plan (UWMP) for the City of Fresno (City), as required by the California Urban Water Management Planning Act (UWMP Act).

The UWMP Act requires all urban water suppliers with more than 3,000 connections or distributing more than 3,000 acre-feet per year (AFY) to complete an UWMP every five years.

As of the close of the 2020 calendar year, the City has over 139,500 residential, commercial, industrial, and institutional water service connections and produced nearly 122,000 AF of water. As a result, the City is required to prepare and adopt an UWMP and submit it to DWR by the July 1, 2021, due date.

IN THIS SECTION

- California Water Code
- UWMP Organization

The UWMP is a valuable planning document used for multiple purposes:

- Serves as a valuable resource to the community and other interested parties regarding water supply and demand, conservation, and water related information
- Meets a statutory requirement of the California Water Code (CWC)
- Provides a key source of information for water supply assessments and written verifications of water supply
- Supports regional long-range planning documents, including City and County General Plans
- Provides a standardized methodology for water utilities to assess their water resource needs and availability
- Provides a resource for regional involvement in the California Water Plan
- Provides for a plan during water drought situations

1.1 The California Water Code

The UWMP Act is administered by the California Department of Water Resources (DWR), which is responsible for compiling data for statewide and regional analysis and publishing the adopted documents online for public access. This report was prepared according to the requirements of the CWC, UWMP Act, and the 2020 UWMP Guidebook.

CWC Section 10620 (a) of the UWMP Act states, "Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640)." These plans are to be updated every five years and submitted to DWR.

Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

In November 2009, the State legislation passed Senate Bill (SB) x 7-7, referred to as SBx7-7 or the Water Conservation Act of 2009. SBx7-7 set the goal of achieving a 20% reduction in urban per capita water use statewide by 2020. Retail water agencies were required to set targets and track progress toward decreasing daily per capita urban water use in their service areas, which would assist the State in meeting its 20% reduction goal by 2020.

This law requires that every UWMP include:

- Baseline per capita water use
- Urban water use target for 2020
- Compliance daily per capita water use

This 2020 UWMP has been prepared to comply with the UWMP Act and SBx7-7. In addition to meeting the requirements of the Act, this report will be used to support water supply assessments and written verifications of water supply required by SB 610 and SB 221 of 2001. These bills require that water supply information be provided to counties and cities for projects of a certain size, prior to discretionary project approval. Both bills allow an UWMP to be used as a source document to fulfill these legislative requirements. The UWMP Act has undergone significant expansion since it was originally passed, particularly since the City's previous UWMP was prepared in 2015. Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions affect the reliability of each water supplier as well as the statewide water reliability overseen by DWR, the State Water Resources Control Board, and the Legislature. Accordingly, the UWMP Act has grown to address changing conditions, and the current requirements are found in Sections 10610–10656 and 10608 of the CWC.

Since 2015, several amendments have been added to the UWMP Act. These require urban water suppliers to prepare a five-year consecutive drought supply and demand assessment and a five-year drought risk assessment to evaluate the functionality of the Water Shortage Contingency Plan (WSCP) in the event of a continuous five-year drought beginning next year.

There are also new requirements for the WSCP, and it is now required to be adopted as a separate plan from the UWMP. This 2020 UWMP was developed to incorporate these new requirements, under the guidance of DWR's 2020 UWMPs Guidebook for Urban Water Suppliers. A checklist to document compliance of this 2020 UWMP with the Act and the CWC is provided in **Appendix A**.

This 2020 UWMP includes all required DWR standardized tables for **Chapters 1 to 10** compiled in **Appendix B** and all required SBx7-7 tables in **Appendix C**. A selection of these tables is also provided in the body of this Plan, as necessary to present supporting data.

1.2 UWMP Organization

This 2020 UWMP is organized into the following chapters.

- **Chapter 1 - Introduction and Overview:** This chapter provides a discussion of the purpose and content of the 2020 UWMP and the extent of the City's water management planning efforts.
- **Chapter 2 - Plan Preparation:** This chapter provides information on the City's development of the 2020 UWMP, including the basis for plan preparation, planning type, data format, and coordination and outreach to nearby agencies.
- **Chapter 3 - System Description:** This chapter provides a description of the City's water system, including service area maps, climate information, service population and demographic information, and an overview of the City's organizational structure and history.
- **Chapter 4 - Customer Water Use:** This chapter describes the City's historic, current, and projected water uses, system losses, water savings, and water use by lower income households.
- **Chapter 5 - Conservation Target Compliance:** This chapter includes a description of the City's chosen method for calculating baseline per capita water use, the City's calculated baseline, 2015 interim and 2020 per capita demand targets, and compliance with the 2020 target.
- **Chapter 6 - System Supplies:** This chapter includes a discussion of the City's water system supplies, including groundwater, surface water, wastewater, and recycled water, the City's future water projects, and a summary of existing and future water sources.
- **Chapter 7 - Water Supply Reliability Assessment:** This chapter describes the reliability of the City's water supply through a 20-year planning horizon, including a supply and demand assessment and regional reliability evaluation. Supply reliability is presented for a normal, single dry year and five consecutive dry years.
- **Chapter 8 - Water Shortage Contingency Planning:** This chapter provides a description of the City's WSCP, including stages of action, prohibitions, penalties, reduction methods, and catastrophic supply interruption.
- **Chapter 9 - Demand Management Measures:** This chapter explains the City's existing and historic efforts to promote water conservation and the City's plans to use Demand Management Measures to achieve its 2025 water use targets.
- **Chapter 10 - Plan Adoption, Submittal, and Implementation:** This chapter details the steps taken by the City to adopt the 2020 UWMP in accordance with the CWC, make it available to the public, and implement it.

- **Appendices:** These include any additional information to support and clarify any information presented within the 2020 UWMP content.

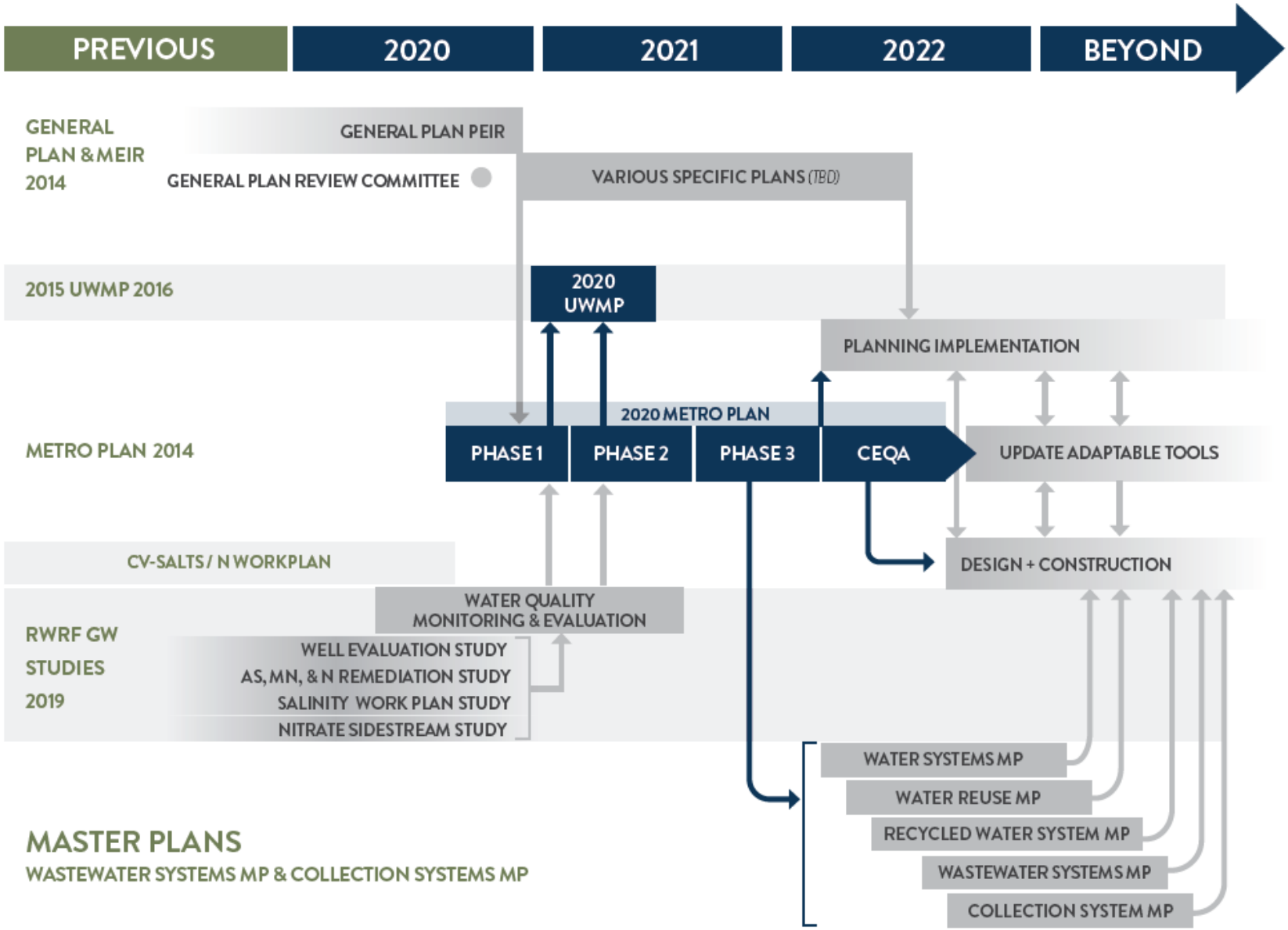
1.3 UWMPs in Relation to Other Efforts

The City previously prepared a 2005 UWMP, 2010 UWMP, and 2015 UWMP. This 2020 UWMP serves as an update to the 2015 UWMP and complies with new requirements and regulations. In addition to completing the 2020 UWMP, the City is presently updating its Fresno Metropolitan Water Resource Management Plan (Metro Plan). The last Metro Plan was completed in 2014, and the current Metro Plan update will prepare a fresh look at the City's water resources and consider new conditions and strategies for planning through 2070. **Figure 1-1** shows the City's ongoing and additional future water resources planning efforts.

1.4 Demonstration of Consistency with the Delta Plan

A new requirement for the 2020 UWMP is that agencies that anticipate participating in, or receiving water from, a proposed project utilizing Sacramento-San Joaquin Delta (Delta) Water or within the Jurisdiction of the Delta Stewardship Council (covered action) should demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta. Covered actions include, but are not limited to, projects such as multiyear water transfers, conveyance facilities, or new diversions that involve transferring water through, exporting water from, or using water in the Delta, per California Code of Regulations, Title 23, Section 5003. The City of Fresno contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 AF of Class 1 water. Although the Friant Division of the CVP does not directly divert or convey water from the Delta, the project was developed through an exchange with the Delta-Mendota supply. As restrictions on Delta exports have hindered USBR from making deliveries to the Delta-Mendota Canal, the Friant Division Class 1 allocations are reduced, and the water is transferred back to the users that would typically receive water from the Delta-Mendota Canal. As such, the City is required to demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta. **Appendix D** includes the reporting and calculations that demonstrate Fresno's reduced reliance on supply from their USBR CVP water supply.

Figure 1-1. Previous and Ongoing Water Resources Planning Efforts



2 CITY OF FRESNO
Plan Preparation

The City has coordinated the preparation of its 2020 UWMP with its water suppliers, the County, the City of Clovis, nearby water agencies, and community members to develop a UWMP that adheres to the requirements of the CWC and plans for a resilient water future.

IN THIS SECTION

- Coordination and Outreach

The City of Fresno provides water service to a variety of customer sector types within the City limits, inclusive of several historic County Waterworks Districts (county islands) which have been incorporated into the City's water system.

The City has approximately 139,500 service connections and produced just under 122,000 AF of potable water in 2020. The City meets the threshold identified in the CWC to be classified as an urban water supplier and in the California Health and Safety Code as a public water system. The City provides water directly to its customers and does not wholesale water to any other agencies for potable uses (defined as sales greater than 3,000 acre-feet per year). Therefore, the City is required to prepare and update a Retail UWMP every five years. This report was prepared on a calendar year basis.

2.1 Coordination and Outreach

The City has water supply contracts with USBR and Fresno Irrigation District (FID). Each of these water suppliers has been notified of the plan update and provided water supply projections for the time period covered by this plan. Additionally, the preparation of this 2020 UWMP was coordinated with other appropriate agencies to ensure regional stakeholders had the opportunity to provide input to this plan. The City has coordinated preparation of the 2020 UWMP and solicited participation and comments with the agencies indicated in **Table 2-1**. The City has also published notices in local newspaper and encouraged the active involvement of the population within the water service area to provide feedback on the UWMP and the WSCP during the public review period, as discussed in **Section 10.1**.

Table 2-1. Agency Coordination and Outreach

AGENCY	NOTIFIED 60 DAYS PRIOR TO PUBLIC HEARING	NOTIFIED OF PUBLIC DRAFT 14 DAYS PRIOR TO PUBLIC HEARING
Bakman Water Company	✓	✓
City of Clovis	✓	✓
County of Fresno	✓	✓
Fresno Irrigation District	✓	✓
Fresno Metropolitan Flood Control District	✓	✓
Friant Water Authority	✓	✓
Garfield Water District	✓	✓
Malaga County Water District	✓	✓
Pinedale County Water District	✓	✓
North Kings Groundwater Sustainability Agency	✓	✓
US Bureau of Reclamation	✓	✓

3 CITY OF FRESNO System Description

This chapter describes the history of the City's water system, its current service area, climate, population, and demographics.

The original Fresno water system began operations in 1876 as a non-profit organization inaugurated by a group of public-minded citizens. Initially, the water system consisted of one pumping station composed of small pumps and two storage tanks located above the second floor of one of the early store buildings. This building was located on Fresno Street between "J" and "K" Streets, presently known as Broadway and Fulton.

IN THIS SECTION

- Service Area
- Land Uses
- Water System
- Population and Demographics

By 1888, the town had grown to a small city, which demanded an improved water distribution system. This was necessary because of several large fires, including the destruction of the first permanent courthouse. In 1888, the first pumping station and water tower were constructed at Fresno and "O" Street. These facilities were designed to be an integral part of a larger and continually expanding water system. This No. 1 station was in continuous use until 1959, when it was retired having served its useful purpose. Today, this building is known as the "Water Tower" and has been declared a historic structure.

Between the years of 1887 and 1890, 4-inch and 2½-inch cast iron pipe, as well as 4-inch wrought iron water mains were laid out. Most of these original “permanent pipes” have since been replaced in the present water supply system. The owner and operator of the system in 1888 was the Fresno Water Company. In 1904, the Fresno Water Company was purchased by Balch, Kerckhoff & Wishon, and was reorganized as the Fresno City Water Company. In 1926, the facilities were purchased by the California Water Service Company. This company then sold the water system to the City of Fresno in 1931, which operated as a municipal utility. It was first managed under an appointed water board, but currently is a division of the Department of Public Utilities.

Historically, the City’s supply of water consisted of direct pumping from wells drilled into the underground aquifer. Today, groundwater remains one of the City’s primary water supply sources, including 202 active and 56 inactive groundwater wells. The production capacity from the active wells is approximately 403 million gallons per day (mgd) and the total production capacity is 487 mgd, including inactive wells. The wells are located around the City to provide equitable distribution throughout the City’s water system, as described below. Most wells are connected directly into the transmission grid main system (14- to 20-inch diameter pipelines) to convey water throughout the system.

In the 1960s, the City secured a surface water contract made available from the United States Bureau of Reclamation (USBR). The City contracted with USBR for 60,000 acre-feet of water per year from the Friant Division (Millerton Lake) and developed a system to recharge the groundwater basin by “intentional recharge,” percolating the imported surface water supplies in constructed recharge basins. The City’s USBR supplies are conveyed to the City via FID canals. In 1976, the City signed a contract with FID for delivery of surface water supplies from the Kings River based on the City’s pro rata share of FID’s water entitlements. The Kings River water is used for groundwater recharge and treated for potable use.

In 2004, the City also began treating surface water supplies for direct potable use at its first surface water treatment facility located in northeast Fresno (NESWTF). For the period of 2005–2014, this 30 mgd-rated facility provided 10–15% of the City’s potable water supplies. From 2016–2020, this facility produced 15% of the City’s potable water supply, an increase largely attributed to transmission system improvements, which permitted conveying water further into the City’s distribution system, and the City’s lower overall system demands. Also, in 2015, the City commenced operations of its new T-3 Water Storage and modular Surface Water Treatment Facility (T-3 SWTF) in southeast Fresno. In January 2013, the City completed the installation of meters on all single-family residences.

In 2018, the City completed construction of its new 54 mgd surface water treatment facility in southeast Fresno (SESWTF) and large diameter water mains that serve nearly one-half of the City. Production from this facility may ultimately be 80 mgd with the City demonstrating to the Division of Drinking Water (DDW) that the facility is capable of safely running at higher filter loading rates. With the SESWTF operational, along with the NESWTF and T-3 SWTF, the City provided greater than 50% of its potable supply through using surface water for the first time in 2019 and 2020. The City expects to provide half or more of its potable demand using its surface water supply sources going forward.

3.1 Service Area

The City of Fresno presently covers approximately 115 square miles (sq mi) (73,500 acres) consisting largely of single-family residential, commercial, public, and industrial development. It also includes several areas not within the City limits (e.g., County islands), as shown in **Figure 3-1**. With the exception of the Bakman Water Company (Bakman), Pinedale County Water District (Pinedale), Park Van Ness Mutual Water Company (Park Van Ness), California State University Fresno (CSUF), and private groundwater users located within County islands, the City currently serves water to the entire area encompassed by its City limits and will eventually serve out to the Sphere of Influence (SOI) boundary. The SOI is coincident with the City of Fresno General Plan Land Use and Circulation Map, which was adopted in the 2014 General Plan and therefore, includes all lands planned to be annexed by the City at the projected 2056 buildout of the General Plan (City of Fresno Development and Resource Management Department, 2014).

3.1.1 Land Uses within Service Area

According to the General Plan and the City's Planning and Development Department, the City's planning area covers approximately 106,000 acres (165.6 sq mi) comprised of approximately 73,500 acres (115 sq mi) of incorporated land and 32,500 acres (50.8 sq mi) of unincorporated land based on the City's current shapefiles. The total 106,000-acre planning area includes approximately 84,300 acres of developed or planned to be developed land, approximately 18,500 acres of roads, highways, and railroads with no corresponding water demand, and about 2,500 acres outside of the SOI north of the City's most northwesterly portion referred to as the North Area and shown on **Figure 3-1**.

Of the 106,000 acres within the City's planning area, the City's water service area covers 70,400 acres (110 sq mi) of land within the SOI, which includes most of the 73,500 acres of incorporated area and the unincorporated County Islands not within the City limits. As shown in **Table 3-1**, approximately 59,100 acres of the 70,400 acres within the water service area are developed and served water by the City. The remainder consists of vacant land that will be served by the City when it is developed. Residential units make up the largest portion of water demand served by the City, consisting of over 40% of the total served area and almost 90% of the total service connections.

The remaining areas within the City's SOI are served by other systems or are unserved by a water system, consisting of open space and agricultural land, land used by roads, highways, and railroads, as well as the North Area.

Table 3-1. Current Service Area Characteristics

LAND USE TYPE	AREA (ACRES)	% OF TOTAL AREA	SERVICE CONNECTIONS	% OF TOTAL CONNECTIONS
Single-Family Residential	27,700	39.3%	118,775	85.1%
Multifamily Residential	3,700	5.3%	6,087	4.4%
Commercial	4,500	6.4%	11,982	8.6%
Public	5,600	8.0%	2,504	1.8%
Industrial	4,500	6.4%	175	0.1%
Open Space/ Landscape Irrigation	13,100	18.6%	Note 1	
Total	**59,100**		**139,523[2]**	**100%**
Vacant / Partially Vacant[3]	11,300	15.9%	N/A	
Total	**70,400**	**100%**		

Source: Acreage from City of Fresno Geographic Information System Shapefile of Land Uses provided 8/12/20. Number of connections provided by the City for 2020.

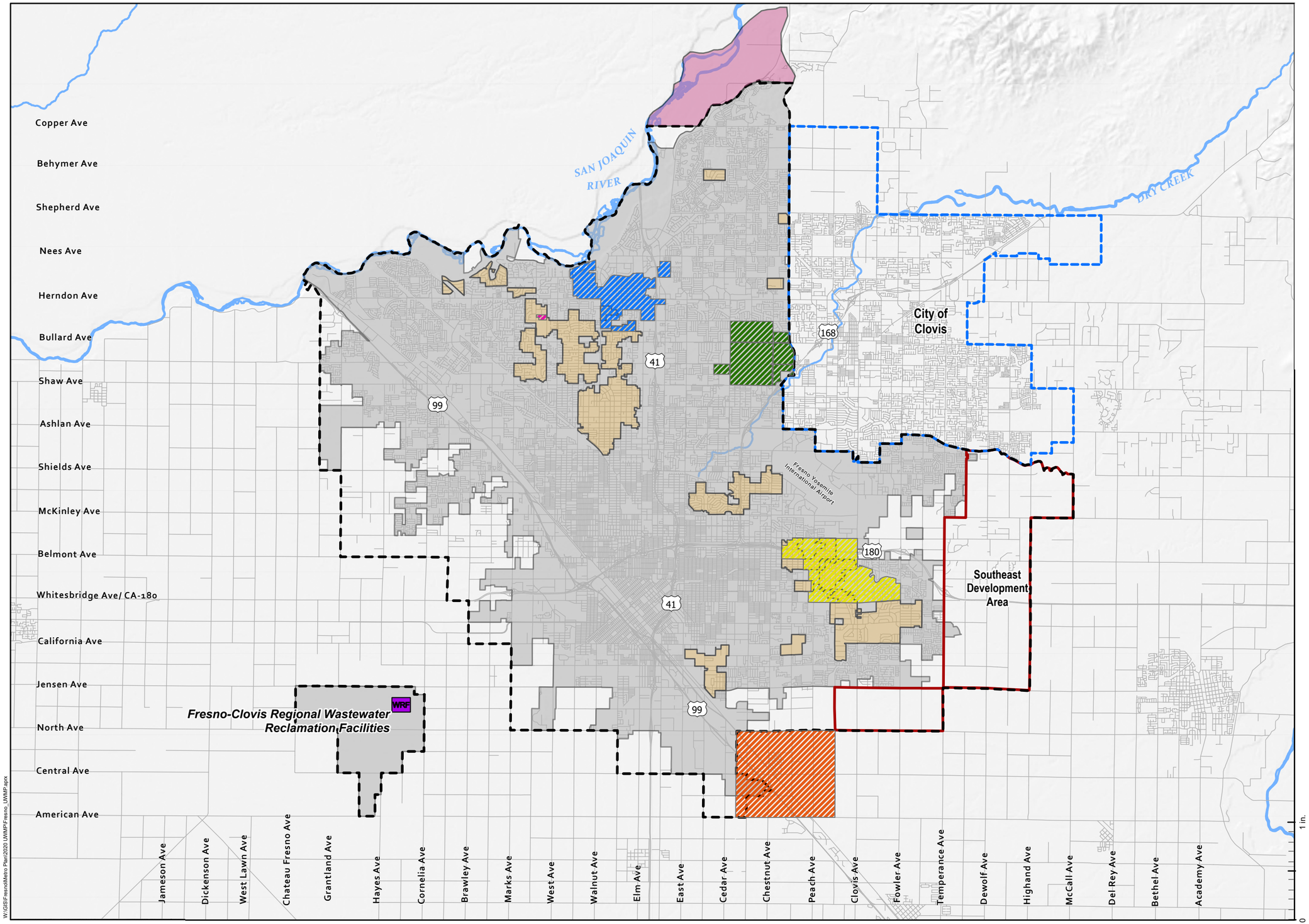
Notes:

1. Dedicated irrigation meters are included in commercial and public meter total.
2. Approximately 3,633 dedicated fire service connections are included in the total services connections, most of which are included in the commercial and public meter total.
3. For partially vacant land, half of the area is included in the zoned land use type and the other half is assumed vacant.

3.1.2 Water System

The City's water system consists of about 1,860 miles of distribution and transmission mains, 202 active municipal groundwater wells, three surface water treatment facilities (SWTFs) with current rated capacities ranging from 4 to 54 mgd, five water storage facilities with pump stations, including one at each of the SWTFs plus two in the distribution system, and three booster pump facilities.

The City's service area spans an approximate 120 feet of elevation difference, declining from northeast to southwest. To help regulate pressure throughout the water distribution system, the City utilizes five pressure zones, as shown on **Figure 3-2**: Highway 41, Shepherd, Sierra, Southwest, and Booster Pump 4 (BP04). The pressure zones are separated by a series of closed or partially closed valves between each zone to prevent or impede flow from one zone to the next, referred to as gate systems. There are four gate systems — Shepherd, Sierra, Southwest, and BP04 — separating the five pressures zones. The Highway 41 Pressure Zone was previously split into two pressure zones divided by a series of 26 gate valves closely following the alignment along Highway 41. However, these zones were combined into a single zone in 2015 by fully opening the Highway 41 gate valves, and as a result are not shown on **Figure 3-2**.



Legend

- Fresno Sphere of Influence
- Clovis Sphere of Influence
- Fresno City Limits
- County Islands
- North Area
- Southeast Development Area
- WRF Wastewater Reclamation Facility
- Streets

Areas Served Water by Others

- Bakman Water District
- Malaga Water District
- Park Van Ness Mutual Water District
- Pinedale County Water District
- CA State University, Fresno

Prepared by: WSC

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0 0.75 1.5 3 Mi

0 3,750 7,500 15,000 US Feet

References:

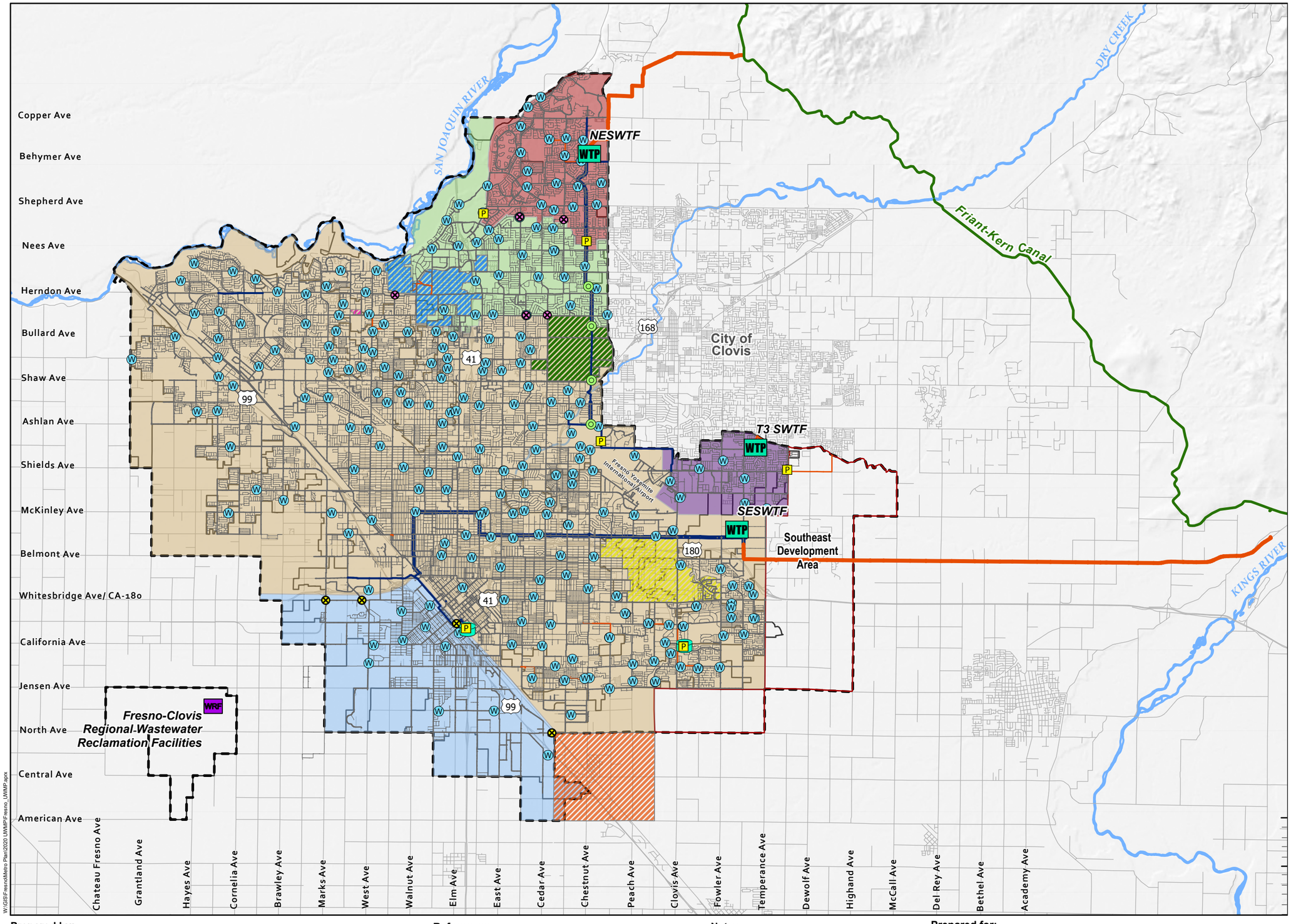
1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 3-1. City Service Area



Legend

City Facilities

- WTP — Water Treatment Plant
- P — Booster Pump Station
- Storage Facility
- W — Active Well
- Existing Turnout
- WRF — Wastewater Reclamation Facility

Gate System Valves

- Pressure Relief Valve
- Pressure Sustaining Valve

Water Mains by Diameter (inch)

- <10
- 10 - 16
- 16 - 30
- 30 - 72

Raw Water Mains by Diameter (inch)

- <10
- 10 - 16
- 16 - 30
- 30 - 72
- Friant-Kern Canal

Areas Served Water by Others

- Bakman Water District
- Malaga Water District
- Park Van Ness Mutual Water District
- Pinedale County Water District
- CA State University, Fresno

Pressure Zones

- Highway 41
- Booster Station 4
- Shepherd
- Sierra
- Southwest

City Features

- Southeast Development Area
- Fresno Sphere of Influence
- Fresno City Limits
- Streets

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Prepared by: WSC

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References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 3-2. Water System

3.2 Service Area Climate

The City's service area is in California's San Joaquin Valley in Fresno County along Highway 99. The climate of the area is best described as Mediterranean, characterized by hot dry summers and cool winters. Precipitation in the area averages around 11 inches per year, as shown in **Table 3-2**. However, rainfall can significantly vary year to year, with over 18 inches received in 2011 and less than 4 inches received in 2014. The recent drought was marked by four consecutive years (2012 to 2015) of less than 10 inches of rainfall. As shown by the average evapotranspiration (ET_o) and temperature values in **Table 3-2**, the City's water use in the summer months is significantly higher than in the winter, reflecting increased water use for irrigation purposes during the hot, dry summers.

Table 3-2. Average Climate Characteristics

MONTH	ET_o (INCHES)	RAINFALL (INCHES)	TEMP-HIGH (°F)	TEMP-LOW (°F)
Jan	1.17	2.33	56.9	37.4
Feb	1.98	1.8	62.6	39.8
Mar	3.73	1.99	68.4	43.6
Apr	5.43	0.99	73.7	46.9
May	7.33	0.54	81.3	53.2
Jun	8.41	0.19	89.6	59.1
Jul	8.8	0.02	95.7	63.8
Aug	7.82	0.01	94.6	62.5
Sep	5.69	0.07	89.6	57.9
Oct	3.68	0.59	79.3	49.3
Nov	1.85	0.98	66.2	40.6
Dec	1.10	1.83	56.5	36.1
Total/ Average	**56.99**	**11.34**	**76.2**	**49.2**

Source: CIMIS Website: http://www.cimis.water.ca.gov, Station 80 Fresno State (1988 to 2020) Monthly Average Report, October 2020 (downloaded November 30, 2020)

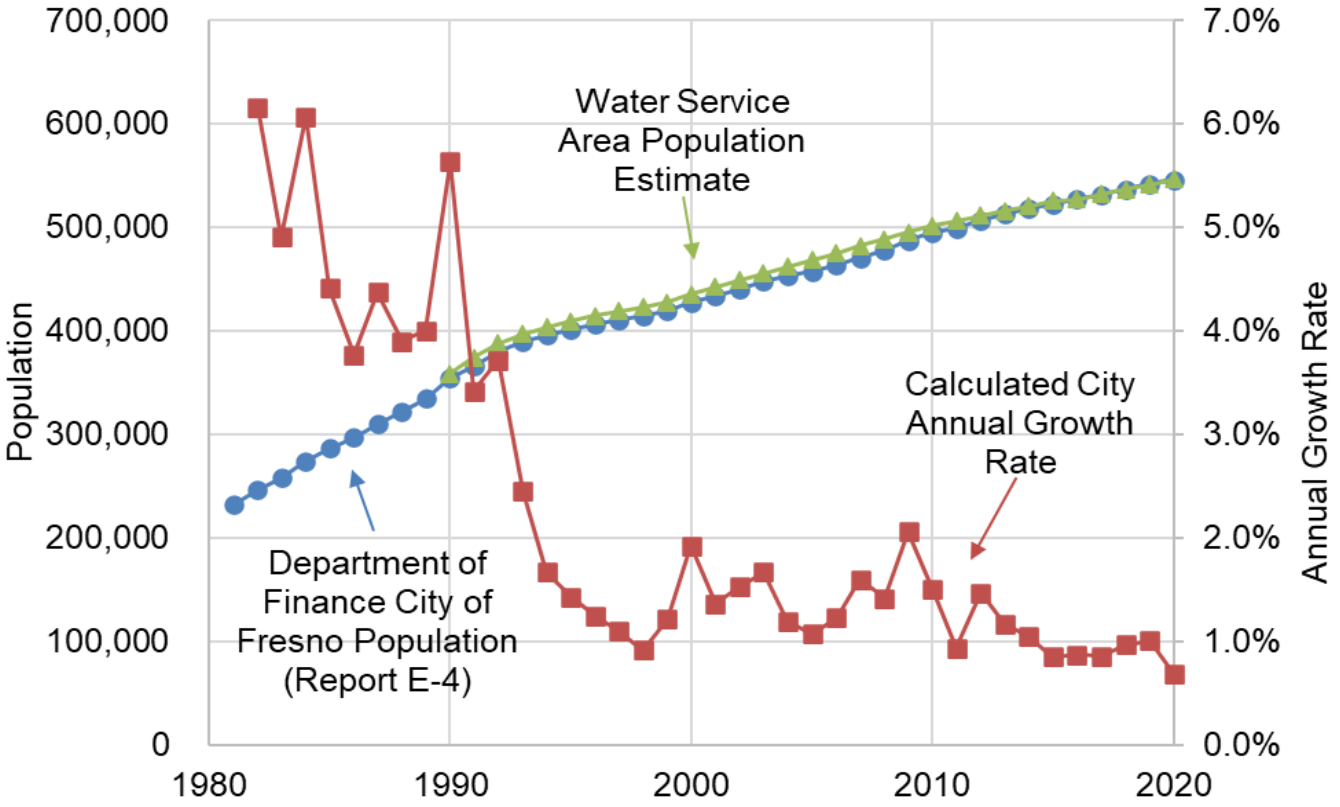
3.3 Service Area Population and Demographics

The City experienced rapid growth since it was founded by the Central Pacific Railroad in 1872 up through the mid-1990s, when the City's annual growth rate was typically greater than 2%. From 1995 to 2015, the annual growth rate has decreased to an average of 1.3%, and since 2015, the rate has not surpassed 1.0%.

The population served by the City Water Division is slightly higher than the City's population after adding unincorporated areas served by the City and removing areas within the City limits served by private water companies, special districts, or private wells. The City acquired County service areas and facilities in 1989, which increased the service area population to slightly greater than the City population since 1990.

Figure 3-3 compares the historic City population to the water service area population since 1990. Water service area population estimates prior to 1990 were unavailable for comparison to the City's population. The City Water Division's methodology for calculating the population of the City's water service area involves summing all the Census tract data for the City's overall service area and subtracting out tracts not served by the City. These tracts included areas served by Pinedale, Bakman, and CSUF, as well as areas outside the City service area, unserved areas within County areas, unserved areas within City areas, and areas with only partial service (i.e., straddling City service areas). Based on the City's methodology, the water service area population was estimated to be 546,502 in 2020, compared to 545,769 for the total City population in January 2020 (California Department of Finance, 2020). For comparison, in the 2015 UWMP, the City Water Division population served was 525,575 compared to the total City population of 522,369 (California Department of Finance, 2020). The City's water service area population in 2020 using the DWR Population Tool is 550,217 and is similar to the population estimate using the City's methodology.

Figure 3-3. City of Fresno and Water Service Area Historic Population



The City's General Plan is the City's primary growth planning document from which the baseline water service area population projection for this UWMP was developed. The General Plan includes population estimates for the City planning area, which includes all areas within City limits and unincorporated areas outside of City limits within the City's SOI, based on projections developed by the Fresno Council of Governments and estimates a buildout population of 921,057 in 2056. In 2017 the Fresno Council of Governments developed population projections in 5-year increments through 2050 for all cities within Fresno County (Applied Development Economics, Inc. and Mintier Harnish Associates, 2017). The Fresno Council of Governments' 2017 report projects the City's population will grow at an annual growth rate ranging from 0.92–1.44%, with an average annual growth rate between 2020 and 2056 (buildout) of 1.03% per year. These population projections and growth rate have been incorporated in the City's General Plan population projections.

According to the City's Planning and Development Department, the City's water service area population is anticipated to continue to grow along with the City, with some slightly higher growth years anticipated within the next 10 years due to multiple large developments planned for completion in the near term. For planning purposes, this UWMP assumes the City will slowly incorporate areas served by others within the City's SOI by buildout in year 2056. As such, the long-term water service area population annual growth rate is expected to be 1.44% between 2020 and 2056 to account for absorbing these areas into the City's water system.

The baseline population projection starts with the 2020 water service area population determined using the DWR Population Tool and grows based on areas expected to be developed by 2030,

as provided by the City's Planning Department, and then linearly beyond 2030 to meet the buildout population in 2056. The City's 2020 population estimate includes the entire City planning area, including areas not served water by the City and areas currently outside the City limits but within the SOI, and is higher than the current water service area population. The water service area population projection assumes the City will incorporate all areas currently served by others and grow to provide water service to all areas within the SOI by buildout. Because the water service area has more growth potential than the City planning area, the annual average growth rate as calculated ranges from 1.1–2.1% between 2020 and 2056, with an average annual growth rate of approximately 1.56% between 2020 and 2045 that continues to slow through the buildout. **Table 3-3** shows the water service area population projections through 2045 in five-year increments.

Table 3-3. Current and Projected Population (DWR 3-1R)

POPULATION SERVED	2020	2025	2030	2035	2040	2045
TOTAL	**550,217**	**609,433**	**674,677**	**719,327**	**765,278**	**812,529**

3.3.1 Other Social, Economic, and Demographic Factors

Most recently, the City is experiencing significant impacts due to the global pandemic caused by COVID-19 (SARS-CoV-2) virus. In March 2020, the State issued a stay-at-home order that forced many businesses to close and other businesses to require residents to continue work only from their home to slow the spread of the virus. Additionally, the forced closure of several businesses caused a historic increase in unemployment across the US and a resulting economic recession. While all the impacts of COVID-19 are not entirely known at this time, it has caused a shift in water use by customer class. In 2020, residential demands increased by over 8% from 2019 demand, while commercial and industrial water use decreased by over 5%. This shift is expected to be temporary with an anticipated return to previous levels once all stay at home orders are lifted and businesses can reopen. However, the economic recession could have longer term impacts to the region.

CITY OF FRESNO

4 Water Use Characterization

This chapter describes and quantifies 2020 water use and projected water use through 2045 within the City's service area.

Water consumption in the City is characterized by the typical demand sectors of residential, commercial, institutional, industrial, and irrigational. The difference between production and consumption is losses, which may be attributed to system leaks, meter inaccuracies, fire flows, theft, unmetered use, or other factors.

IN THIS SECTION

- Distribution System Water Losses
- Past and Current Water Use
- Projected Water Use

4.1 Non-Potable Versus Potable Water Use

The City serves its customers potable water for residential, commercial, institutional, industrial, and landscape irrigational demands through its potable water distribution system.

The City also diverts raw surface water obtained from the United States Bureau of Reclamation (USBR) and Fresno Irrigation District (FID) to recharge basins throughout the service area. The City coordinates with FID for the delivery of the recharge water, utilizing FID's existing system of channels and pipelines to convey the raw water, and with Fresno Metropolitan Flood Control District (FMFCD) to deliver water to FMFCD's stormwater retention and recharge basins or its own recharge basins. The raw surface water recharges the groundwater basin to sustain the groundwater supply for the City. The groundwater recharge volume can vary based on surface water supply availability and is represented as an addition to annual groundwater supplies as discussed in **Chapter 6**. In addition, the City serves a limited number of customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively. The recycled water demands are discussed in **Section 6.4**.

4.2 Past, Current, and Projected Water Use by Sector

The following sections document the past and current water use for each sector, and the projected water use through 2045.

4.2.1 Water Use Sectors

Records of historical water consumption serve as the basis for developing water demands by water use sector. Water consumption is the volume of water measured at each metered service.

The City tracks water consumption across different water use sectors listed in the California Water Code (CWC), including:

- Single-Family Residential
- Multifamily Residential
- Commercial and Institutional / Governmental
- Industrial
- Landscape
- Distribution System Losses

In addition to the water uses listed in the CWC, the City participates in exchanges and transfers, provides temporary travel meters for temporary water use, and diverts non-potable surface supplies for groundwater recharge, described below. The City does not provide water for sales to other agencies, saline water intrusion barriers, or agricultural use.

4.2.1.1 Exchanges

Since 1976, the City has had a water exchange agreement with FID for delivery of the City's percolated wastewater effluent — considered equivalent to tertiary treatment — to FID canals. This is not counted as a water use in this chapter and is discussed as a water supply in **Section 6.6.1.2**.

4.2.1.2 Other

A small, quantified water demand has been classified as “other” to account for temporary travel or construction meters for water used for dust control. This use type typically accounts for less than one percent of total water use.

4.2.2 Distribution System Water Losses

Real losses, as defined in the American Water Works Association (AWWA) Water Audit tool are:

“Physical water losses from the pressurized system (water mains and customer service connections) and the utility’s storage tanks, up to the point of customer consumption. In metered systems, this is the customer meter; in unmetered situations, this is the first point of consumption (stop tap/tap) within the property. The annual volume lost through all types of leaks, breaks, and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks, and overflows.”

The past five years of distribution system losses are listed in **Table 4-1**, and the results of the 2016-2019 AWWA Water Audit Tool are provided in **Appendix E**. The AWWA Audit Worksheet was not completed for 2020 prior to the submittal of this plan, and the volume of water loss is estimated as the difference between water produced and metered water consumed for each calendar year period.

The overall consumption of water in the system is placed into four different categories:

- Billed Metered Usage
- Billed Unmetered Usage
- Unbilled Metered Usage
- Unbilled Unmetered Usage

The water losses for the system were found by determining the difference between the overall amount of water supplied to the community and the apparent system losses. The City’s system losses have many different possible causes such as hydrant flushing/testing, construction, firefighting, system leaks, water main breaks, and meter error. The estimated loss in 2020 is 9,568 acre-feet (AF), which is the difference between metered production and metered consumption and is approximately 8% of the overall system production. Based on the previous four years of audits, the City has not had to apply meter adjustments in the AWWA Water Audit Tool, and the water losses report is the difference between water produced and metered water consumed each year. It is anticipated that the estimated 2020 water loss volume in **Table 4-1** will be the water losses reported on the 2020 AWWA Audit when it is certified.

Currently, the City does not have a water loss standard but intends to evaluate programs to reduce water losses in their Metro Plan that is currently being updated. The City is also tracking forthcoming water use standards, which will include a water loss standard that is planned to be adopted by the Water Board within the next few years.

Table 4-1. DWR 4-4R 12 Month Water Loss Audit Reporting

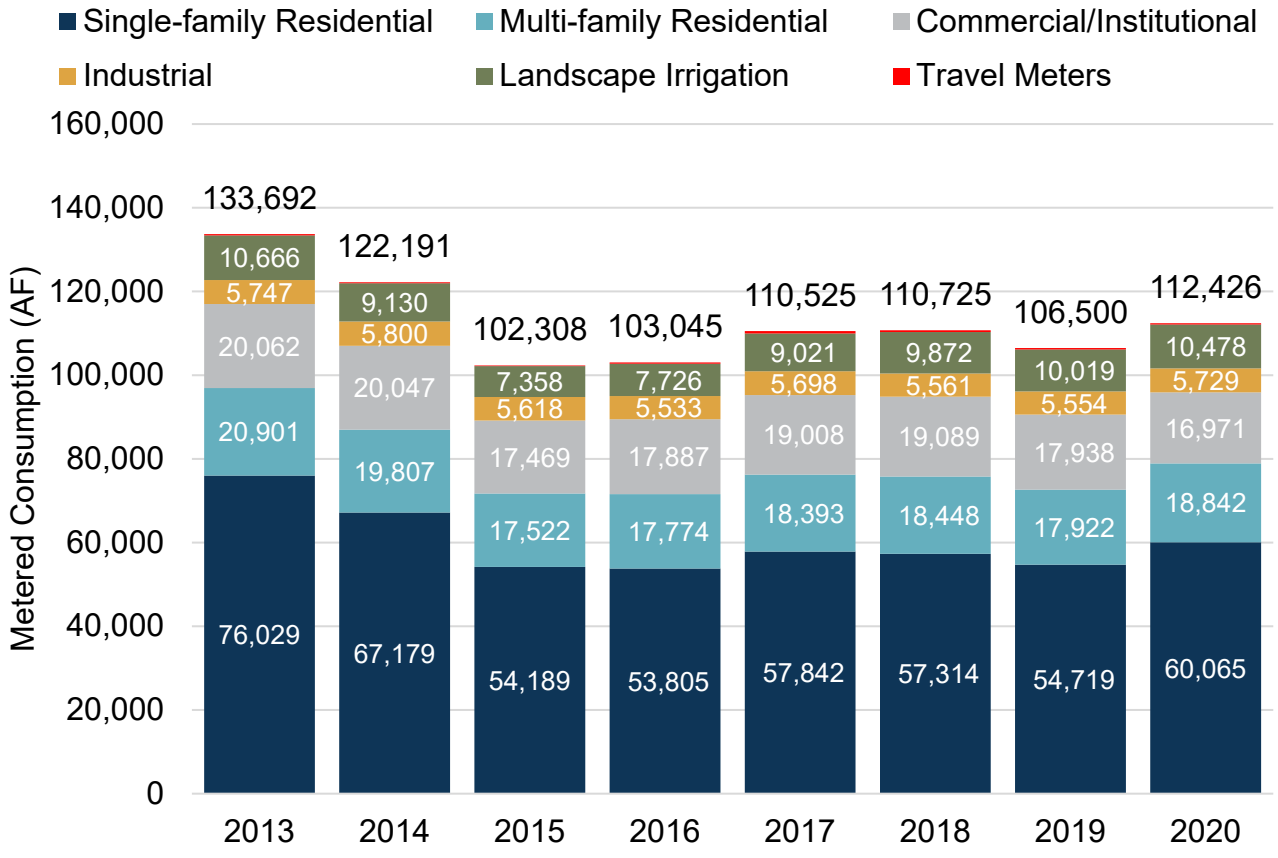
REPORT PERIOD START DATE		VOLUME OF WATER LOSS, AFY	PERCENT LOSS OF PRODUCTION
MM	YYYY		
1	2016	9,036	8.0%
1	2017	10,235	8.5%
1	2018	9,028	7.5%
1	2019	9,059	7.8%
1	2020	9,568	7.8%

For 2016 through 2019, volume of water loss is taken from the AWWA Water Audit Tool. For 2020, the volume of water loss is the difference in metered production and metered consumption.

4.2.3 Past and Current Water Use

Since 2013, all water services in the City's water service area have been metered. Prior to 2013, the City estimated single-family residential water use, since these services were not equipped with meters, by subtracting all other metered uses (commercial, institutional, industrial, and irrigational), plus 10% assumed losses, from production data. Water consumption for the City's water service area by customer type for 2013–2020 is shown on **Figure 4-1**.

Figure 4-1. Historical Consumption by Customer Type (2013–2020)



As shown in the figure, single-family residential water use has decreased more than 20,000 AFY since the Single-Family Metering Program was completed in 2013. Multifamily residential, commercial, and institutional services have historically been metered, and consumption has also decreased since 2013, with industrial users and landscape irrigation consumption at similar levels to 2013 consumption, even as new customers are connected to the City's water system. Landscape irrigation demands did decrease in 2015 and 2016, likely due to the drought restrictions, and continue to recover after the drought ended in 2017.

Table 4-2 provides the breakdown of actual water use by sector type in calendar year 2020. As shown in **Table 4-2**, single-family residential water use is the largest use type in the City and accounted for almost 50% of potable water use in 2020. Multifamily residential use was the second largest, accounting for approximately 15% of water sales in 2020. Together, residential water use accounts for about 65% of all potable water uses in the City's service area. The remaining potable water uses consist of mainly commercial and institutional water use, which are tracked together and included only on the commercial use row on **Table 4-2**, followed by landscape irrigation and industrial usage. Distribution losses accounted for approximately 8% of potable water used in 2020 (per **Section 4.2.2**).

Table 4-2. Actual Demands for Water: Potable (DWR 4-1R)

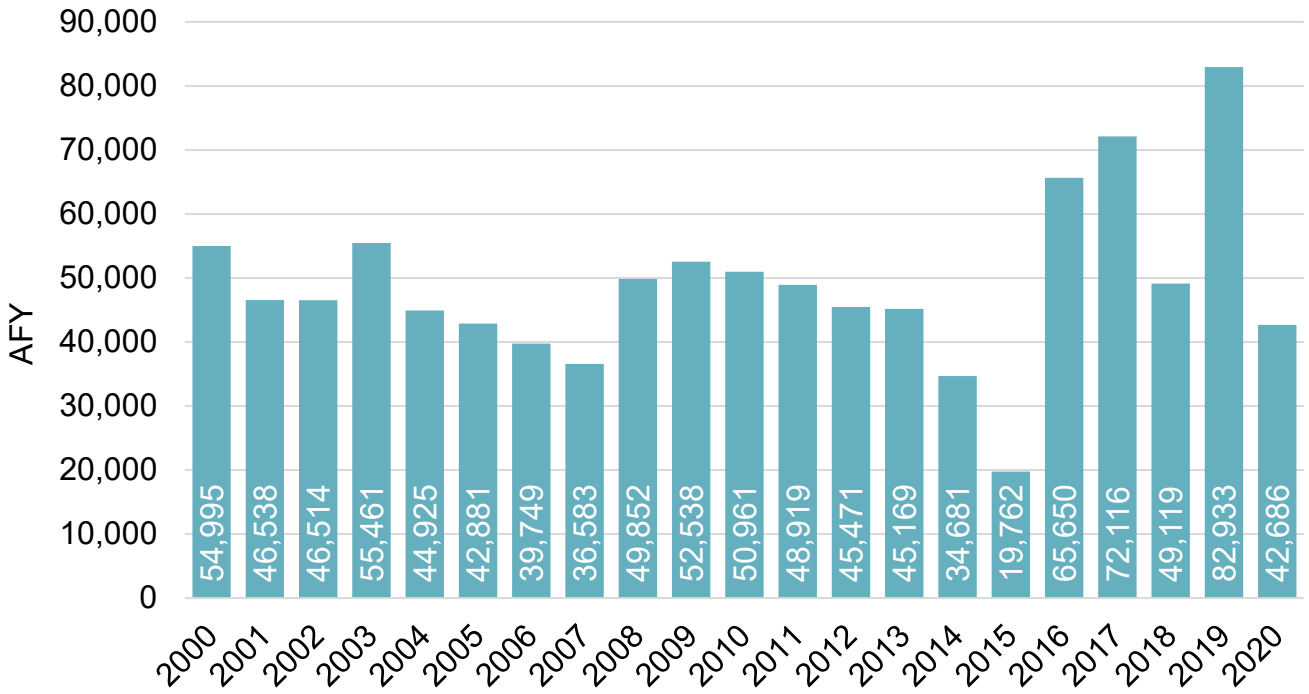
USE TYPE	ADDITIONAL DESCRIPTION	LEVEL OF TREATMENT WHEN DELIVERED	2020 VOLUME	PERCENT OF TOTAL
Single Family		Drinking Water	60,065	49.2%
Multi-Family		Drinking Water	18,842	15.4%
Commercial		Drinking Water	16,971	13.9%
Industrial		Drinking Water	5,729	4.7%
Institutional/ Governmental	See Note 1	Drinking Water	---	---
Landscape		Drinking Water	10,478	8.6%
Other	Travel Meters	Drinking Water	340	0.3%
Losses		Drinking Water	9,568	7.8%
Total:			**121,993**	**100%**

Note:

1. Institutional and Governmental water usage is included in the Commercial use type.

Figure 4-2 shows the historic volume of the City's raw surface water used for groundwater recharge since 2000. Over the last 20 years (2000–2020), the average annual intentional recharge of surface water was 49,240 AFY. Total recharge has ranged from a high of 82,900 AF in 2019 and a low of 19,700 AF in 2015. Also, total recharge volumes in 2016, 2017, and 2019 were three of the highest volumes in the last 20 years. The increases were due to over 30% increase in recharge at City basins from the addition of several basins (Nielsen, Fancher) and proactive maintenance of basins to maximize percolation capacity. The annual variability between years is caused by several factors, including basin availability, water delivery season, pond maintenance, or length of wet seasons.

Figure 4-2. Historic Recharge of City Surface Water



4.2.4 Projected Water Use

4.2.4.1 Land Use Projections

The potable demand projections through 2045 for normal water use follow the methodology for land use-based projections described in Appendix K of the 2020 Urban Water Management Plan (UWMP) Guidebook. Under this methodology, existing land use and demand is accounted separately from future land use and demand. This allows different demand factors to be applied to current land use areas and future land use areas. Future land use areas represent future customers and developments that are expected to be more water efficient than existing land uses and buildings due to the California Plumbing Code (CPC) and use of higher efficiency appliances and landscapes.

The existing and future land use acreage was sourced from the City's Geographic Information System (GIS) database and the City's General Plan. The existing land use shapefile and associated acreage for each land use classification were used to represent 2020 land use data. Areas not served by the City were excluded from the existing land use shapefile. The future land use shapefile corresponds with the planned land use at buildout as described in the City's General Plan representing the year 2056. Although the City does not have any plans to serve areas currently served by others within the City limits, all areas within the City Sphere of Influence (SOI) were assumed to be served by the City by buildout for conservative planning purposes. **Table 4-3** lists the land use acreage by land use category for the 2020 and buildout 2056 water service areas.

The land use acreage between 2020 and 2056 was estimated in 5-year increments based on areas planned to be developed by 2030 from the City's Planning Department, and by linearly interpolating the remainder of the change in acreage for each land use category between 2030 and 2056. **Figure 4-3** shows the existing and projected land use by customer class used to develop the projections.

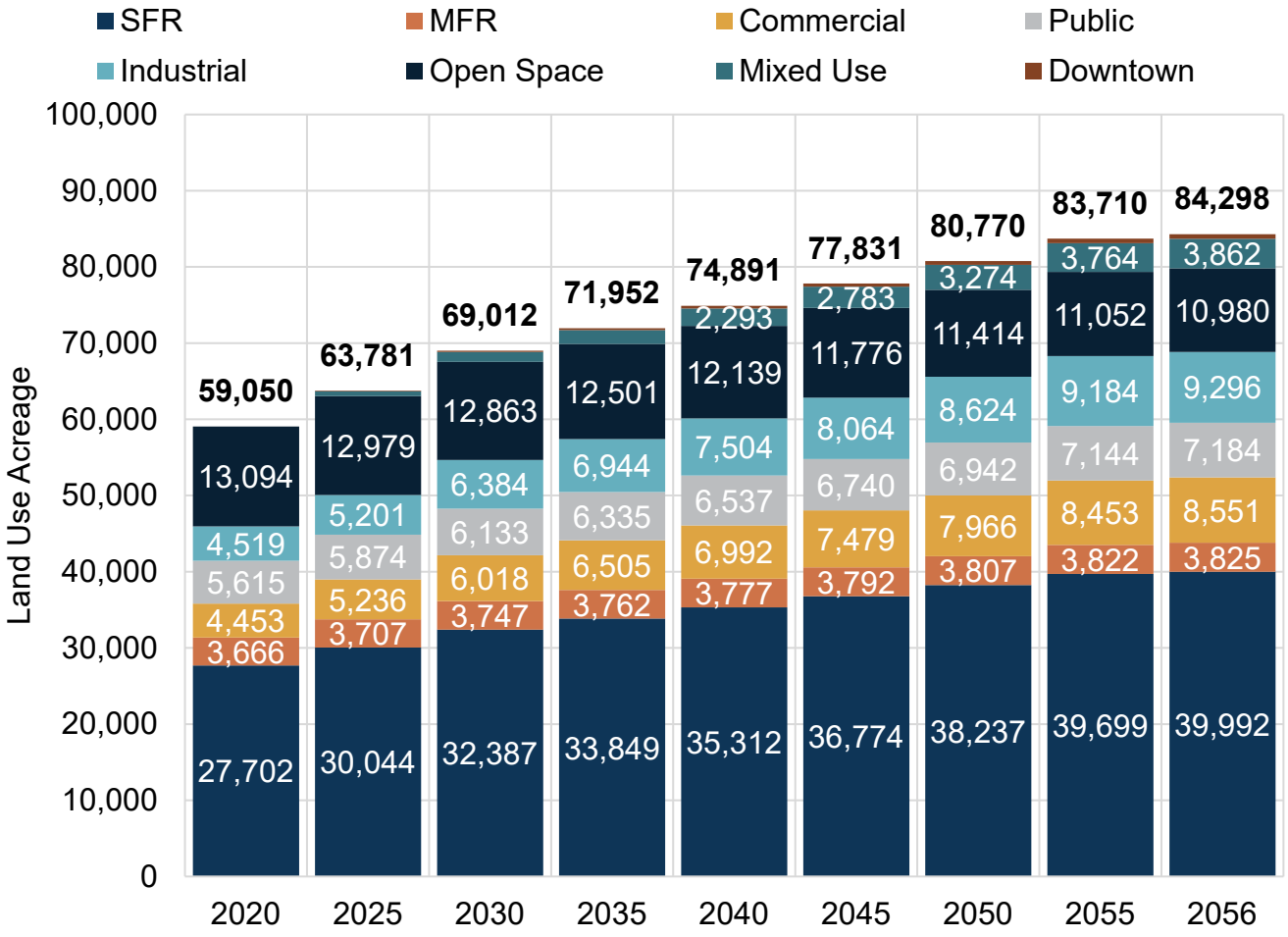
Table 4-3. Existing and Future Water Service Area Acreage

LAND USE CATEGORY	2020 WATER SERVICE AREA[1, 3, 4]		2056 WATER SERVICE AREA[2]	
	ACRES	PERCENT	ACRES	PERCENT
Single-Family Residential	27,700	47%	40,000	47%
Multifamily Residential	3,700	6%	3,800	5%
Commercial	4,500	8%	8,600	10%
Public Facility	5,600	9%	7,200	9%
Industrial	4,500	8%	9,300	11%
Open Space/ Landscape Irrigation	13,100	22%	11,000	13%
Mixed Use[3]	0	0%	3,900	5%
Downtown[3]	0	0%	600	1%
TOTAL	**59,100**	**100%**	**84,300**	**100%**

Notes:

1. Acreage from City of Fresno GIS Shapefile of Land Uses provided 8/12/20 and reduced to the City's water service area (excludes Pinedale, Bakman, and California State University Fresno and unserved areas outside the City limit and SOI).
2. Future Land Use Shapefile provided by the City on 8/12/20 and aligns with the General Plan for buildout in year 2056. The buildout service area acreage listed excludes the Fresno-Clovis Regional Wastewater Reclamation Facility, land used for road, highways, and railroads, and the north area outside of the SOI.
3. Mixed use and downtown land use categories are not in the existing land use shapefile. They are described in the General Plan as new designations for redevelopment of existing areas that contain a mix of land uses.
4. Approximately 11,300 acres of non-water demanding vacant/partially vacant land is excluded from the 2020 water service area acreage.

Figure 4-3. Existing and Projected Land Use



Note: Acreage for Mixed-use and Downtown land use types are not shown every year for clarity, but are included in the total acreage value.

4.2.4.2 Demand Factors and Future Savings

Land use-based water demand factors were developed using 2018 metered consumption data matched to 72 categories of land use data. These demand factors were applied to the 2020 land use acreage by category to develop the demand projection beginning in 2020. Demand factors for land uses that grow over time and represent new developments were assigned a lower demand factor than the demand factors for existing development. Additionally, demand factors were assumed to slowly reduce over time due to passive conservation, which includes the replacement of older water fixtures and appliances with more efficient types now required as part of the CPC. The passive conservation savings are projected to be greater for existing customers than future customers because future customers are already assumed to have a lower water demand factor and meet the plumbing code.

Future savings due to passive conservation were developed using the Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool. The Tracking Tool is an Excel tool that can

incorporate water service area-specific data to estimate natural replacement rates of fixtures and future savings based on the CPC.

Table 4-4 lists the passive conservation savings assumption incorporated in the potable demand projections. Existing unit demand factors are reduced by the percentages listed to develop the future development unit demand factors. As shown in the table, this assumes future residential and non-residential dwelling units are 10% and 5% more water efficient, respectively, than existing dwelling units due to changes in the plumbing code and ever-increasing new water efficient technology. **Table 4-5** compares the total potable demand projections without the estimated savings due to passive conservation from 2025–2045.

Table 4-4. Passive Conservation Savings Assumptions

LAND USE TYPE	FUTURE DEVELOPMENT UNIT DEMAND FACTOR REDUCTION[1]	EXISTING DEVELOPMENT ANNUAL PASSIVE CONSERVATION SAVINGS[2]	FUTURE DEVELOPMENT ANNUAL PASSIVE CONSERVATION SAVINGS[3]
Residential/Mixed Use	10%	0.20% per year	0.04% per year
Commercial/Downtown	5%	0.05% per year	0.01% per year
Public	5%	0.05% per year	0.01% per year
Industrial	5%	0.05% per year	0.01% per year
Open Space/ Landscape Irrigation	0%	0% per year	0% per year

Notes:

1. Existing (2020) unit demand factors are reduced by the percentages listed to develop the future development unit demand factors.
2. Existing development annual passive conservation savings were developed using the AWE Water Conservation Tracking Tool.
3. Future development passive conservation savings are assumed to be one-fifth the rate of existing development passive conservation savings.

Table 4-5. Projected Future Savings for Potable Demands, AF

	2025	2030	2035	2040	2045
Total Potable Demand with no conservation	137,521	149,361	157,204	165,047	173,160
Estimated Passive Conservation	1,017	2,005	2,994	3,973	5,213
TOTAL POTABLE DEMAND WITH PASSIVE CONSERVATION	**136,504**	**147,356**	**154,210**	**161,074**	**167,947**

4.2.4.3 Demand Projections

Table 4-6 provides the projected demands by use type based on the methodology described above. **Table 4-7** includes the projected raw surface water used for groundwater recharge through the planning period for normal years. The City intends to recharge an average of 60,000 AFY beyond 2020, corresponding with the average recharge volume from 2016 through 2020, and gradually increase recharge by about 540 AFY each year. In 2025, the normal year groundwater recharge is projected to be 62,700 AFY and will continue to increase to 73,500 AFY by 2045. The actual volume recharged is based on the available surface water supplies each year, as well as available basin capacity and other factors, and may be lower in dry years or higher in wet years.

Table 4-6. Projected Demands for Water: Potable (DWR 4-2R)

USE TYPE	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
		2025	2030	2035	2040	2045
Single Family		76,255	80,429	82,934	85,437	87,936
Multi-Family		19,000	20,654	21,737	22,831	23,935
Commercial		19,052	21,135	22,587	24,041	25,496
Industrial		7,410	9,003	9,922	10,841	11,758
Institutional/ Governmental	See Note 1					
Landscape		4,490	5,035	5,422	5,809	6,196
Other	Travel Meters	200	200	200	200	200
Losses		10,097	10,900	11,408	11,917	12,426
TOTAL:		**136,504**	**147,356**	**154,210**	**161,076**	**167,947**

Note 1: Institutional and Governmental water usage is included in the Commercial use type.

Table 4-7. Projected Demands for Water: Non-Potable (DWR 4-2R)

USE TYPE	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
		2025	2030	2035	2040	2045
Groundwater Recharge	Raw-Water	62,700	65,400	68,100	70,800	73,500
TOTAL:		**62,700**	**65,400**	**68,100**	**70,800**	**73,500**

4.2.4.4 Future Conservation

In 2018, following the unprecedented drought, California Legislature established a framework centered on "Making Water Conservation a California Way of Life." The goal was to help the State better prepare for droughts and climate change by establishing statewide water efficiency standards and incentivizing recycled water (California Department of Water Resources, State Water Resources Control Board, November 2018). The resulting legislation of Senate Bill 606 and Assembly Bill 1668, along with future regulations, will have impacts on water providers over the coming years, requiring indoor, outdoor, and commercial, industrial, and institutional water use goals, water loss standards, annual water budgets, and documented preparation for long-term water shortages. All the water use goals together will form a total urban water use objective specific for each water agency. The Department of Water Resources (DWR) has provided recommended standards for indoor residential water use, and other urban water use goals are currently being developed and are expected to be released in late 2021. The State Water Resources Control Board is anticipated to adopt the element that includes the total water use objective in 2022, and agencies will begin reporting their water use in accordance with their urban water use objective beginning in 2024, with compliance anticipated by 2027. Because most of the water use goals are unknown, and none has been adopted by the State, the City's total urban water use objective is unknown and was not incorporated into the demand projections herein. However, the City is tracking the water use efficiency standards and goals and is aware it may need to implement additional conservation above what is presented in these projections to meet its total urban water use objective as mandated by the State in the future. The City is considering these higher conservation demand projections within a demand envelope in the current Metro Plan update.

4.2.5 Characteristic Five-Year Water Use

A new component of the UWMP is to prepare a five-year drought risk assessment (DRA) to evaluate water service reliability for a drought lasting five years from 2021–2025. The five-year DRA assumes potable water demand is unconstrained, and the City will continue to meet all projected potable demands. The raw water demand varies based on the availability of surface water supplies for groundwater recharge. The recycled water supply is not impacted by the drought, and recycled water demands are at normal year projections for the five-year drought. Projected water demands for years 2021–2025 for the DRA are included in **Section 7.2**.

4.3 Water Use for Lower Income Households

The Fresno Council of Governments (COG) prepared an update to the Regional Housing Needs Allocation (RHNA) to cover the period of January 1, 2015–December 31, 2023. The City subsequently developed its own Housing Element based on the COG RHNA for the planning period of December 31, 2015–December 31, 2023. The City's current Housing Element was adopted on April 13, 2017.

The City's Housing Element specifies the City will develop 8,955 new housing units through 2023 for extremely low, very low, and low income levels (City of Fresno Development and Resource Management Department, 2017). The City's Planning and Development Department prepares Housing Element Annual Progress Reports to report the progress of the RHNA and housing goals. The City of Fresno 2019 Housing Element Annual Progress Report details that 909 lower income units are approved or permitted (City of Fresno Planning and Development Department,

2020). The remaining number of lower income units needed over the RHNA 2013–2023 period, when subtracting the approved and permitted units, is 8,046.

Table 4-8 includes the Housing Element identified available single-family and multifamily acres to be developed and dwelling units for Extremely Low, Very Low, Low, Moderate, and Above Moderate income levels (City of Fresno Development and Resource Management Department, 2017). This data was used to determine the number of acres of both single-family and multifamily land use that needs to be developed by 2023 to meet the remaining 8,046 lower income units target for RHNA. The identified acres needed for low-income development by 2023 was applied to the average water demand factor for single-family and multifamily land uses to project the lower income water demands through 2023 to meet RHNA, shown in **Table 4-8**.

Table 4-8. Lower Income Dwelling Units and Acres to be Developed through 2023 and Estimated Water Demand

FRESNO HOUSING ELEMENT	SINGLE-FAMILY RESIDENTIAL	MULTIFAMILY RESIDENTIAL	TOTAL
Acres Available for Low-Income Development	3,163.6	1,310.9	4,474.5
Total Dwelling Units	13,457	21,526	34,983
Dwelling Unit per Acre	4.25	16.42	
Dwelling Unit Needed to Meet RHNA	3,095	4,951	8,046
Acres to be developed to Meet RHNA	727.6	301.5	1,029.1
Average Water Demand Factor (AF/ Acre)	2.54	5.13	
Low-Income Demand to meet RHNA from years 2020 – 2023 (AF)	1,847	1,545	3,392
Annual Low-Income Demand to meet RHNA (AFY)	**462**	**386**	**848**

Based on the estimated low-income water demand to meet the RHNA requirements by 2023, the annual projected low-income households demand is 462 AFY for single-family residential and 386 AFY for multifamily residential. For the purposes of this plan, the current RHNA projected low-income growth and water demands was applied through the UWMP planning period of 2045 and is presented in **Table 4-9**. However, lower income demands beyond 2023 will be based on the next Housing Element and RHNA Update expected in 2023 and may change in the future. All housing units and associated population are included in the adopted General Plan, and the demands for these units that occur within the water service area boundaries are included in the future water demands presented in this plan.

Table 4-9. Lower Income Household Projected Water Demands

LOW INCOME DEMAND	2025	2030	2035	2040	2045
Single-Family Residential Demand	2,308	2,308	2,308	2,308	2,308
Multifamily Residential Demand	1,932	1,932	1,932	1,932	1,932
TOTAL (AF)	**4,240**	**4,240**	**4,240**	**4,240**	**4,240**

4.4 Climate Change Considerations

Climate change impacts were considered in the North Kings Groundwater Sustainability Plan (NKGSP) based on DWR's Guidance for Climate Change Data Use during Groundwater Sustainability Plan (Department of Water Resources, 2018) and the related Sustainable Groundwater Management Act climate change website.[1] As documented in the NKGSP, the DWR climate change datasets were developed for the California Water Commission's Water Storage Investment Program (WSIP), are consistent with other DWR programs, are based on the best available science, build on previous efforts, incorporate the latest advances in projections, and follow the Climate Change Technical Advisory Group guidance (Provost & Pritchard, November 2019).

Changing precipitation and evapotranspiration (ETo) rates are expected to have the greatest impact on future demands, especially for outdoor water use. The WSIP climate change data sets estimate minimal changes to precipitation due to climate change from the historic period. The same datasets predict the ETo rate estimates with climate change will increase 3% by 2030 and up to 8% by 2070. More specifically, the ETo rate is predicted to increase the most in typically low ETo months (winter) and when irrigation is limited. The ETo rate is also predicted to be only slightly higher than historic in warmer months during the irrigation season. While higher ETo rates would increase irrigation demands, they are not anticipated to substantially impact the City's urban water use. The climate change impacts to supply sources are discussed in the supply chapter of **Section 6.8.2.1**.

[1] https://data.cnra.ca.gov/dataset/sgma-climate-change-resources

CITY OF FRESNO

5 SBX7-7 Baseline, Targets and 2020 Compliance

Senate Bill x 7-7 (SBx7-7) was signed into law in 2009 and requires the State to achieve a 20% reduction in per capita water use by December 31, 2020, with an interim target of 10% reduction by December 31, 2015.

IN THIS SECTION

- Baselines & Targets
- 2020 Compliance

The legislation requires each urban water supplier to develop and include in its Urban Water Management Plans (UWMPs) estimates of: 1) *baseline* daily per capita water use; 2) daily per capita water use *target*; 3) daily per capita water use *interim target*; and 4) *compliance* daily per capita water use. The UWMP must also include the basis for determining the estimates, with references to supporting data.

The Department of Water Resources (DWR) developed the Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use Guidebook (GPCD Methodologies Guidebook) to provide appropriate methodologies and criteria guidance (California Department of Water Resources, Feb 2016).

The baseline and 2020 per capita water use targets were calculated in the 2015 UWMP and are provided in **Appendix C**. There have not been significant changes in the City's service area since 2015, thus the calculations included in the 2015 Plan are still valid for compliance in this 2020 UWMP.

5.1 General Requirements for Baseline and Target

Methodologies consistent with those described in the GPCD Methodologies Guidebook were used to develop baselines and targets. The selected procedure used to develop the required SBx7-7 estimates includes the following basic steps:

1. Calculate baseline water use, which is the average gross daily water use per capita, reported in gallons per capita per day (GPCD), based on gross water use and service area population for a continuous 10-year period ending no earlier than December 31, 2004.
2. Calculate urban water use target using one of the four methods described below.
3. Check and confirm the urban water use target using the five-year running average.
4. Calculate the interim urban water use target (equal to the average of the baseline and confirmed urban water use target).
5. Calculate the compliance daily per capita water use (equal to the gross daily water use per capita during the final year of the reporting period).

DWR allows the urban water supplier to choose one of four different methods to calculate the urban water use target in Step 2 above.

- **Method 1** involves calculating the target based on 80% of baseline daily per capita water use and the interim target based on 90% of the baseline daily per capita water use.
- **Method 2** involves calculating the per capita daily water use by using the sum of performance standards applied to indoor residential use, landscaped area water use, and commercial, industrial, and institutional uses.
- **Method 3** calculates the water use target as 95% of the applicable state hydrologic region target as stated in the draft 20x2020 Water Conservation Plan.
- **Method 4** is an approach developed by DWR that uses a spreadsheet to calculate estimated water savings factors to estimate targets.

The City selected Method 1 for determining its 2015 Interim and 2020 Final urban water use targets during the preparation of its 2010 UWMP. This selection was made after reviewing the four alternative methods available. Rather than duplicating the evaluation for this plan update, the reader is directed to Appendix I of the City's 2010 UWMP for details, as the previous City adopted evaluation is still applicable and results in the same target method selection.

5.2 Service Area Population

The City's 2020 service area population was estimated using the DWR Population Tool consistent with DWR Methodology 3 (Service Area Population) and the 2015 UWMP. Shapefiles of the City's water service area were loaded into the DWR Population Tool along with available residential service connection numbers to develop service area populations for the corresponding census years. The DWR Population Tool, provided in **Appendix F**, estimated the City's water service area population is 550,217. The DWR Population Tool provides a population based on the 2000 and 2010 census data and, published effective as of April 1 of the census year, the water service area during each census year and the number of water service connections. For the 2020 population, the number of services from December 31, 2020, was used, and the 550,217 population is estimated as of the end of 2020.

5.3 Gross Water Use

The City's gross water use is comprised of surface water contracted for delivery of allocated supplies from USBR and FID and groundwater produced by its municipal wells. The basis of gross water use are the meters installed at the City's North Fresno Wastewater Reclamation Facility, Southeast Surface Water Treatment Facility, and T-3 Water Storage and modular Surface Water Treatment Facility, and each of its municipal groundwater wells, which are equipped with flow meters. DWR Methodology 1 (gross water use) provides the opportunity to make adjustments and deductions in the reported gross water use for factors such as: meter errors, changes in distribution storage, indirect recycled water use, agricultural water use, and process water use. The City's gross water use has not been adjusted for any of these factors. Therefore, the total water use shown in **Table 4-2** is the City's gross water use.

5.4 Baselines and Target Summary

The City's 2015 UWMP reviewed and updated the 10-year and five-year Baseline Daily Per Capita Water Use and 2020 Target, included in **Table 5-1**. The continuous time period used in the 2015 UWMP for the 10-year baseline period is 1999–2008 and has an associated average daily per capita water use of 309 GPCD. The continuous time period that was used in the 2015 UWMP for the five-year target confirmation baseline period was 2003–2007, which has an associated average daily per capita water use of 304 GPCD. The confirmed 2020 target was established as a 20% reduction from the 10-year baseline per capita use and is 247 GPCD. Refer to **Chapter 5** of the City's 2015 UWMP for more information on how the baselines and targets were developed.

Table 5-1. Per Capita Water Use Baseline and 2020 Target

BASELINE PERIOD	TIME PERIOD	AVERAGE BASELINE GPCD (GPCD)	CONFIRMED 2020 TARGET (GPCD)
10 Year	1999 – 2008	309	247
5 Year	2003 – 2007	304	

5.5 2020 Compliance Daily Per-Capita Water Use (GPCD)

This section presents the procedure used to meet the requirements of SBx7-7 as defined in the Water Conservation Act of 2009 as incorporated into Division 6 of the California Water Code, commencing with Section 10608 of Part 2.55.

5.5.1 Meeting the 2020 Target

The determination of 2020 target compliance is based on gross water use for the 2020 calendar year, which was 121,993 acre-feet (see **Table 4-2**), and a service area population of 550,217 as of December 31, 2020 (see **Table 3-1**). The resultant actual per capita water use for the City in 2020 was 198 GPCD. As such, the City has met and exceeded the 2020 target of 247 GPCD.

The overall water usage patterns of the City have been greatly reduced due to its conservation measures and metering of all services. Prior to January 2013, nearly all of the City's single-family residential water customers had been billed on a monthly flat rate structure; they were unaware of the water they actually used and had no real incentive to conserve water. As of January 2013, the City has completed its residential water meter program, which installed approximately

113,000 water meters for single-family homes. With the completion of this program, all the City's water service connections are now metered, and the City and its customers can work more closely together to optimize water use. Since completion of the project, residential water demands have dramatically decreased. Attainment of the 2020 target has been influenced by the City's investments in metering and the proactive conservation education and outreach to customers. These factors have played a significant role in the City's ability to meet and surpass the 2020 target. In the future, the City will need to remain diligent in monitoring water use and continuing incentive programs to further reduce water consumption. These efforts are necessary so when the current strict reduction requirements are lifted, all water users remain diligent in avoiding unnecessary use of water and upgrade fixtures to eliminate water wasting.

5.5.2 2020 Adjustments to 2020 Gross Water Use

No extraordinary events or economic adjustments have taken place that would cause any adverse effects with regards to overall water usage. As was previously mentioned, the City did not make any adjustments to the 2020 gross water use as is permissible with Water Code 10608.24 cited above.

CITY OF FRESNO

6 Water Supply Characterization

This chapter identifies and quantifies, to the extent practicable, the existing and planned sources of water supplies for the City through 2045.

The City relies on groundwater from the North Kings Subbasin; surface water from Central Valley Project (CVP), through a contract with the United States Bureau of Reclamation (USBR); Kings River water, through a contract with Fresno Irrigation District (FID); and recycled water. This chapter also provides a discussion of supply availability and reliability under normal supply conditions (normal water year), during a single dry year, and for a drought lasting five years.

IN THIS SECTION

- Groundwater
- Surface Water
- Recycled Water
- Projected Water Supply

Water production in the City has consisted of 100% groundwater prior to the commissioning of the City's first surface water treatment facility (SWTF) in 2004. Since 2004, the City has invested in expanding its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demands in the service area.

6.1 Groundwater

The City overlies the Kings Subbasin, which is part of the greater San Joaquin Valley Groundwater Basin. The City is one of many water purveyors that use groundwater from the Kings Subbasin. The City has a network of over 270 municipal wells and currently operates approximately 202 municipal supply wells within the Kings Subbasin. Until late 2004, the City relied solely on groundwater to meet the water demands. The City's desire is to continue to use groundwater within a larger conjunctive use program that maximizes its existing water rights and surface water supply sources.

6.1.1 Basin Description

The Department of Water Resources (DWR) has partitioned the State into 10 major hydrologic regions (also referred to as "basins") and then further divided each basin into subbasins. The City is located in the Kings Subbasin (DWR Groundwater Subbasin Number 5-22.08) and lies within the larger San Joaquin Valley Groundwater Basin in the Central Valley of California. The Kings Subbasin covers approximately 1,530 square miles (sq mi).

6.1.1.1 Basin Location

The San Joaquin Valley Groundwater Basin is bounded to the north by the Sacramento-San Joaquin Delta and Sacramento Valley, to the east by the Sierra Nevada Mountains, to the south by the San Emigdio and Tehachapi Mountains, and to the west by the Coast Ranges. The Kings Subbasin, located within the southern half of the San Joaquin Valley Groundwater Basin, is bounded to the north by the San Joaquin River, to the east by the alluvium-granite rock interface of the Sierra Nevada foothills, to the south by the southern fork of the Kings River, and to the west by the Delta-Mendota and Westside Subbasins (California Department of Water Resources, January 2006). The Kings Subbasin is split into seven Groundwater Sustainability Agency (GSA) management areas, with Fresno located in the North Kings GSA. **Figure 6-1** illustrates the location of the City within the Kings Subbasin.

6.1.1.2 Area Geology

The upper several hundred feet of geology within the Kings Subbasin generally consists of highly permeable, coarse-grained deposits, which are termed older alluvium. **Figure 6-2** presents an idealized hydrogeologic cross-section that illustrates the general depth of various lithologic features within the Kings Subbasin, near the City.

Coarse-grained stream channel deposits, associated with deposits by the ancestral San Joaquin and Kings Rivers, underlie much of northwest Fresno (Layer 3 and 4 in **Figure 6-2**). There is a laterally extensive clay layer, at an average depth of approximately 250 feet below the ground surface, beneath most of the south and southeastern portions of the City.

Below the older alluvium, to depths ranging about 600–1,200 feet below ground surface, the finer-grained sediments of the tertiary-quaternary continental deposits are typically encountered (Layer 5 in **Figure 6-2**). Substantial groundwater has been produced and utilized from these depths by the City. However, deeper deposits located in the southeastern and northern portions of the City have produced less groundwater.

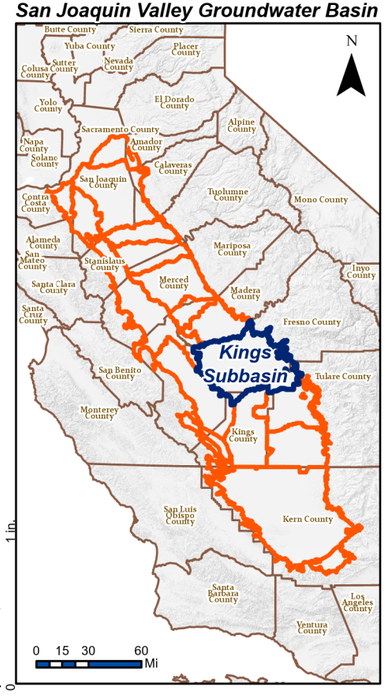
There are also reduced deposits in the northern and eastern portions of the City, at depths generally below 700 or 800 feet, which are associated with high concentrations of iron, manganese, arsenic, hydrogen sulfide, and methane gas. Groundwater at these depths does not generally provide a significant source for municipal supply wells.

Legend

Groundwater Sustainability Agency

- Central Kings GSA
- James Irrigation District
- Kings River East GSA
- McMullin Area GSA
- North Fork Kings GSA
- North Kings GSA
- South Kings GSA
- Fresno City Limits
- Fresno Sphere of Influence
- Kings Groundwater Subbasin
- Major Watercourses
- Lakes and Reservoirs
- County Boundary
- Canal

San Joaquin Valley Groundwater Basin



Prepared by: WSC

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0 2 4 8 Mi

0 5,000 10,000 20,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum North American 1983

Notes:

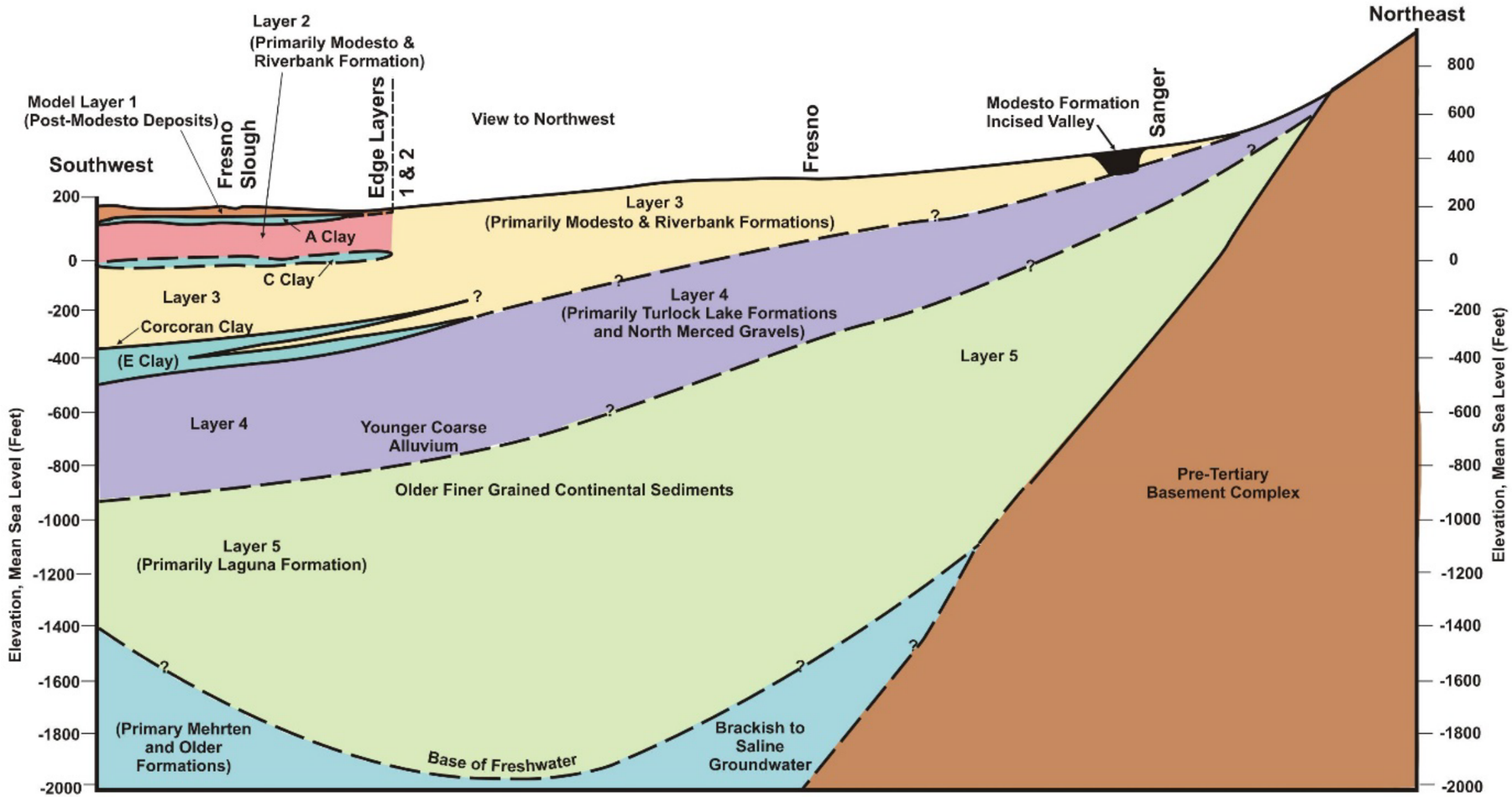
Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-1. Kings Subbasin

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Figure 6-2. Kings Groundwater Subbasin Conceptual Hydrogeologic Cross-Section, Southwest-Northeast



Primary Sources

Croft, 1969
Muir, 1977
Lettis, 1982
Page and LeBlanc, 1969
Cehrs, et. al. 1980
Wiseman, et. al: 2002b

Figure from *Kings Basin Integrated Hydrologic Modeling Hydrogeologic Investigation Technical Memorandum*, dated February 2006, prepared by Brown & Caldwell and Wrime.

6.1.1.3 Aquifer Characteristics

The aquifer beneath the City was characterized using data compiled during aquifer tests performed at the City's production wells. As part of updating the detailed hydrogeologic evaluation, aquifer test data (pump tests) were reviewed to update the hydrogeologic analysis and evaluate the specific capacity data. The specific capacity indicates the ability of a particular well to produce water. **Figure 6-3** presents the estimated specific capacity of each active well from early 2020 pump test data. As shown in the figure, the northwestern and southwestern portions of the City have wells with higher specific capacities.

6.1.2 Groundwater Management

In 2014, a three-bill legislative package was signed into law, composed of Assembly Bill 1739, Senate Bill (SB) 1168, and SB 1319, collectively known as the Sustainable Groundwater Management Act (SGMA) of 2014, which is codified in Section 10720 et seq. of the California Water Code. This legislation created a statutory framework for groundwater management in California that can be sustained during the planning and implementation horizon without causing undesirable results. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040. The Kings Subbasin was designated a critically overdrafted basin in the DWR's Bulletin 118. The North Kings GSA is working within the SGMA framework to reach groundwater sustainability.

The City was a founding member of the North Kings GSA, which consists of the following public agencies and participating agencies:

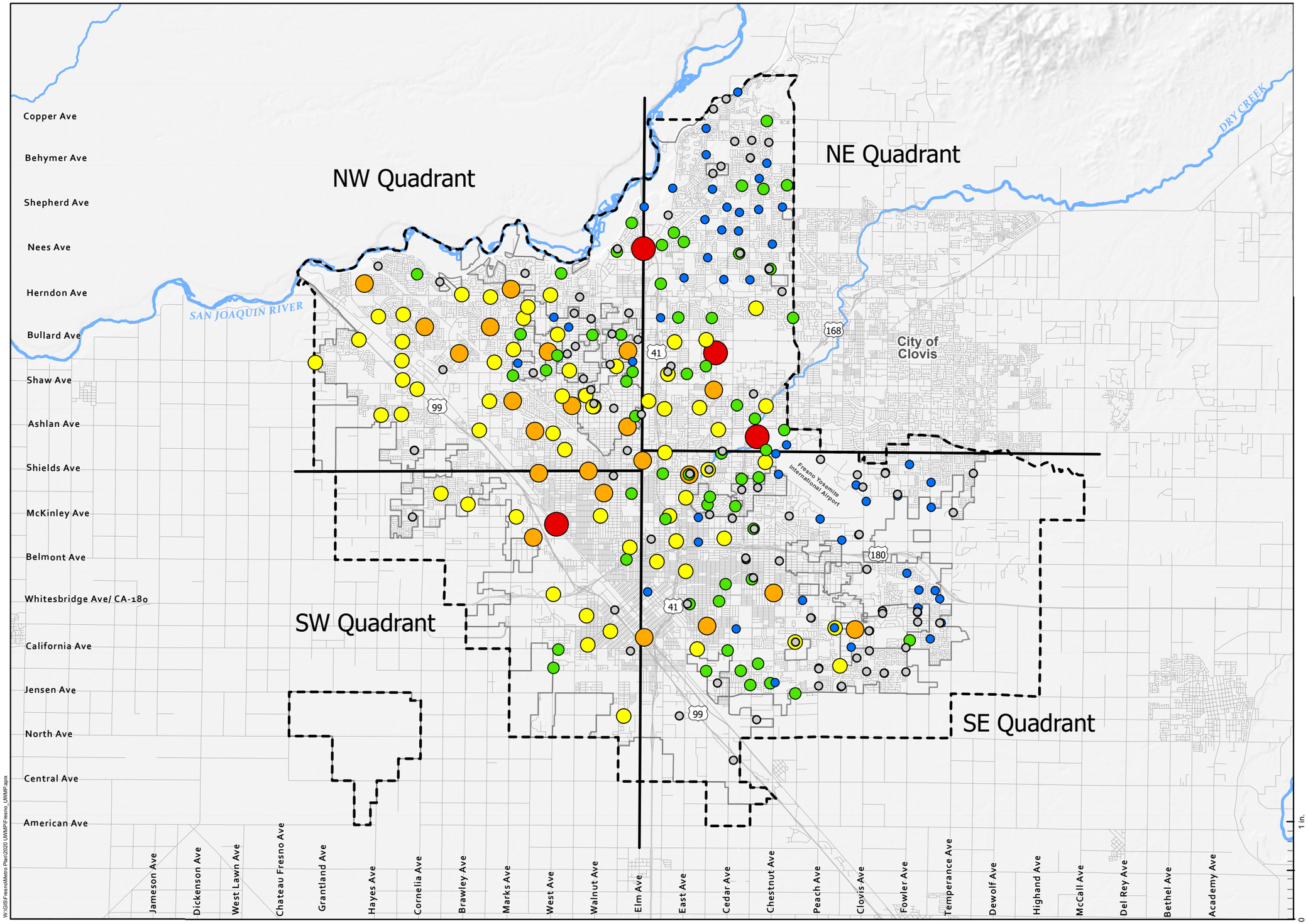
- Fresno Irrigation District (member)
- City of Fresno (member)
- City of Clovis (member)
- City of Kerman (member)
- County of Fresno (member)
- Bakman Water Company (participating agency)
- Biola Community Services District (member)
- Garfield Water District (member)
- International Water District (member)
- Fresno Metropolitan Flood Control District (participating agency)

The Kings Subbasin contains seven GSAs, including the North Kings GSA, as listed below and shown in Figure 6-1:

- Central Kings GSA
- James Irrigation District GSA
- Kings River East GSA
- McMullin Area GSA
- North Kings GSA
- North Fork Kings GSA
- South Kings GSA

The seven GSAs operate cooperatively across the basin via a coordination agreement that ensures common approaches to sustainability items such as similarity of data usage and methodologies, consistent interpretations of the basin setting, and common assumptions and development of water budgets, monitoring networks, sustainable management criteria and data management systems.

The North Kings GSA prepared and submitted its GSP in January 2020 (Provost & Pritchard, November 2019) and is awaiting DWR review by January 2022.



Legend

Well Specific Capacity (gpm/ft)

- Unknown
- < 20
- 20 - 50
- 50 - 100
- 100 - 200
- 200 - 450
- Groundwater Quadrant Divide
- Fresno Sphere of Influence
- Fresno City Limits
- Streets

Prepared by:

WSC

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0 0.75 1.5 3 Mi

0 3,500 7,000 14,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

1. Well specific capacity was provided by the City and calculated using 2020 data.

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City of FRESNO Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-3. City Wells Specific Capacity

As required by SGMA, the North Kings considers six sustainability indicators:

- Chronic lowering of groundwater levels indicating significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Each indicator has an identified undesirable result, measurable objective, and minimum threshold. The measurable objective and minimum threshold allow the North Kings GSA to evaluate their progress for the subject indicator and determine if conditions are improving, remaining stable or degrading. The sustainability indicators of primary concern within the City are groundwater levels, groundwater storage, and groundwater quality. The methodology for the water quality indicators has been developed and the methodology is still being developed for the groundwater levels and groundwater storage indicators. A copy of the GSP is provided in **Appendix G** of this UWMP[1].

6.1.3 Overdraft Conditions

SGMA directs DWR to identify groundwater basins and subbasins in conditions of critical overdraft. As defined by SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." As mentioned, DWR classifies the Kings Basin as being in a state of critical overdraft in its Bulletin 118, and the future of the groundwater basin has been projected to see continued overdraft conditions.

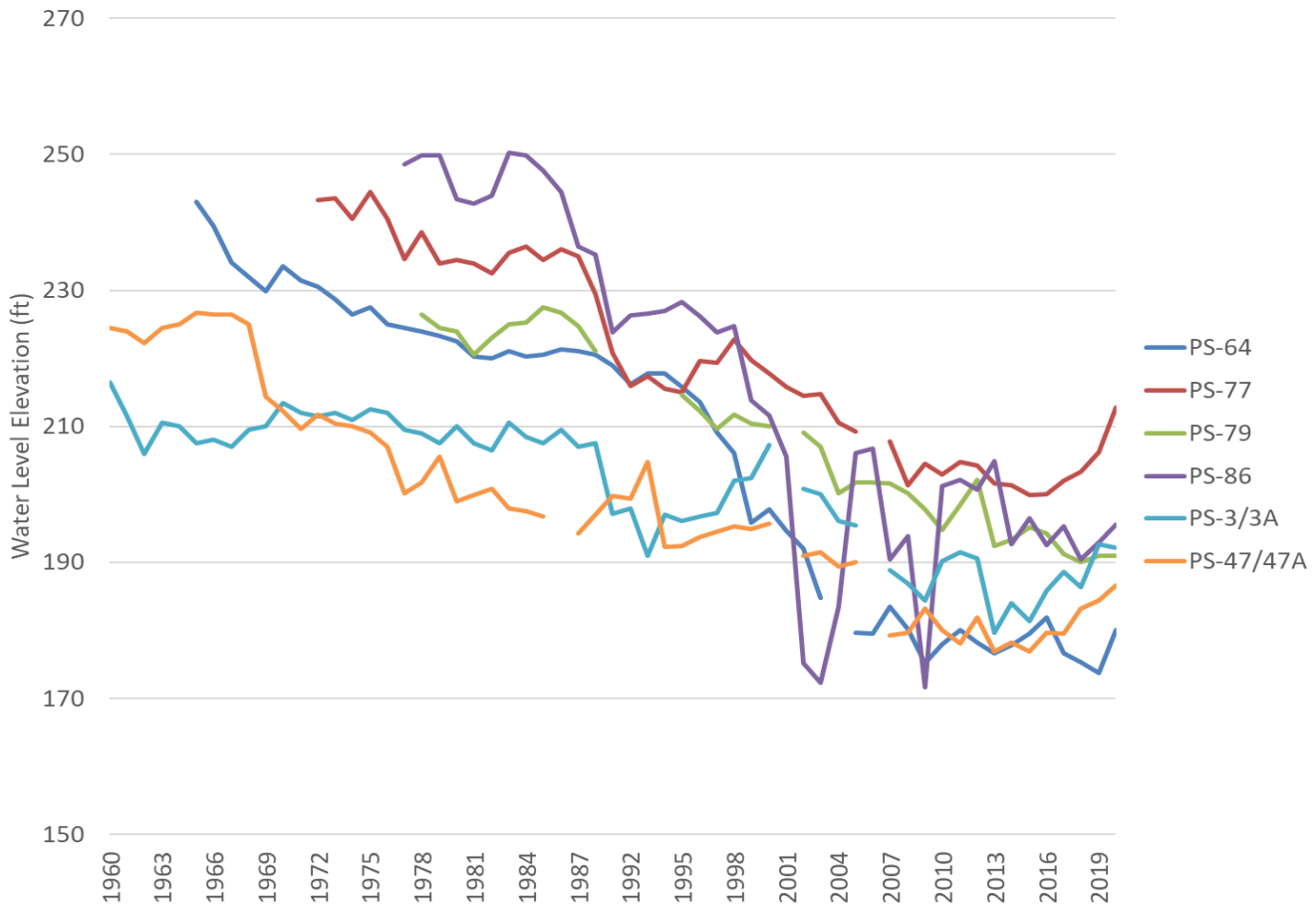
The Kings Subbasin groundwater aquifer supplies the City, other municipalities, agriculture, and rural residential areas with a consistent source of water. Like much of the Kings Subbasin, groundwater levels beneath the City were relatively shallow at 25 feet below ground surface in 1940, prior to the start of World War II (Fresno City Water, Engineering Department, 1940). After the war, the State, including the City, began growing at a rapid rate. For the period from 1959 to 1968 it was reported groundwater levels declined at a rate of 2.8 feet per year (John Carollo Engineers, 1969). The City continued to rely on the groundwater aquifer for decades, monitoring groundwater levels continuously. Groundwater levels since 1990 have declined at a lower rate than previously. Rates of decline slowed further starting in 2004 when the Northeast Surface Water Treatment Facility (NESWTF) started operations and the City renewed focus on increasing groundwater recharge. In 2019 and 2020, surface water accounted for more than half of the total water supply in the City. With the reduced pumping due to higher reliance of surface water, the groundwater levels have begun to increase in certain areas of the City in the last few years. **Figure 6-4** provides a depiction of the City's depth to groundwater for six representative wells across the Sphere of Influence (SOI) since 1960.

The City expects to continue to operate its three SWTFs and pump groundwater at a lower rate than historically so that the groundwater basin can recover. One of the primary objectives for the City as described in its current Metro Plan is to maximize the use of available surface water

[1] Available at https://www.northkingsgsa.org/groundwater-sustainability-plan/

treatment supplies to reduce overall reliance on groundwater. Additionally, as described in **Chapter 4**, the City plans to continue their groundwater recharge program to protect the groundwater basin. **Figure 6-5** shows the active and proposed recharge basins and FID Canals the City utilizes as part of groundwater recharge program.

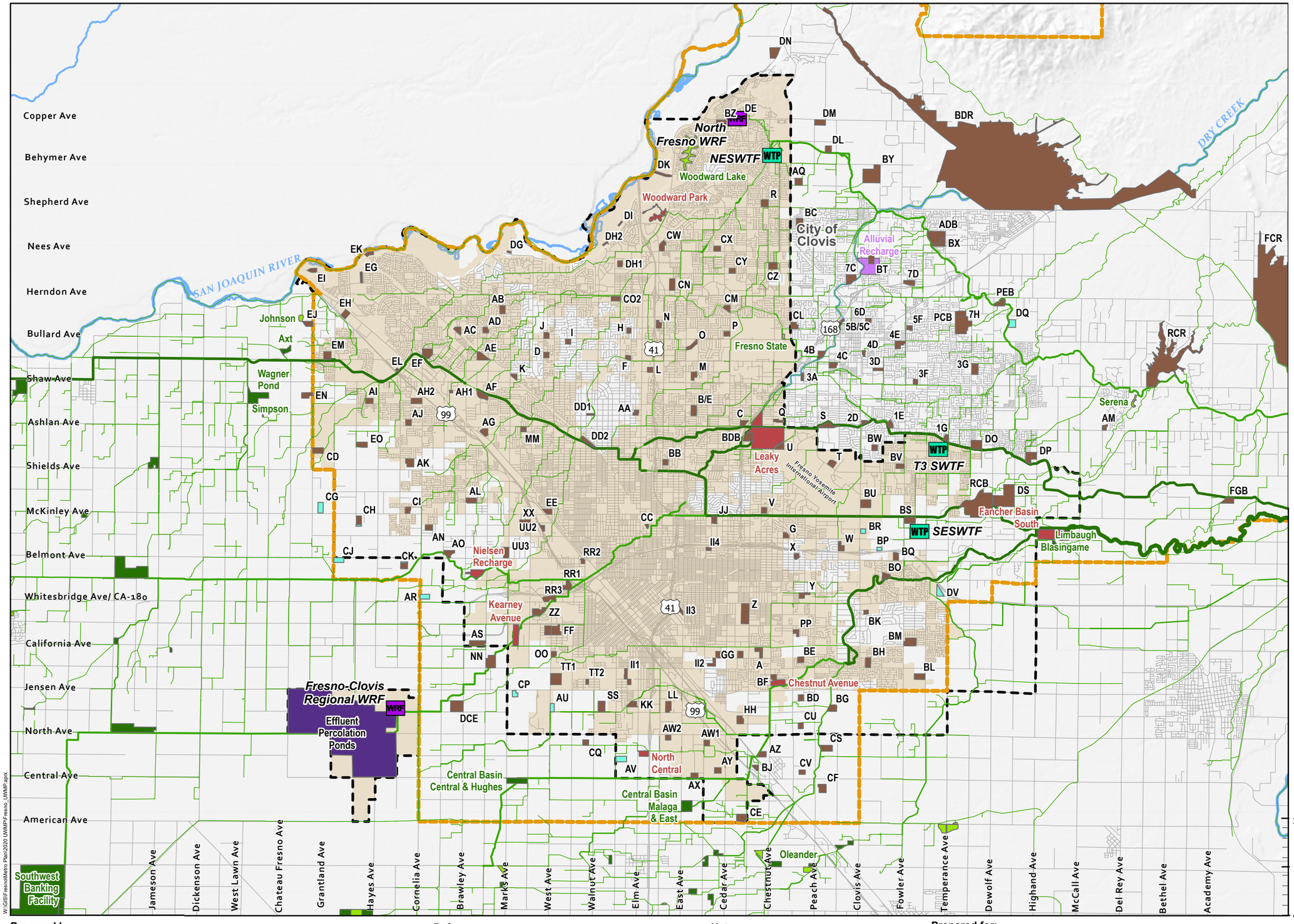
Figure 6-4. Time Series of Groundwater Levels at Representative Wells



6.1.4 Groundwater Quality

Groundwater within the North Kings Subbasin generally meets primary and secondary drinking water standards for municipal water use and is described as being bicarbonate type water, including calcium, magnesium, and sodium as the dominant ions (California Department of Water Resources, January 2006). Total dissolved solids (TDS) concentrations rarely exceed 600 mg/L and range from 200 to 700 mg/L (California Department of Water Resources, January 2006). However, the groundwater basin has been impacted by multiple chemical contaminants that affect the City's ability to fully utilize the groundwater basin resources without some type of wellhead treatment in certain areas.

Figure 6-6 presents the general location of regional plumes and major point sources within the City. The primary contaminants are nitrate, 1,2-dibromo-3-chloropropane (DBCP), 1,2,3-trichloropropane (1,2,3-TCP), and other volatile organic compounds like trichloroethylene (TCE) and and perchloroethylene (PCE). The City has received settlements in a number of lawsuits related to these contaminants and has constructed wellhead treatment systems and implemented blending plans for a number of wells.



Legend

Groundwater Recharge Basins

- FID Basin
- Privately Owned Basin
- City of Clovis Basin
- City of Fresno Basin
- RWRF Effluent Percolation Area
- FMFCD Basin
- FMFCD Proposed Basin
- FMFCD Boundary
- WRF Wastewater Reclamation Facility
- WTP Water Treatment Plant

FID Facilities by Capacity

- Less than 35 cfs
- 35 - 150 cfs
- 150 - 350 cfs
- 350 - 900 cfs
- 900 - 1500 cfs

- Fresno Sphere of Influence
- Fresno City Limits
- Streets

Recharge Basin Summary

Owner/ Operator	No. of Basins	Total Area (acres)
FID	25	2,900
Private Owner	8	300
City of Clovis	1	90
City of Fresno	11	450
City of Fresno RWRF	---	2,000
FMFCD (Existing)	166	8,500
FMFCD (Proposed)	12	140

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Prepared by: WSC

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References:

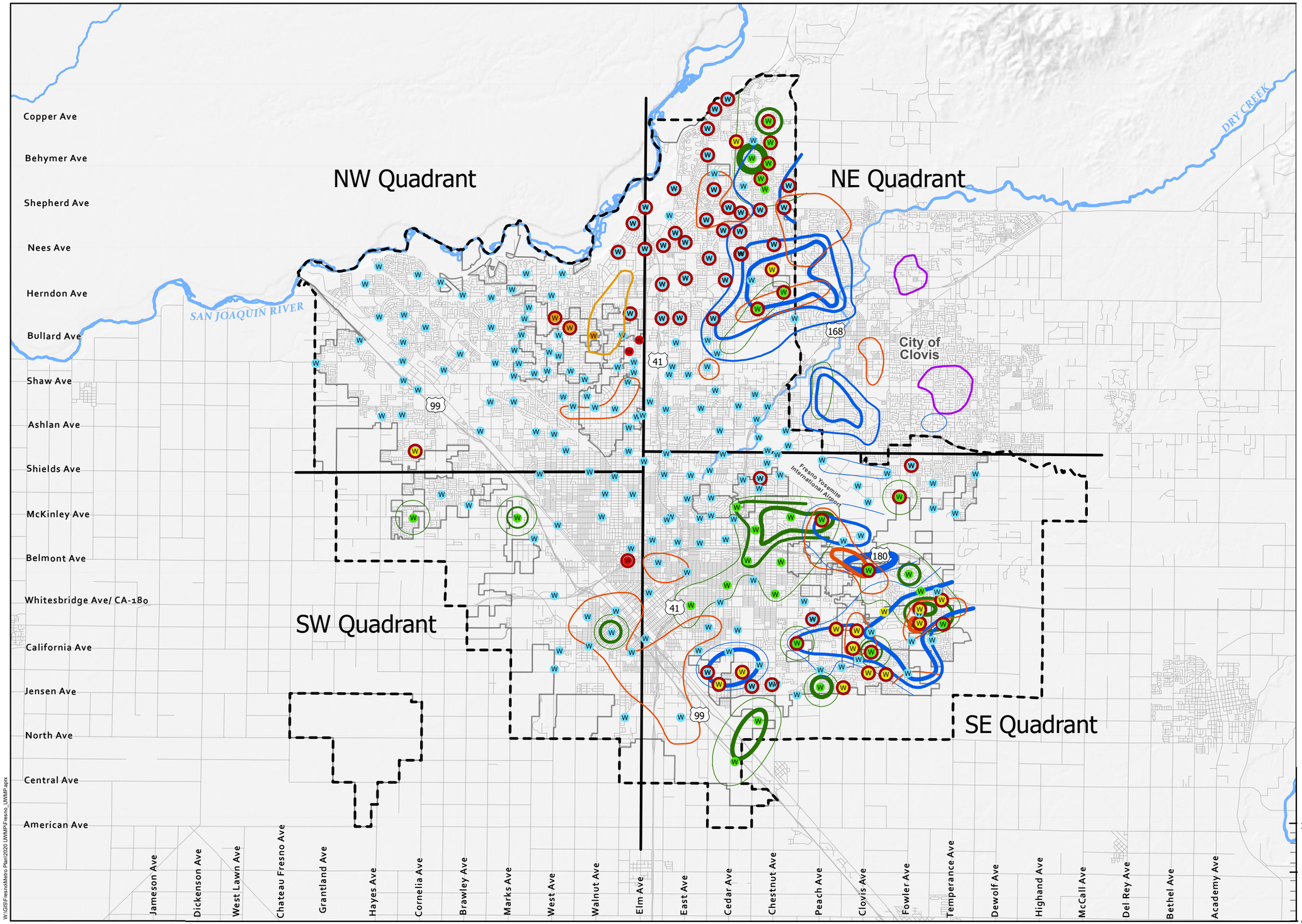
1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-5. Groundwater Recharge System



Legend

Nitrate-Nitrogen Contamination and Concentration

- 5 mg/L
- 10 mg/L

DBCP Contamination and Concentration

- 0.01 ppb
- 0.02 ppb
- 0.05 ppb
- 0.1 ppb
- 0.2 ppb

1,2,3-TCP Contamination and Concentration

- 5 ppt
- 10 ppt
- 20 ppt
- 50 ppt
- 100 ppt

Other Plumes

- TCE Plume
- EDB Plume (old)

Well Pumped to Control Contaminant Plumes

- DBCP
- PCE
- TCE
- TCP
- No Minimum Pumping
- Well Head Treatment
- Groundwater Quadrant Divide
- Fresno Sphere of Influence
- Fresno City Limits
- Streets

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References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

1.A list of wells with treatment was provided by the City as of September 2020. Some wells share treatment and convey water via a raw water pipeline to another well's treatment site. Wellhead treatment types includes activated carbon for VOC/SOCs, air stripping for VOCs, blending, degassing tank, corrosion control treatment, H2S odor control, and manganese treatment, or a combination of such.

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2020 Urban Water Management Plan

Figure 6-6. Regional Groundwater Contamination

Approximately 40 City wells are being treated for contaminants such as PCE, DBCP, TCE, 1,2,3-TCP, perfluorooctanoic acid, perfluorooctanesulfonic acid, ethylene dibromide, and nitrate, and an additional 20 wells include treatment for iron, manganese, and hydrogen sulfide removal or corrosion control.

As shown in the figure, extensive groundwater contamination nearly covers the City's entire water service area; only areas located in the northwest appear to be relatively unaffected by regional groundwater contamination. Also, many of the City's wells are impacted by one or more of the contaminant plumes (indicated by the presence of overlapping plumes on the figure). The figure also shows the approximately 93 existing active wells that are impacted by at least one contaminant plume and the 60 existing wells with wellhead treatment. The City is also managing contamination from spreading by pumping specific wells to control the plumes.

6.1.5 Estimated Groundwater Yield

As part of the ongoing Metro Plan update, the City is developing a storage accounting framework to estimate groundwater yield. The storage framework will track the City's groundwater recharge, pumping, and flows into and out of the City's SOI and incorporate bi-annual monitoring well water level readings on a grid basis. This work is ongoing, and the City reserves the right to update this analysis with more recent data when available.

Currently, the best available information on the City's groundwater yield is from a hydrologic groundwater and surface water model that was prepared for the Upper Kings Basin Integrated Regional Water Management Authority. The City contributed additional funding to the effort so the model would be more refined for its service area and capable of assisting in the development of the City's previous Metro Plan. The Kings Basin Integrated Groundwater and Surface Water Model (IGSM) was completed in 2007 and provided outputs specific to the City SOI (WRIME, 2007). The IGSM was developed and calibrated utilizing data for the period of 1964–2004. Building off the calibrated IGSM, additional modeling was conducted in 2008 to evaluate the City's proposed water supply plan and its ability to attain the balanced use of groundwater by the buildout year of 2025. The estimated groundwater yield within the City's SOI presented in this section is based on the modeling efforts to establish the various natural elements of the underlying aquifer.

6.1.5.1 Natural Recharge

As a result of the IGSM effort, the long-term average deep percolation from rainfall and irrigation-applied water for the period of 1964–2004 was found to be 42,700 acre-feet per year (AFY) for the entire SOI (West Yost Associates, January 2014). However, as urbanization continues within the SOI, the amount of deep percolation will decline because of increased runoff and less open land for natural recharge. For 2005, it was estimated deep percolation would be about 37,000 AFY and would reduce annually, ultimately declining to and remaining at 27,000 AFY by buildout in 2025. The new General Plan now anticipates SOI buildout will occur in 2056. Holding the 2005 value of 37,000 AFY and extending the 27,000 AFY to 2056, intermediate values were straight-line interpolated. Additionally, the City currently covers 73,500 acres of the 100,277 acres within its SOI, representing 73% urbanization, which would approximate the City's water system service area. **Table 6-1** shows estimated natural recharge through 2045.

6.1.5.2 Net Subsurface Inflow

Again, utilizing information developed from the IGSM, average net subsurface inflow into the SOI was characterized as being 64,800 AF annually for the period of 1964–2004. Applying the

previously described 73% proportioning factor of the developed SOI area to overall SOI area, approximately 47,510 AFY would be attributed to the City's water service area in 2020. This value will increase in future years as the City annexes more land until the SOI is built out. **Table 6-1** shows the estimated subsurface inflows for future years based on the land use growth presented in **Figure 4-3**. The City has historically benefitted from the net subsurface inflows and requires these flows for replenishment necessary to maintain the sustainable yield of the groundwater aquifer system.

6.1.5.3 Intentional Groundwater Recharge

The City has long made efforts toward offsetting the decline of groundwater levels and minimizing overdraft conditions through an active intentional recharge program that started in 1971 (CH2MHill, 1992). Through cooperative agreements with Fresno Metropolitan Flood Control District (FMFCD) and FID, the City has access to not only City-owned basins, but also those of these two agencies. Utilizing available surface water supplies, the City recharged on average approximately 60,000 AFY from 2000–2019; however, with the reduction in available surface water supplies, intentional recharge declined to 34,700 AF in 2014 and 19,800 AF in 2015, followed by an increase in recharge in years 2016, 2017, and 2019 to help replenish the aquifer. In 2019, City recharge of 82,993 AF was the maximum annual recharge attained during this period. The City has averaged over 60,000 AFY the previous five years and plans to gradually increase recharge by about 540 AFY each year. However, during wet years the City will recharge more water when it is available to allow to the City to draw on additional groundwater during dry years when surface water is not available. Intentional recharge is included in the non-potable demand projections as well as contributing to the estimated groundwater yield presented in **Table 6-1**.

Table 6-1. Components to Groundwater Yield for Normal Years

	QUANTITY (AFY)					
GROUNDWATER COMPONENT	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Natural Recharge[1]	24,970	25,480	25,910	26,280	26,570	26,790
Net Subsurface Inflow[1]	47,510	49,910	52,320	54,720	57,120	59,530
SUSTAINABLE YIELD	**72,480**	**75,390**	**78,230**	**81,000**	**83,690**	**86,320**
Intentional Recharge[2]	60,000	62,700	65,400	68,100	70,800	73,500
TOTAL ESTIMATED GROUNDWATER YIELD	**132,480**	**138,090**	**143,630**	**149,100**	**154,490**	**159,820**

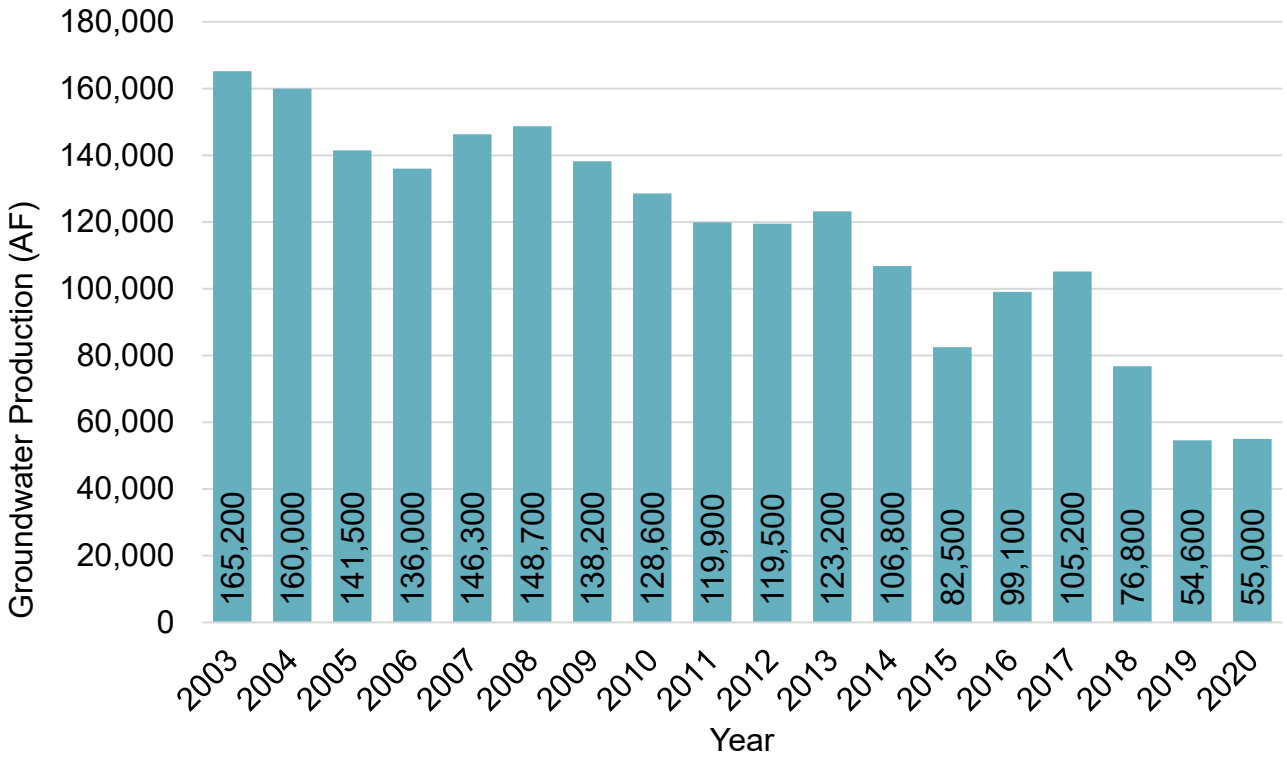
Notes:

1. Based on the Kings Basin IGSM and projected City land growth from **Figure 4-3** as discussed in **Section 3.1.1.**
2. Projected normal year intentional recharge from **Table 4-7**.

6.1.6 Historic Groundwater Pumping

The City has historically relied on groundwater as its main supply source prior to the construction of its SWTFs. With the recent investments in surface water infrastructure, the City has been able to drastically reduce its groundwater pumping. **Figure 6-7** shows the historic groundwater pumping since 2003. As shown, pumping has dropped significantly since 2003, the City's peak year for groundwater production.

Figure 6-7. Historic Groundwater Production



6.2 Surface Water

With the completion and operation of the Southeast Surface Water Treatment Facility (SESWTF), surface water is now a primary water supply used to meet potable demands within the City. The City contracts with FID for Kings River water and with the USBR for CVP water from the Friant-Kern Canal. The surface water supply is used either for potable uses through treatment and distribution or delivery to recharge basins for groundwater recharge.

The Kings River water year (WY) is October through September while USBR uses a WY of March through February. The City has historically used a calendar year (CY) for its analysis, so monthly water supply information was compiled in CY format for this report.

6.2.1 USBR Friant Division Contract Supply

The City, through an agreement originally executed in January 1961, secured a surface water supply from USBR CVP Friant Division. This agreement, for an annual water supply of 60,000 AF of Class 1 water, was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. A copy of the renewed contract is provided in

Appendix H of this UWMP. The USBR CVP Friant Division facilities generally include: Friant Dam (Millerton Reservoir), the Friant-Kern Canal, and the Madera Canal. The Friant-Kern Canal is maintained and operated by the Friant Water Authority. The USBR water supply is a wholesale supply.

Construction of Friant Dam was completed in 1947 and began making diversions to the Friant-Kern Canal in 1949. Full operations of the CVP Friant Division did not commence until the Madera Canal was completed in 1951. Class 1 water was intended to be a supply that would be dependable in practically every year, regardless of the type of hydrologic WY. Class 2 water is essentially excess water available as determined by USBR and less reliable than Class 1 water.

Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement between the Department of the Interior and Commerce, the Natural Resources Defense Council, and the Friant Water Users Authority (which is now the Friant Water Authority). The City is a member of the Friant Water Authority. The Settlement ended an 18-year legal dispute over the operation of Friant Dam brought by a coalition of conservation and fishing groups. The agreement characterized Class 1 deliveries by six hydrologic year types based on a recurrence over an 82-year simulation (1922–2003): wet, normal-wet, normal-dry, dry, critical-high, critical-low. The projected surface water available for the City from USBR during each hydrologic year defined by the 2006 Settlement Agreement is summarized in **Table 6-2**. As shown in the table, the average simulated delivery is 53,680 AFY and the median simulated delivery, which is similar to normal year delivery, is 60,000 AFY. The median value is higher than the average value because 100% allocation of 60,000 AF is simulated in 50 of 82 years but the dry and critical years result in substantial reductions, which bring down the average allocation.

The Settlement Agreement estimates the reduced supply available to the City compared to historic supplies, most evident in dry years. Restrictions on exports from the Delta have hindered the USBR from making deliveries to the Exchange Contractors via the Delta-Mendota Canal. The Exchange Contractors allowed the formation of the CVP Friant Division by agreeing to not exercise their historic pre-1914 water rights to the San Joaquin and Kings Rivers if guaranteed water deliveries continued through the Delta-Mendota Canal or other facilities. If USBR is unable to deliver water to the Exchange Contractors, they have the right to receive their water from the San Joaquin River, which reduces the Class 1 water availability (History of SJRECWA Exchange Contractors, n.d.).

Reduced deliveries from the Delta to the Exchange Contractors resulted in the CVP Friant Division contractors with zero allocations of Class 1 water in USBR WY 2014 and 2015, though the City received USBR deliveries in CY 2014 (prior to the USBR WY starting in March). Annual USBR deliveries since 2007 are shown in **Figure 6-8** for CY. The availability and reliability of the City's surface water supplies through its USBR contract are discussed further in **Chapter 7**.

Table 6-2. Available USBR Simulated Allocation (1922–2003)

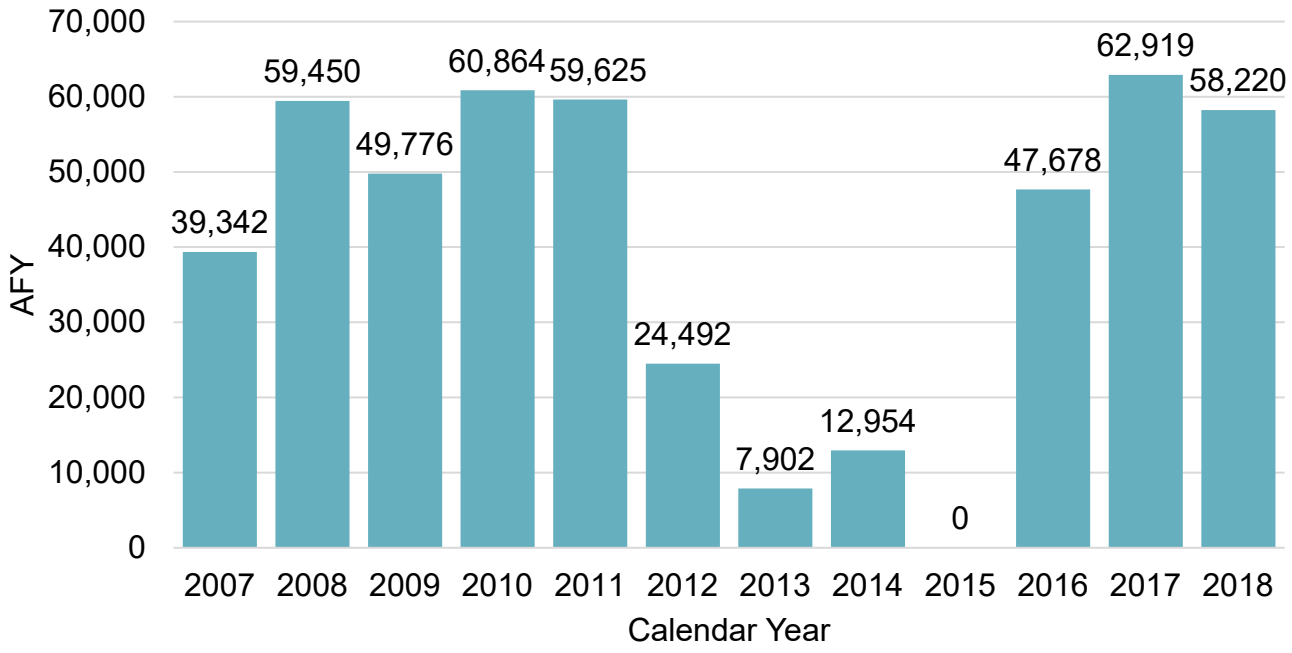
WATER YEAR TYPE	% OF YEARS OVER SIMULATION PERIOD OF DELIVERIES (1)	NUMBER OF YEARS IN THAT YEAR TYPE	RANGE OF ALLOCATION TO CITY (AF)	AVERAGE ALLOCATION TO CITY (AF)
Wet	Highest 20%	16	60,000	60,000
Normal-Wet	50% to 80%	25	60,000	60,000
Normal-Dry	20% to 50%	25	47,500 to 60,000	57,060
Dry	5% to 20%	12	28,100 to 46,800	36,575
Critical(2)	Lowest 5%	4	13,900 to 24,700	19,025
	TOTAL	**82**	**AVERAGE**	**53,680**
			MEDIAN	**60,000**

Source: 2006 Settlement Agreement

Notes:

1. As defined in 2006 Settlement Agreement
2. Includes both critical-high and critical-low, which are differentiated by the amount of unimpaired runoff. The simulation uses deliveries through 2006 and does not include the zero allocation years in 2014 and 2015.

Figure 6-8. USBR Deliveries to City Since 2007



In addition to the Class 1 water available to the City, the USBR contract also makes available water classified as: recovered water account water; Section 215 water; and unreleased restoration flows, unreleased recirculation flows, and uncontrolled season flows. The complexities of each water type are beyond the scope of this report but are mentioned here to reflect the other water acquisition opportunities afforded to the City through this contract.

The San Joaquin River water supply has excellent water quality as it originates from snowmelt from the high Sierras and has not been detrimentally impacted.

6.2.2 Fresno Irrigation District Supply

FID is one of 28 agencies that receives an entitlement of water from the Kings River through the Kings River Water Association. Water entitlements for Kings River Water Association contract members is determined based on a methodology that was initially developed in 1917–1919 to established entitlements for early claimed rights holders. The methodology was based on historic mean daily natural flow conditions at Piedra, which is approximately three miles downstream from the then yet to be built Pine Flat Dam and "at the heart of Kings River uses, regulation, and stream control and storage." (Kings River Water Association and Kings River Conservation District, June 2003)

On December 20, 2016, the Revised, Amended, and Restated Cooperative Agreement was executed between FID and the City for Water Utilization and Conveyance (2016 FID Agreement) (**Appendix I**). The 2016 FID Agreement replaces the 1976 Cooperative Agreement and ends in 2035. The Agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly every year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID (roughly 200,000 acres). As the City incorporates new land area into its service area, the percentage of FID supply increases. However, the 2016 FID Agreement sets the maximum percentage as 29.0%, although the City's service area is anticipated to expand and encompass more than 29.0% of FID's service area between 2025 and 2030. In 2020, the City's percentage of overall FID Kings deliveries was 25.79%. The FID Agreement identifies that the 29.0% maximum was based on moderate growth in Growth Area 1 of the City's SOI (shown in Exhibit C in the 2016 Agreement). As such, the supply projections in this plan limit the City's FID supply with the 29.0% cap, but if the agreement were revised in the future the City's FID allocation percentage could grow beyond 29.0% as the water service area expands.

The City has historically not used all of its available allocation in any given year, although it pays a flat rate for its total allocation regardless of use. Water unused by the City is reallocated by FID to its other customers.

The City's potential supply from FID was summarized using actual Kings River deliveries for CYs 1964–2019, then categorized by the same WY types used for the USBR Friant supply. The range and average FID deliveries by WY type is shown in **Table 6-3**. The average of all 56 CY delivery totals of FID Kings River deliveries is 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29.0% City supply percentage. **Table 6-4** lists the historic and projected allocation of FID's Kings River water for the City in normal (average) CYs. The City percentage of FID supplies was estimated assuming the City's water service area will grow from 59,100 acres to 84,300 acres by buildout at the rate shown in **Figure 4-3**.

Table 6-3. FID Diversions by Water Year Type (1964 to 2019)

WATER YEAR TYPE	% OF YEARS[1]	NUMBER OF YEARS BETWEEN 1964 AND 2019	TOTAL FID DELIVERIES (AF)[2]		EXAMPLE AVERAGE AVAILABLE TO CITY[3]
			RANGE	AVERAGE	
Wet	Highest 20%	11	563,500 to 644,600	590,700	171,300
Normal-Wet	50% to 80%	17	452,800 to 563,300	513,700	149,000
Normal-Dry	20% to 50%	17	362,600 to 448,000	415,000	120,400
Dry	5% to 20%	8	253,700 to 362,000	315,700	91,600
Critical	Lowest 5%	3	158,100 to 253,300	210,200	61,000
		56	**AVERAGE**	**453,800**	**131,600**

Notes:

1. As defined in 2006 Settlement Agreement
2. Assigns water year type defined in defined in 2006 Settlement Agreement to FID deliveries from 1964 to 2019
3. Based on maximum 29.0% City supply percentage to provide an example City supply amount

Table 6-4. Projected FID Kings River Allocation for City, Normal Years

YEAR	PROJECTED TOTAL FID ALLOCATION, AFY	PROJECTED ALLOCATION TO CITY, AFY[1]
2025	27.55%	125,030
2030	29.00%	131,600
2035	29.00%	131,600
2040	29.00%	131,600
2045	29.00%	131,600

[1]Projected City Allocation (%) x 453,800 AFY (estimated normal year diversion by FID, per **Table 6-3**)

6.3 Stormwater

The Fresno-Clovis Metropolitan Area and surrounding rural vicinities are within the service area boundaries of the FMFCD, which has primary responsibility for managing the local stormwater flows. Most stormwater in the City drains to urban stormwater basins, where the water is retained to attenuate peak flow runoff and recharge stormwater, or is pumped to local irrigation canals for conveyance away from the municipal areas. FMFCD's operation of stormwater basins is predicated on maintaining storage capacity for rain events, which limits accessibility for recharge activities during the rainy season. FMFCD estimates the amount of stormwater that is recharged each wet season. However, recharge attained with the FMFCD basins largely occurs in May

through October when limited storage capacity is required. Dry-season recharge is accomplished by diverting surface waters, from the Kings River and Millerton Reservoir, using City-allocated surface water. It is difficult to estimate stormwater recharge volumes as there is no physical measurement of stormwater flows into the basins, and infiltration rates can vary with water elevation and degree of siltation in the basin. However, FMFCD estimates that stormwater recharge in urban basins during the winter months may range from 7,000 AF/yr to 22,200 AF/yr. Stormwater capture and infiltration are considered an integral component of natural groundwater recharge discussed in **Section 6.1.5.1**.

6.4 Wastewater and Recycled Water

6.4.1 Recycled Water Coordination

The City is currently expanding its recycled water supplies to increase offset use of potable water for landscape irrigation. In 2010, the City completed a Recycled Water Master Plan (adopted by the City Council in 2013) to evaluate and plan for increased recycled water use in the City. The City's last Metro Plan, adopted in 2014, also outlined projects to increase the use of recycled water to offset potable demands (Carollo, 2010). The City is currently updating the Metro Plan and will reevaluate recommendations and projects to increase recycled water use.

The City owns and operates two water reclamation facilities: 1) the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and 2) the North Fresno Wastewater Reclamation Facility (NFWRF), both of which can produce Title 22 recycled water for use within the City's service area. They are described further in **Section 6.4.3**.

Coordination with other water agencies and potential consumers within the planning area is inherently within the purview of the City's Department of Public Utilities (DPU) as this department provides both water and wastewater services. DPU has been on the forefront of numerous water supply preservation, enhancement, and development projects and programs for decades. The concept of multiagency coordination is fully embraced by the department as is evident with the previously discussed joint agency agreements and the commitment to construct new infrastructure to further develop new resources. The endeavor to develop recycled water as a resource was a requirement of a development in north Fresno, where the developer was conditioned to have a net zero impact on water resources. The fundamental component of this development was the construction and dedication of the NFWRF to the City.

There are only a few agencies, besides the City, that have wastewater collection and treatment facilities within and immediately adjacent to the plan area. These agencies include:

	Collection	Treatment
City of Clovis	X	X
Malaga County Water District	X	X
Pinedale County Water District	X	-
Pinedale Public Utility District	X	-

As the City is the primary responsible agency for wastewater collection and treatment for its annexed areas and certain County islands, it has taken the lead role of developing and implementing recycled water facilities to serve the same area.

6.4.1.1 City of Clovis

The RWRF was developed under a Joint Powers Authority agreement executed in 1977 among the City of Fresno, the City of Clovis, and the County of Fresno. Both of the cities contribute to the cost of operations and maintenances and capital expenditures for the RWRF based on formulas in the agreement. This facility provides service for most of Clovis' sewer flows.

The City of Clovis recently constructed its own wastewater treatment facility that produces tertiary level effluent and is distributed in a dedicated purple pipe system within portions of its service area.

6.4.1.2 County of Fresno

The County of Fresno, like the City of Clovis, is a party to the RWRF Joint Powers Authority for treatment of flows from unincorporated areas encompassed by the City's service area.

6.4.1.3 Malaga County Water District

Malaga County Water District provides water and sewer service to an unincorporated county area of about 2.25 sq mi, which covers a small portion of the City's SOI. The district provides wastewater collection and treatment for residential and non-residential customers.

6.4.1.4 Pinedale County Water District

Pinedale County Water District provides water, sewer, and solid waste service to an area of about 2 sq mi, which service area covers an unincorporated County island and a portion of the City. The district provides wastewater collection to an area of 699 acres and diverts the flow to the City's collection system for treatment at the RWRF.

6.4.1.5 Pinedale Public Utility District

Pinedale Public Utility District provides wastewater, street lighting, street sweeping, and landscape maintenance. The district services an area of 362 acres in the northern portion of the City, serving both an unincorporated County island and portions of the City. The collected wastewater is diverted to the City's collection system for treatment at the RWRF.

6.4.2 Wastewater Collection, Treatment, and Disposal

The City's wastewater collection system was originally developed in 1891 with the installation of a 24-inch outfall sewer that discharged to a 40-acre sewer farm located southwest of town. The amount of land and facilities at this location continued to be expanded as the City grew over the years. Today, the City's wastewater collection system consists of about 1,630 miles of pipes ranging in size from 4 inches in diameter to 84 inches in diameter. This collection system also utilizes 15 lift stations throughout the City, ranging in pumping capacity from 0.25 mgd to 2.2 mgd.

6.4.2.1 Wastewater Treatment and Discharge Within Service Area

The City is served by two wastewater treatment plants, briefly described below.

Fresno-Clovis Regional Wastewater Reclamation Facility

The RWRF has developed from what was once a sewer farm to what is now a state-of-the-art wastewater treatment facility. In 1966, the City of Fresno was appointed the sewering agency

for the local metropolitan region and shortly after began long-range planning and construction of new facilities to handle increasing flows and regulatory requirements. The RWRF treats flows from not only the City, but also sewered County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District.

Flows received at this facility peaked at 81,100 AF in 2006 and have been steadily decreasing since, with the average influent flow about 63,000 AF over the last five years. The RWRF includes preliminary, primary, secondary, and tertiary treatment units with disinfection. Secondary treatment consists of three treatment trains with an annual average capacity of 87 mgd, consisting of 30 mgd for Train A and 57 mgd for Trains B and C combined. In 2017, a 5-mgd tertiary treatment system — the Tertiary Treatment and Disinfection Facility (TTDF) — was completed. The system can be expanded to 15 mgd and ultimately to 30 mgd.

The City has three primary means of effluent disposal:

1. Undisinfected secondary effluent to on-site and off-site farmland for restricted irrigation
2. Undisinfected secondary effluent to percolation ponds
3. Disinfected tertiary effluent to the recycled water distribution system

The percolated effluent has been deemed equivalent to Title 22 tertiary treated water by the State Water Resources Control Board Department of Drinking Water (DDW). The City has been extracting this water for reuse in areas within and surrounding the RWRF, as well as to FID's canals, through an exchange agreement for delivery to FID agricultural customers.

The discharged effluent is within the City boundaries and located just southwest of the metropolitan area. The treated effluent percolation ponds are within the City's SOI and hydrologic sphere that benefit the City's overall regional water budget. See **Figure 3-1** for a depiction of the facility's location relative to the metropolitan area.

North Fresno Wastewater Reclamation Facility

The NFWRF was constructed as part of a residential, commercial, and golf course master planned development located in the northern portion of the City. As a condition of the planned community, the developer was required to construct a wastewater treatment facility that would produce tertiary level effluent for use within the development to ensure the overall project had a net zero impact on water resources. This facility is presently rated at 0.71 mgd (average monthly flow) and 1.07 mgd (maximum daily flow). However, the ultraviolet (UV) light disinfection system was only validated for 300 gpm (0.43 mgd), which is the current flow limit until the DDW approves a higher flow. This facility is expandable to 1.25 mgd (average monthly flow). The disinfected tertiary effluent from the plant is largely used to irrigate the Copper River Ranch Golf Course. Of the 325 AF of wastewater treated in 2020, 54 AF was used for irrigation of turf. Treated but unused effluent is diverted to the City's collection system to the RWRF.

6.4.3 Recycled Water System Description

The 2014 Metro Plan recommended expanding reuse by: 1) using the NFWRF effluent to irrigate Copper River Ranch Golf Course; and 2) up to 25,000 AFY of recycled water for landscape irrigation or other non-potable uses from the RWRF or new satellite WRFs. Since then, the City has irrigated the Copper River Ranch Golf Course with recycled water and has constructed much of the southwest recycled water distribution system. However, the City is currently updating the Metro Plan and reevaluating the target volume of reuse in the City beyond the southwest system

considering new conditions and regulations, including the potential for potable reuse in the future.

6.4.3.1 Fresno-Clovis Regional Wastewater Reclamation Facility

As mentioned above, the RWRF produces undisinfected secondary effluent for restricted irrigation to on-site and off-site farmlands and disinfected tertiary treated effluent for the recycled water distribution system.

The City's RWRF diverts a portion of the undisinfected secondary effluent to irrigate non-food crops grown adjacent to this facility. The practice of using the secondary effluent to irrigate non-food crops has been carried-out for decades and is expected to continue for the foreseeable future. The City owns nearly 3,300 acres of land for and around the RWRF, consisting of percolation ponds (1,750 acres) and other land available to farm non-food crops. **Table 6-5** provides the annual quantities of recycled water applied to these crops for the period from 2015–2019.

Additionally, the RWRF produces Title 22 disinfected tertiary treated effluent through the TTDF completed in 2017 and through tertiary equivalent soil aquifer treated recycled water recovered from the percolated secondary effluent. A series of 15 groundwater wells located at the RWRF are used to extract previously percolated effluent groundwater from beneath the facility. The extracted groundwater has the potential to be used for higher beneficial use if it can be demonstrated this water has attained a level of treatment satisfactory to meet disinfected tertiary levels. The City embarked on a joint project with the WateReuse Research Foundation to demonstrate to State regulatory agencies the soil aquifer treated recycled water met Title 22 levels. The culmination of this study is presented in a final report entitled "Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment," which was completed in 2013 (WateReuse Research Foundation, 2013). This study concluded that, based on the documented sampled water quality data, the extracted groundwater met requirements for classification as disinfected tertiary level recycled water. The SWRCB DDW stated that the percolated effluent water meets the tertiary treatment classification, and the City is making plans for its use as part of its recycled water production and distribution system (California Regional Water Qulaity Control Board, 2018). The combined rated production yield of the 15 wells, if run year-round, would be approximately 32,000 AFY. The City plans to blend the recycled extraction well water with the disinfected tertiary level recycled water produced from the 5 mgd TTDF to feed the southwest recycled water distribution system. As new sales grow for the recycled water, additional recycled extraction well water will be utilized to feed the City's southwest recycled water system.

The tertiary equivalent soil aquifer treated recycled water (recovered groundwater) is also used for on-site irrigation and transport to FID canals for delivery to customers during the irrigation season, as facilitated through an exchange agreement with FID. More information on the City's FID RWRF Exchange Agreement is discussed in **Section 6.6**.

Since the completion of the 2010 Recycled Water Master Plan (RWMP), the City has constructed most of the southwest recycled water system, shown in **Figure 6-9.** The southwest recycled water system consists of a 3.2 MG recycled water reservoir located at the RWRF, a 6,000 gpm (8.64 mgd) recycled water pump station located at the RWRF, a 640-gpm booster pump station (Roeding Park Booster), and 15.7 miles of 10-inch to 54-inch recycled water pipeline. Roughly 7.5 miles of pipeline remain to be constructed. The City also updated the demand and distribution system from the 2010 RWMP with the 2019 Citywide Recycled Water Demand and Southwest

Recycled Water System Analysis (Carollo, 2019) to identify potential recycled water customers. This recent analysis will be incorporated into the latest Metro Plan update.

6.4.3.2 North Fresno Water Reclamation Facility

As described earlier, the City has an existing recycled water plant in the northern portion of the City that receives and treats sewage from the residential, commercial, and golf course master planned community. The NFWRF was constructed in 2008 but was not fully operational until 2009 due to the inability to properly run at extremely low flow conditions. Subsequent modifications at the plant allowed it to run on a regular basis in 2010 and again in 2014 for UV approval. The amount of reuse has varied substantially since 2016 because the delivery system was offline in 2017 and 2018 for treated water basin slope repairs. City staff indicated that 2016 is representative of operations going forward. The disinfected tertiary effluent is conveyed in a dedicated pipeline to an adjacent golf course for irrigation purposes. The quantities used for irrigation purposes are shown in **Table 6-5** for the period of 2015–2019.

Table 6-5. Historic Recycled Water Used Within Service Area

	QUANTITY (AFY)					
RECYCLE WATER FACILITY	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
RWRF, Secondary Effluent (Non-Food Crop Irrigation)	8,688	7,329	4,540	7,031	3,652	3,845
RWRF, Tertiary Effluent	531	485	423	867	912	858
NFWRF	62	110	0	0	19	54
TOTAL	**9,281**	**7,924**	**4,963**	**7,898**	**4,583**	**4,757**

Note: Reuse at the NFWRF was zero in 2017 and 2018 because the recycled water delivery system was offline for system repairs.

6.4.4 Potential, Current, and Projected Recycled Water Uses

The 2020 actual recycled water use, and projected recycled water use in the City's service area is included in **Table 6-6**. Secondary undisinfected reuse is projected to continue to be used to irrigate non-food crops adjacent to the RWRF in the future. The projected secondary undisinfected use going forward is based on the average use from 2015 to 2020. Additionally, the amount of tertiary recycled water from the RWRF is projected to increase to provide 6,210 AF for landscape and agricultural irrigation as the southwest recycled water system is built out. Projected tertiary recycled water from the NFWRF for golf course irrigation is projected to be 110 AF annually through 2045.

The 2015 UWMP anticipated that 21,200 AFY of recycled water would be produced and utilized in 2020. The previous projected increases in recycled water were based on recommendations from the 2010 RWMP, which included projects to increase recycled water use for landscape irrigation, agricultural irrigation, industrial use, and blending with raw surface water for groundwater recharge. Since the 2010 RWMP, the City has focused on constructing the southwest recycled water system to increase landscape and agricultural irrigation in the southwest portion of the City. The City is also currently updating the Metro Plan that is evaluating recycled water alternatives in the City and is expected to update its RWMP following the Metro Plan update to serve as a new guiding planning document for recycled water use by the City.

Customer ID	Customer Name	MDD (gpm)	PHD (gpm)	Hours of Irrigation
1	Quist Farms	1,300.0	1,300.0	24
2	Fresno Memorial Gardens	131.0	450.0	7
3	Roeding Park	267.0	640.0	10
4	Peelman Farms	650.0	650.0	24
5	Peelman Farms	650.0	650.0	24
6	St Peters Cemetery	152.7	458.2	8
7	Westside Auto	8.0	30.0	6
8-10	Multiple Cemeteries	225.8	677.2	8
11-12	Caltrans-99	100.0	300.0	8
13-16	Multiple Cemeteries	225.8	677.2	8
17	Masis Ararat Cemetery	80.0	240.0	8
18	Belmont Memorial Park	172.3	517.0	8
19	Caltrans 180/ Hughs	33.3	100.0	8
20	Caltrans 180/ Fruit	16.7	50.0	8
21	Fink-White Park	61.0	183.0	8
22	Caltrans 99/ Amador	16.7	50.0	8
23	Columbia Elem	44.3	133.0	8
24	Frank Ball Park	19.3	58.0	8
25	Kearney Triangle	18.3	55.0	8
26	Eaton Plaza	21.0	63.0	8

Customer ID	Customer Name	MDD (gpm)	PHD (gpm)	Hours of Irrigation
27	Veteran's Memorial	27.7	83.0	8
28	City Hall	27.7	83.0	8
29	AmeriPride	67.3	202.0	8
30	Courthouse Park	116.7	350.0	8
31	Community Regional	173.0	519.0	8
32	Chukchansi Park	59.3	178.0	8
33	Caltrans 41/H	16.7	50.0	8
34	McKinley Elem	66.7	200.0	8
35	El Capitan Middle	83.3	250.0	8
36	Polk Elem	74.7	224.0	8
37	Madison Elem	56.1	168.3	8
38	King Elem	44.3	101.6	8
39	Gaston Middle	87.5	350.0	8
40	Computech Middle	63.0	245.5	8
41	Edison High	43.7	166.0	8
42	Fresno City College	639.4	871.9	24
43	Hinton Park	19.3	58.0	8
44	Oasis Residential Development	210.5	631.5	8
	Total	**6,070.0**	**12,013.4**	**---**

Legend

Existing Facilities

- Wastewater Reclamation Facility
- Existing Recycled Water Pipeline
- Recycled Water Reservoir

Recycled Water Pump Station

- Existing
- Future

Future/ Proposed Recycled Water Pipelines

- Oasis Development
- SW1D
- South Pipeline

Recycled Water Customer

- Existing Recycled Water Customer
- Agriculture
- Cemetery
- Central Unified School District
- College
- Fresno Unified School District
- Park
- Private/Commercial
- Residential
- Freeway

City Features

- Fresno Sphere of Influence
- Fresno City Limits
- Streets

Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/ CA-180
California Ave
Jensen Ave
Brawley Ave
Marks Ave
West Ave
Walnut Ave
Elm Ave
SWPS1
Roeding Park PS
RWRF PS
Fresno-Clovis Regional WRF
3.2 MG Recycled Water Reservoir

Prepared by: WSC

N

1:44,248
0 0.28 0.55 1.1 Mi
0 1,000 2,000 4,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
2. Figure recreated from Figure 7 Potential Southwest Recycled Water Users from the 2019 City Wide Recycled Water Demand and Southwest Recycled Water System Analysis prepared by Carollo Engineers, Inc.

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-9. Southwest Recycled Water System

W:\GIS\FresnoMetro Plan\2020 UWMP\Fresno_UWMP.aprx

Table 6-6. Recycled Water within Service Area in 2020 (DWR 6-4R)

The supplier will complete the table.

Name of Supplier Producing (Treating) the Recycled Water:	City of Fresno
Name of Supplier Operating the Recycled Water Distribution System:	City of Fresno
Supplemental Volume of Water Added in 2020:	0%
Source of 2020 Supplemental Water:	N/A

BENEFICIAL USE TYPE	POTENTIAL BENEFICIAL USES OF RECYCLED WATER	AMOUNT OF POTENTIAL USES OF RECYCLED WATER	GENERAL DESCRIPTION OF 2020 USES	LEVEL OF TREATMENT	2020	2025	2030	2035	2040	2045
Agricultural Irrigation[1]	Non-foodcrop irrigation	7,900	Irrigate non-food crops	Secondary, Undisinfected	3,845	7,900	7,900	7,900	7,900	7,900
Landscape Irrigation (excludes golf courses)	Landscape Irrigation	5,800	Landscape irrigation, distributed through the southwest recycled water distribution system	Tertiary	858	5,800	5,800	5,800	5,800	5,800
Agricultural Irrigation[1]	Food crop irrigation	410	Irrigate limited food crops, distributed through the southwest recycled water distribution system	Tertiary	-	410	410	410	410	410
Golf Course Irrigation	Landscape Irrigation	110	Copper River Golf Course	Tertiary	54	110	110	110	110	110
-				Total:	4,757	14,220	14,220	14,220	14,220	14,220

Note:

1. Recycled water for agricultural irrigation does not offset the City's potable water demands, and as such, is excluded from projected recycled water in subsequent tables.

6.4.5 Actions to Encourage and Optimize Future Recycled Water Use

The 2010 RWMP identified the need for the City to adopt an ordinance to establish a recycled water policy and criteria for its use within the City's SOI. On July 14, 2014, the Recycled Water Ordinance was adopted by the City Council, laying the foundation for the expanded use of recycled water within the City.

The focus of the ordinance includes the following:

- Establish an Administrative Authority.
- Establish approved uses of recycled water.
- Define areas of potential eligibility for recycled water service.
- Specify voluntary uses of recycled water, depending on user classifications.
- Require installation of a transmission and distribution infrastructure.
- Encourage the use of voluntary retrofits for existing users that may not be addressed in the ordinance.
- Require the City of Fresno to prepare Rules and Regulations.
- Provide enforcement and severability clauses.
- Establishing a means for the City to provide recycled water at a negotiated price.

Efforts to further the use of recycled water include the requirement that new developments within planned major recycled water distribution mains must install purple pipe. Then, as the City's capital projects construct a distribution infrastructure, these segments will be in place to facilitate connections to new customers, reduce program costs by avoiding digging up new street improvements and reduce disruption to vehicular traffic.

Most of the southwest recycled water distribution system from the RWRF is completed or planned for construction in 2021. The City has identified potential customers to connect to the recycled water system once it is completed to offset potable demand and increase recycled water use in the City.

6.5 Desalinated Water Opportunities

The City is located in the central San Joaquin Valley; therefore, seawater desalination is not applicable to the City. Additionally, the groundwater that exists within the immediate area of the City is not brackish in nature and does not require desalination treatment.

6.6 Water Exchanges and Transfers

6.6.1 Exchanges and Transfer Opportunities

6.6.1.1 USBR Supply

The Central Valley Project Improvement Act (CVPIA) of 1992 authorized the transfer of all or a portion of a CVP contractor's water supply to any other California water users or water agencies. The CVPIA allows water transfers as long as they are consistent with federal and state water laws. The primary component of the CVPIA that specifies water transfer provisions for federal

water supplies is Section 3405(a), which includes provisions regarding maximum annual water transfer, beneficial use, and approvals.

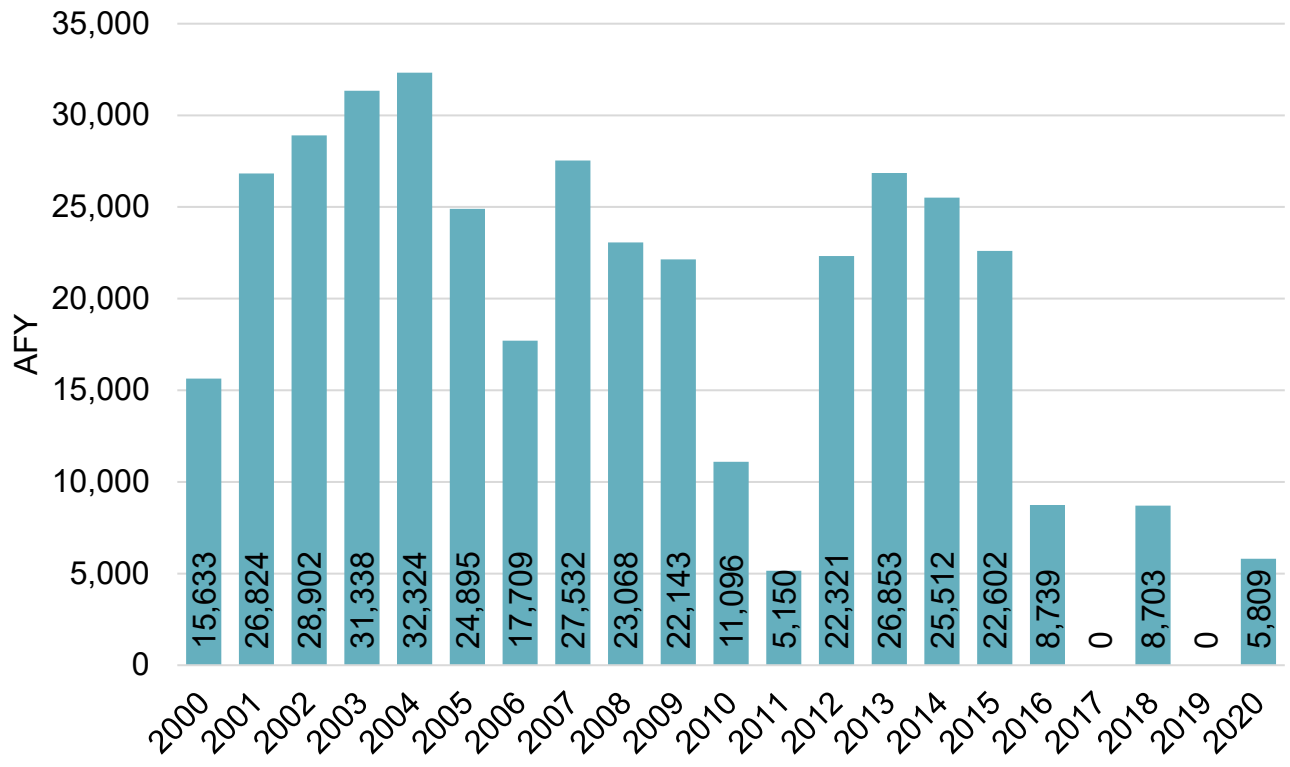
As part of the City's current Metro Plan update, the City is evaluating potential future water transfers and exchanges of its periodically available USBR water. Currently, the City does not have any plans to transfer its USBR water to other California water users.

6.6.1.2 FID / RWRF Groundwater Exchange Supply

Since 1974, the City has had an agreement with FID to exchange recycled water for the delivery of surface water east of the City (**Appendix I**). The Agreement between FID and the City for Exchange of Recycled Water allows for water pumped from beneath the RWRF to be conveyed to FID's Dry Creek and Houghton Canals for delivery to growers west of the City. In exchange for the water delivered to FID by the City, FID agreed to deliver 46% of the total from either its Kings River entitlement or USBR Class II supply to growers or basins in the eastern portion of FID "insofar as is feasible and practical." The water is to be considered additional to the water that would have been delivered to the eastern portion of FID, such that the additional delivered water used by growers is assumed to offset groundwater pumping in the area and, therefore, provide a groundwater basin benefit. This is an indirect benefit to the City.

The agreement includes a minimum of 100,000 AF delivered over a 10-year period and no more than 30,000 AF in any given year. As shown in **Figure 6-10**, the City exceeded the maximum yearly delivery in 2003 and 2004 and has maintained more than 100,000 AF of deliveries over a 10-year period. However, since 2016, the City has reduced RWRF groundwater exchange deliveries. The City is currently discussing an update to the agreement with FID, while the 2020 Metro Plan will identify and recommend other beneficial uses for the City's percolated effluent.

Figure 6-10. Historical RWRF Groundwater Exchange Deliveries



6.6.2 Emergency Interties

In 2007, the Cities of Fresno and Clovis executed an agreement for interconnection of their potable water systems to provide service during emergencies and other times of hardship in either community. The agreement covers interconnections, including apportionment of capital costs, at two locations: Leonard Avenue at the Gould Canal alignment and Behymer Avenue at Willow Avenue.

The agreement provided for temporary deliveries from Clovis to southeast Fresno through the Leonard connection through 2013. The Leonard interconnection was constructed and remains in place for emergency uses through manual operation.

The agreement also provided for temporary deliveries from Fresno to northern Clovis through the Behymer connection through 2015. However, the Behymer interconnection has yet to be constructed and, if constructed in the future, would serve only for emergency use.

6.7 Future Water Projects

The City is currently updating its Metro Plan, which will recommend programs and projects to improve the City's water supply portfolio and continue providing a safe, reliable, and sustainable water supply. While the outcomes of the Metro Plan update are currently being developed, the City's ongoing and future projects to improve its supply portfolio include:

- Expansion of recycled water distribution system
- Expansion of groundwater recharge program
- Expansion of surface water treatment capacity
- Beneficial transfers and exchanges

6.7.1 Expand Recycled Water Distribution System

As mentioned in **Section 6.4.5**, the City has made significant improvements to their recycled water system over the last five years and is currently expanding their recycled water distribution system. The City expects to implement construction on the final portion of the Southwest recycled water distribution system this year. The completed distribution system will allow an additional 5,000 AF of recycled water use in the City to offset potable demands that can be used in all hydrological year types. The expansion is projected to be completed by 2025.

6.7.2 Expand Groundwater Recharge Capacity

With the acknowledgement that the groundwater aquifer is and will remain an integral resource, the City is currently evaluating an expanded recharge program as part of the Metro Plan update. Expanding intentional recharge may include the development of new dedicated intentional recharge facilities and/or joint projects for basins with FMFCD and potentially FID. The target for recharge expansion is to maximize storage within the groundwater basin and optimize use of available surface water supplies in normal years. The stored water will be used more in the single-dry year and consecutive dry years when surface water supplies are less available.

The timing for groundwater recharge capacity expansion will be examined as part of the Metro Plan update and, for the UWMP, is assumed to increase to allow for an additional 540 AFY of recharge to occur on average each year.

6.7.3 Expand Surface Water Treatment Capacity

A key component to the success of the City's ability to reverse the long-time overreliance on groundwater is the construction of its surface water treatment facilities. These have allowed the City to optimize the use of available surface water supplies. The City's NESWTF currently has a 30 mgd capacity and the capability to expand up to 60 mgd. The SESWTF is currently permitted to produce up to 54 mgd but, with the subsequent rerating of the media filters, will be capable of operating at a rated capacity of 80 mgd.

The timing for the SWTF expansion will be examined as part of the Metro Plan update and determined based on need as the City grows and demands increase.

6.7.4 Beneficial Transfers and Exchanges

As mentioned in **Section 6.6.1**, the City is evaluating future beneficial transfers and exchanges of the City's USBR water in normal water years when available water supplies exceeds demands.

6.8 Summary of Existing and Planned Sources of Water

Summaries of the above discussed existing and planned sources of water are provided in **Table 6-7** and **Table 6-8** below.

6.8.1 Supply Management

The City currently balances its surface water supplies and groundwater based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes and prevent their spread. The minimum operation conditions typically occur in the low-demand winter months, and the City can increase surface water production during peak demand months when surface water is available. In normal and wet years, the City intends to rely on more surface water supply and recharge raw surface water to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will ramp up well production to meet demands. The City is expected to continue this supply management strategy in the future.

Table 6-7. Actual Water Supplies (DWR 6-8R)

	2020	
WATER SUPPLY	**ACTUAL VOLUME**	**WATER QUALITY**
Groundwater	55,028	Drinking Water
USBR CVP	37,447	Drinking Water
FID Kings River	71,292	Drinking Water
Recycled Water, RWRF	858	Recycled Water
Recycled Water, NFWRF	54	Recycled Water
TOTAL:	**164,679**	

Table 6-8. Projected Water Supplies (DWR 6-9R)

	REASONABLY AVAILABLE VOLUME, AFY				
WATER SUPPLY	**2025**	**2030**	**2035**	**2040**	**2045**
Groundwater	138,090	143,630	149,100	154,490	159,820
USBR CVP	60,000	60,000	60,000	60,000	60,000
FID Kings River	125,030	131,600	131,600	131,600	131,600
Recycled Water, RWRF	5,800	5,800	5,800	5,800	5,800
Recycled Water, NFWRF	110	110	110	110	110
TOTAL:	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**

6.8.2 Special Conditions

This section details climate change and future regulatory conditions that impact the City's supply sources.

6.8.2.1 Climate Change Effects

Climate models disagree on average annual precipitation projections but agree on other hydrologic metrics relevant to water resources management, including:

- Snowpack declines
- Increased fraction of precipitation on extreme rainfall days
- Shorter, sharper rainy season
- Increased evapotranspiration
- Higher frequency of extremely wet and extremely dry years
- Higher incidence of extreme dry year followed by an extreme wet year or vice versa (Persad, 2020) (Partida, 2020)

As discussed in **Section 4.4**, climate change impacts were evaluated in the North Kings GSP using DWR climate change datasets, which were developed for the California Water Commission's Water Storage Investment Program (WSIP). The North Kings GSP analyzed WSIP water supply projections and found climate change will have no significant impact on the FID Kings River diversions. The North Kings GSP estimates the timing of the inflows to water reservoir and surface water supplies is anticipated to shift significantly due to warmer temperatures causing precipitation to arrive as rainfall instead of snowmelt. The warmer temperatures are also predicted to cause the snowmelt to turn to runoff earlier each spring. These climate impacts are estimated in the North Kings GSP to slightly increase inflows to the Kings River (0.6% in 2040 and 0.3% in 2070); however, it is not expected to impact the Kings River diversions significantly and the timing will have a greater impact on water management, including a possible greater need for additional storage. The North Kings GSP also estimated climate impacts to the San Joaquin River supplies available to the CVP Friant Division Contractors, including the City's USBR Class I supplies, and found the WSIP dataset estimates a slight reduction in future water supplies (Provost & Pritchard, November 2019). This plan

considers water supply during an extreme dry year or multi-dry year scenario, which may occur more often due to climate change, further in **Chapter 7**.

6.8.2.2 Regulatory Conditions

The City has existing contracts for its surface water supplies that are not facing any reduction due to forthcoming regulation. The City's groundwater supply is from an unadjudicated basin and is also considered reliable. The GSA is currently working toward determining a safe yield for the Kings Subbasin, which is the amount of water than can be pumped from the basin over a long-term period without producing undesirable results. The City is an active member of the GSA, working collaboratively to bring the basin to balance while protecting the City's groundwater supply.

Additionally, forthcoming California regulations for per- and polyfluoroalkyl substances (PFAS) may impact certain wells within the City. The City is currently monitoring and treating some groundwater wells for PFAS. These regulations are not expected to impact the City's ability to use its full groundwater supply.

6.9 Energy Intensity

Pursuant to CWC Section 10631.2(a), readily available information regarding energy intensity shall be reported in the 2020 UWMP. For the City, this includes the total energy usage at each production facility, including each well site and the three SWTFs. The electrical usage includes the energy to produce, treat, and pump the water into the distribution system. Because the City's distribution system includes over 200 groundwater wells, **Table 6-9** presents the total energy usage, water produced, and average energy intensity for all groundwater wells and for each SWTF following the methodology presented in Appendix O of the DWR 2020 UWMP Guidebook. The energy intensity varies significantly between groundwater wells depending on the depth to the groundwater table, if the well includes treatment beyond disinfection, and other local conditions. The total energy intensity for all production and treatment in the City's distribution system in 2020 was 384 kWh/ AF.

Table 6-9. Water System Energy Intensity in 2020

	WELLS	NESWTF	SESWTF	T-3 SWTF	TOTAL
Electricity (kWh)	27,667,366	5,848,314	13,416,000	454,470	47,386,150
Treated Water Deliveries (AF)	56,445	20,724	45,367	875	123,411
Energy Intensity (kWh/AF)	490	282	296	520	384

7

CITY OF FRESNO

Water Service Reliability and Drought Risk Assessment

This Section discusses the long-term reliability of surface and groundwater supplies for the City.

A comparison is made of anticipated supplies and demands through 2045 for a normal year, single dry year, and five-year drought. Shorter-term reliability planning that may require immediate action, such as drought or catastrophic supply interruption, is addressed in **Chapter 8**.

IN THIS SECTION

- Water Service Reliability Assessment
- Drought Risk Assessment

7.1 Water Service Reliability Assessment

This section describes the existing constraints on the City's supply sources and reliability in different hydrologic year types.

7.1.1 Constraints on Water Sources

7.1.1.1 Groundwater

Groundwater has long been the primary water supply source for the City. Before the City's investments to increase its use of surface water with the construction of its NESWTF, T-3 SWTF, and SESWTF, groundwater levels were declining, and the falling levels were a potential constraint. Groundwater levels in some areas of the City have actually been increasing over the last five years as a result of the City's using less groundwater and are expected to continue to increase as the City pumps less in the future.

The North Kings GSP is setting sustainability indicators for groundwater levels and groundwater storage. The current GSP does define a measurable objective and minimum threshold for the basin to allow the North Kings GSA to evaluate its progress for the subject indicator, as defined by SGMA, and determine whether conditions are improving, remaining stable, or degrading.

Another constraint to the use of groundwater stems from the negative impacts from contamination (see **Section 6.1.4**). To ensure the continued beneficial use of the groundwater supply, the City has set minimum pumping requirements for specific wells to prevent the spread of existing groundwater plumes to other areas in the City and to protect the basin. The City will remain proactive in pursuing responsible parties so the proper remediation is conducted to preserve the groundwater system as a viable and sustainable resource in perpetuity. Largely, the City has been able to rely on the relatively good quality of this resource.

7.1.1.2 USBR

The City has a contract for 60,000 AFY of Class 1 water with the USBR. Analysis supporting the 2006 San Joaquin River Settlement is the basis for USBR supply projections. The settlement is based on ensuring flows downstream of Millerton Dam for varying hydrologic conditions, which can constrain surface water supplies available to the CVP Friant Division contractors, such as the City.

Another constraint that affects the consistency of this supply are the restrictions that have been imposed on water diversions from the Delta (see **Section 6.2.1**). The resulting impacts associated with the restrictions from the Delta has been more detrimental to water supplies for the CVP Friant Division contractors than the above-discussed settlement, as the latter has resulted in two years of zero allocations for the CVP Friant Division contractors.

The construction of a raw water pipeline in 2018 to convey USBR water from the Friant-Kern Canal to the NESWTF, referred to as the Friant-Kern Canal Pipeline, has improved the reliability and water quality of deliveries to the NESWTF. The NESWTF is now capable of year-round operation, and the original connection from FID's Enterprise Canal still exists as a backup delivery system if needed.

Every three years, the Friant-Kern Canal is taken down for maintenance, and during these shutdowns the City has the flexibility to deliver its Kings River supply to the NESWTF to allow for its continued use.

7.1.1.3 FID

The City has an agreement with FID providing the City an allocation of approximately 115,000 AFY of Kings River water in normal-year conditions. Water supplied from the FID contract is most susceptible to annual hydrologic conditions. The City's annual FID supply allocation is dependent on annual precipitation, Sierra Nevada mountain snowpack, and natural river flow conditions. The annual variability of these sources results in variable allocations to the City. Based on the foregoing data, FID receives an annually adjusted entitlement, the delivery of which will fluctuate throughout the irrigation delivery season. The City in turn receives its pro rata allocation based on the foregoing entitlement determination.

Another factor that may constrain the availability of Kings River water supply is scheduled maintenance of FID's vast canal network. FID typically terminates water deliveries to the City's water treatment facilities in the months of November and/or December so they can perform necessary infrastructure repairs and maintenance. However, the City constructed a dedicated 13-mile, 72-inch-diameter raw water pipeline to deliver Kings River water to the SESWTF to allow for year-round operations and prevent shutdowns due to FID maintenance. Deliveries to intentional recharge facilities will continue to be supplied through the FID canal system.

7.1.1.4 Recycled Water

At present, the largest constraint for recycled water use is the lack of infrastructure to distribute the water to end users. The City has recently increased recycled water production capabilities and constructed much of the southwest recycled water system, as described in **Section 6.4**. The City plans to complete construction of the southwest recycled water distribution system in the near term and expand its recycled water delivery in the City.

7.1.2 Description of Management Tools and Options

The City currently manages its surface water and groundwater supply by maximizing surface water for potable use and intentional recharge during wet and normal years, while relying on groundwater during dry years. The City is currently updating its Metro Plan, which will recommend projects and programs to optimize the use of its supply portfolio and further improve supply resilience. Supply management tools are an expected outcome of the Metro Plan update; however, the City's ongoing supply management is intended to maximize local supplies and improve the groundwater basin storage. Current actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

7.1.3 Year Type Characterization

Normal-water-year, single-dry-water-year, and five-consecutive-year-drought-period supply projections were made based on historic water allocations for surface water supplies, historic municipal water well pumping for groundwater, and projected utilization for recycled water, as described below.

Kings River water supply data was obtained from the Kings River Water Association and FID. USBR CVP Friant Division data was obtained from the USBR website, the City of Fresno, and FID. Groundwater and recycled water supply data was obtained from the City of Fresno.

7.1.3.1 Normal Year

Data for the total water supply for the normal-year condition is provided in **Table 7-1** based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**.
- **USBR:** long-term average allocation from **Table 6-2**.
- **FID:** long-term average allocation from **Table 6-3**.
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

7.1.3.2 Single Dry Year

The single-dry-year supply availability is based on 2015, during the 2012-2017 drought, because the City had the lowest surface water supply available in 2015. Data for total water supply for the single-dry-year condition is provided in **Table 7-2** based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** actual allocation in 2015 (0 AF).
- **FID:** actual total FID allocation in 2015 (42,935 AF) but with the projected City percentage of FID supply for the future years considered (per **Table 6-3**).
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

7.1.3.3 Multiple Dry Years

Data for total water supply for the five-year drought condition is provided in

Table 7-3 based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** actual allocations in 2012 to 2016, which ranged from 0 to 45,000 AF.
- **FID:** actual total FID allocations in 2012 to 2016, which ranged from 42,935 to 110,824 but with the projected City percentage of FID supply for the future years considered (per **Table 6-3**).
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand**.**

Despite severe reductions of surface water supplies during dry years, sufficient good-quality water was available to permit the SWTFs to operate. As mentioned in the previous section, there is some seasonal vulnerability with surface water availability in dry years, which needs to be closely coordinated with surface water suppliers to minimize impacts to the City's SWTF operations. Groundwater supplies, with intentional recharge augmentation, remain reliable in all hydrologic conditions.

7.1.4 Water Service Reliability

This section compares projected supplies and demands for a normal year, single dry year, and five-year consecutive drought. As shown in **Table 7-1**, the City is projected to have greater than 100,000 AF of available supply after meeting demands in normal years. As shown in **Table 7-2**, the City's surface water supplies are reduced in a single dry year, but all potable demands are met and groundwater recharge of raw surface water is reduced. As shown in **Table 7-3**, the City is projected to meet all demands during a five-year drought with its existing supplies. Potable demands are unrestricted, and non-potable water used for groundwater recharge is reduced in years three and four of a five-year drought.

Table 7-1. Normal Year Supply and Demand Comparison (DWR 7-2R)

	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
Surface Water – USBR	60,000	60,000	60,000	60,000	60,000
Surface Water – FID	125,030	131,600	131,600	131,600	131,600
Recycled Water	5,910	5,910	5,910	5,910	5,910
SUPPLY TOTALS	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**
Potable Demand	136,504	147,356	154,210	161,076	167,947
Non-Potable (Groundwater Recharge) Demand	62,700	65,400	68,100	70,800	73,500
DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
DIFFERENCE:	**129,826**	**128,384**	**124,300**	**120,124**	**115,883**

Table 7-2. Single Dry Year Supply and Demand Comparison (DWR 7-3R)

	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
Surface Water – USBR	0	0	0	0	0
Surface Water – FID	45,852	45,852	45,852	45,852	45,852
Recycled Water	5,910	5,910	5,910	5,910	5,910
SUPPLY TOTALS	**189,852**	**195,392**	**200,862**	**206,252**	**211,582**
Potable Demand	136,504	147,356	154,210	161,076	167,947
Non-Potable (Groundwater Recharge) Demand	27,588	28,776	29,964	31,152	32,340
DEMAND TOTALS	**164,092**	**176,132**	**184,174**	**192,228**	**200,287**
DIFFERENCE:	**25,760**	**19,260**	**16,688**	**14,024**	**11,295**

Table 7-3. Multiple Dry Years Supply and Demand Comparison (DWR 7-4R)

		2025	2030	2035	2040	2045
FIRST YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	30,000	30,000	30,000	30,000	30,000
	Surface Water – FID	99,725	99,725	99,725	99,725	99,725
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**273,725**	**279,265**	**284,735**	**290,125**	**295,455**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**74,521**	**66,509**	**62,425**	**58,249**	**54,008**
SECOND YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	37,200	37,200	37,200	37,200	37,200
	Surface Water – FID	93,426	93,426	93,426	93,426	93,426
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**274,626**	**280,166**	**285,636**	**291,026**	**296,356**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**75,422**	**67,410**	**63,326**	**59,150**	**54,909**
THIRD YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	0	0	0	0	0
	Surface Water – FID	73,568	73,568	73,568	73,568	73,568
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**217,568**	**223,108**	**228,578**	**233,968**	**239,298**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	53,763	46,281	43,526	40,677	37,761
	DEMAND TOTALS	**190,267**	**193,637**	**197,736**	**201,753**	**205,708**
	DIFFERENCE:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**

		2025	2030	2035	2040	2045
FOURTH YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	0	0	0	0	0
	Surface Water – FID	45,852	45,852	45,852	45,852	45,852
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**189,852**	**195,392**	**200,862**	**206,252**	**211,582**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	26,047	18,564	15,810	12,960	10,045
	DEMAND TOTALS	**162,551**	**165,920**	**170,020**	**174,036**	**177,992**
	DIFFERENCE:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
FIFTH YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	45,000	45,000	45,000	45,000	45,000
	Surface Water – FID	125,840	125,840	125,840	125,840	125,840
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**314,840**	**320,380**	**325,850**	**331,240**	**336,570**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**115,636**	**107,624**	**103,540**	**99,364**	**95,123**

7.2 Drought Risk Assessment

A new provision of the Water Code directs Suppliers to prepare a DRA. The DRA considers a drought period lasting five consecutive years, starting from the year following the year when the assessment is conducted. For this plan, the DRA considers five consecutive dry years from 2021 through 2025. The City may conduct an interim update or updates to this DRA within the five-year cycle of its UWMP update. The DRA analysis allows the City to examine the management of its supplies during stressed hydrologic conditions and an opportunity to evaluate whether the City may need to enact its Water Shortage Contingency Plan (WSCP) during the next actual drought period lasting at least five years. The projected gross water use for the five-year DRA is based on unrestricted potable demand, a reduction in raw-water demand for intentional recharge in years three and four of the five-year drought, and unrestricted recycled water demand.

The reliability of supplies over a five-consecutive-year drought is described in **Section 7.1.4** and summarized below for 2021 through 2025:

- **Groundwater:** based on interpolating between the 2020 and 2025 values in **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** based on the actual supply allocations from these sources during the driest consecutive five-year drought (2012–2016).

- **FID:** based on the actual supply allocations from these sources during the driest consecutive five-year drought (2012–2016). For this DRA, the City's percentage of FID supplies are conservatively assumed to remain at the existing 25.79%.
- **Recycled Water:** based on interpolating between the 2020 and 2025 values in **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

Table 7-4 compares the total projected supply and demand for the five-year DRA for 2021 through 2025. As shown, the City does not expect to enact its WSCP for a five-consecutive-year drought based on the unrestricted potable demand projections and the current supply portfolio and reliability.

Table 7-4. Five-Year Drought Risk Assessment

WATER USE TYPE	2021	2022	2023	2024	2025
Groundwater	133,602	134,724	135,846	136,968	138,090
Surface Water – USBR	30,000	37,200	0	0	45,000
Surface Water – FID	93,354	83,085	65,425	40,776	111,911
Recycled Water	1,912	2,911	3,911	4,910	5,910
TOTAL SUPPLY	**258,868**	**257,920**	**205,181**	**182,655**	**300,911**
Potable Demand	124,910	127,827	130,745	133,662	136,504
Non-Potable Demand	60,000	60,000	48,287	22,260	60,000
TOTAL DEMAND	**184,910**	**187,827**	**179,032**	**155,922**	**196,504**
AVAILABLE SUPPLIES	**73,958**	**70,093**	**26,149**	**26,732**	**104,407**

8

CITY OF FRESNO

Water Shortage Contingency Plan

This WSCP is a detailed plan for how the City intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time.

The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

IN THIS SECTION

- WSCP Overview

The WSCP describes the following:

1. **Water Supply Reliability Analysis:** summarizes the City's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition
2. **Annual Water Supply and Demand Assessment Procedures:** describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions
3. **Six Standard Shortage Stages:** establishes water shortage levels to clearly identify and prepare for shortages
4. **Shortage Response Actions:** describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand as well as minimize social and economic impacts to the community
5. **Communication Protocols:** describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements
6. **Compliance and Enforcement:** defines compliance and enforcement actions available to administer demand reductions
7. **Legal Authority:** lists the legal documents that grant the City the authority to declare a water shortage and implement and enforce response actions
8. **Financial Consequences of WSCP Implementation:** describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens
9. **Monitoring and Reporting:** summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation, with results used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced
10. **WSCP Refinement Procedures:** describes the factors that may trigger updates to the WSCP and outlines how to complete an update
11. **Special Water Features Distinctions:** identifies exemptions for ponds, lakes, fountains, pools, and spas, etc.
12. **Plan Adoption, Submittal, and Availability:** describes the process for the WSCP adoption, submittal, and availability after each revision

The 2020 WSCP is a standalone document that can be modified as needed and is included as **Appendix J**.

CITY OF FRESNO

9 Demand Management Measures

This chapter discusses the City's demand management measures including its water waste prevention ordinances, metering program, public outreach, and water loss reduction measures.

The City employs several water conservation programs, in excess of State-mandated restrictions, to promote conservation and reduce the water supply demand. These measures help reduce overdraft of the groundwater aquifer that the City uses and have aided in the City's attainment of the urban water use reduction targets discussed in **Chapter 5**. The following sections provide a description of the Demand Management Measures (DMMs), including the nature and extent of each.

IN THIS SECTION

- Water Waste Prevention
- Metering
- Conservation Pricing
- Public Education and Outreach
- Water Loss Reduction Measures

9.1 Demand Management Measures for Retail

9.1.1 Water Waste Prevention Ordinances

The City prohibits water waste through implementation of the Urban Water Conservation and Excessive Water Use ordinance (see Section 6-520 of the Fresno Municipal Code). The ordinance includes such prohibitions as not washing hardscapes, using a nozzle-controlled hose, and using irrigation practices. The WSCP, included in **Appendix J**, Section 1.5, contains a more in-depth discussion of these prohibitions and consequences associated with them.

The City has a water waste hotline and a reporting form on the City website and keeps records of water waste violations. The City also employs fifteen staff persons year-round to manage and monitor the water conservation programs in place. Communication to the City's diverse customer base is always taken into consideration, so two of the positions require Spanish and Hmong languages. All Water Conservation Representatives use advanced metering infrastructure (AMI) to monitor and confirm excessive or negligent water waste incidents.

The Water Conservation staff can be reached at (559) 621-5300, (559) 621-5480, or (559) 621-CITY for after-hours emergencies. Online forms are also available to the public. Their office is located at 1910 E. University Avenue, Fresno, CA 93703. The Water Conservation Supervisor is Conrad Braganza.

9.1.2 Metering

In 2008, the City embarked on an aggressive project to install meters on all single-family residential service connections throughout its service area. The water meter project was completed at the end of 2012. The City already had water meters on all existing multifamily residential, commercial, industrial, landscape irrigation, and fire services.

With completion of the metering project, the City can now monitor water use more closely and provide its customers an understanding of water use (and its fiscal impacts), which has led to reducing water consumption by approximately 13% since 2013. The City will continue to monitor water use through the metering data and use the data to analyze demand trends and plan for future water shortages.

As part of the analysis of the meter data and through customer complaints or comments, the City is able to identify meters that are not working properly. Once identified, the City can have a maintenance crew visit the property and evaluate whether to repair or replace the meter.

The City also routinely tests and calibrates meters to ensure accuracy in reading and billing. Typically, meters are tested in place in the field or at a test bench in the meter shop. Field testing involves using calibrated flow meters to monitor the flow through a test port on or attached to the meter and comparing the measured flow to the meter reading. The majority of large meters, three inches and above, have a bypass valve that will be turned on during the meter test as not to disrupt water use to the property. In the case where a bypass valve is not in place, the customer is notified at least 48 hours before the test date. The City's service area has a total of approximately 135,000 meters, of which approximately 1,100 are three inches or larger. In 2018, of 157 of these large meters were tested, 10 were repaired, and 15 were replaced.

With the majority of meters being two inches or smaller, testing every single one is not logistically or economically feasible; therefore, a statistical sampling of each size is tested each year based on the following criteria:

- Meters six inches and above are tested annually.
- Meters three inches to four inches are tested at least once every two years.
- Meters three-fourths of an inch to two inches are sample tested as needed.

The City performs more frequent testing on larger meters on the basis that an error in their registration has a greater effect on customer equity and revenue issues. Meters registering larger volumes are given priority regardless of when they were last tested.

The City also shares meter data with the customers through its EyeOnWater tool available on its website or on a mobile app. This allows customers to monitor and better understand their hourly, daily, weekly, and monthly water usage, trends, and how they compare to average users.

9.1.3 Conservation Pricing

The City's customers are subject to the water rate structure adopted by the City Council through the Proposition 218 process. The approved rate structure has a base price designated by meter size and a volumetric rate for water usage. **Table 9-1** shows the rate structure.

The City will investigate the use of alternative rate structures in the future, which could have specific charges for usage to provide a fiscal incentive for customers to conserve water. This approach would permit customers to directly see the impact of water use reduction each month.

Table 9-1. Current Water Rate Structure

	BASE RATE		USAGE CHARGES	
METER SIZE	DOMESTIC	IRRIGATION	100 CUBIC FEET (HCF)	1,000 GALLONS
¾" or smaller	$13.50	$10.70	$1.74 (per each HCF)	$2.33 (per each 1,000 gallons)
1"	$17.90	$13.40		
1.5"	$20.80	$15.20		
2"	$35.30	$24.10		
3"	$52.80	$34.90		
4"	$79.00	$51.00		
6"	$152.00	$96.00		
8"	$705.00	$436.00		
10"	$1,113.00	$687.00		
12"	$1,462.00	$901.00		

9.1.4 Public Education and Outreach

The City has worked diligently to connect with and educate the community it serves. Those efforts include an emphasis on water conservation techniques and the importance of reducing overall water demand, both specifically to the resident (in terms of fiscal impacts) and to the overall water supply.

The City's varied programs to incentivize water savings are frequently discussed, including the following items:

- Water-wise landscape consultation
- EyeOnWater tool
- Irrigation efficiency audit
- Assistance with setting irrigation controllers
- Interior/exterior water leak surveys
- Water meter use information
- Water use rebates, coupons, and permits
- Lawn-to-garden rebates
- Water conservation hotlines

9.1.4.1 Education and Outreach

The City's water conservation public information program is managed in-house with the assistance of JP Marketing. The firm's services include strategic planning, creative concepts, public relations, marketing, promotion, research, advertising, media design, copywriting, event creation, and online services.

The City's public information program has many components, including multimedia campaigns (paid and public service advertising), customer billing inserts, literature, public outreach activities, a speaker's bureau, and inter-agency partnerships. Many of the City's water conservation materials are provided in three languages: English, Hmong, and Spanish.

The City is a member of the Central Valley Water Awareness Committee (CVWAC), which is composed of several cities, water utilities, irrigation districts, and other groups in the Central Valley. The CVWAC was created to increase the public's understanding of how water is treated, managed, and delivered to customers. The City participates in Water Awareness Month activities through its affiliation with the CVWAC.

The City conducted outreach to the community through approximately 50 events between 2015 and 2020, including:

- Setting up outreach booths providing water-saving info and rebate information at local festivals, parades, plant sales, home and garden shows, and fairs
- Participating in Annual Water Wise Plant Exchanges, a large community event to share water-wise plants and information and participate in hands-on activities
- Hosting Kids Water Camp, a large one-day event with hands-on activities for kids in third grade in all elementary schools in the service area
- Hosting workshops and speaker events about water-wise plants, gardening, and landscaping

A full list of specific education and outreach events over the past five years is included in **Appendix K**. The City also maintains a water conservation page on its website with links to many of the flyers and rebates mentioned above.

9.1.4.2 Water Surveys

The City conducted over 24,000 interior and exterior water leak surveys between 2015 and 2020. **Table 9-2** quantifies the number and types of surveys conducted.

Table 9-2. Interior and Exterior Surveys

DESCRIPTION/YEAR	2015	2016	2017	2018	2019	2020	TOTAL
EXTERIOR SURVEYS							
Exterior Audit	942	1,289	1,359	835	2,189	427	7,041
Landscape Consultation	605	382	193	139	149	48	1,516
Large Turf Survey	1	5	1	0	0	0	7
Timer Tutorial	1,644	1,967	1,873	2,170	1,346	518	9,518
INTERIOR SURVEYS							
Interior Audit	835	1,135	1,222	748	2,137	412	6,489
TOTALS	**4,027**	**4,778**	**4,648**	**3,892**	**5,821**	**1,405**	**24,571**

9.1.4.3 Rebate Programs

The City operates 14 rebate programs. Some of those that were active and used during the 2015–2020 reporting period are summarized in **Table 9-3**.

Table 9-3. Rebate Program Results (2015–2020)

	LAWN TO GARDEN		WASHING MACHINE		HIGH EFFIC. TOILET	
YEAR	NO.	REBATE	NO.	REBATE	NO.	REBATE
2015	122	$4,044	358	$46,144	301	$35,344
2016	160	$71,372	247	$27,600	233	$21,124
2017	103	$37,157	255	$19,682	495	$18,937
2018	43	$19,238	57	$5,502	145	$75,721
2019	42	$19,456	84	$8,000	115	$19,091
2020	25	$14,521	121	$6,950	106	$18,033
TOTALS	**495**	**$165,791**	**1,122**	**$113,880**	**1,395**	**$188,253**

9.1.5 Programs to Assess and Manage Distribution System Real Loss

As discussed in **Chapter 4**, the calculated loss was determined to be 8%, illustrating the City's conservative approach in the past. With completed system metering, the City is able to track losses more closely and understand where possible losses are occurring and correct them as necessary.

The AWWA Water Audit Tool suggested the areas the City could improve to reduce system losses, including calibration of source meters, unauthorized consumption, and data handling errors.

The following measures are in place or are being developed to improve the system losses:

- The City installed the remaining source meters on the few unmetered wells within the system in 2017, and now currently all wells and production facilities are fully metered.
- The City has a source meter calibration plan in place.
- The City has implemented meter testing frequency based on service size. This is discussed in more detail in **Section 9.1.2**.
- The City has an online tool as well as a telephone hotline available for the public to report water leaks, either on their property or within the public rights-of-way. This helps reduce detection time and limits the water loss from leaks.
- The City conducted a leak survey on 100 miles of the water system in January 2016. Eight total leaks were pinpointed, one on the main, two on hydrants, two on water service lines, and one at a water meter.
- The City uses meter data to identify any meters not functioning correctly or any leaks in the system so that they can be replaced or repaired. This helps reduce unaccounted for water consumption.

Unauthorized consumption can be determined, at times, through the meter data also. If a meter shows no usage, the City can note the address and schedule a site visit to determine any possible issues.

9.1.6 Other Demand Management Measures

In addition to the water conservation programs, the City has also enacted watering schedules for the community that specify days and times that customers are allowed to water, based on odd or even street addresses. The City has also created an automated courtesy notice program that informs customers when they exceed the excessive water use threshold during days and times when outdoor watering is not allowed.

9.2 Implementation to Achieve Water Use Targets

As discussed in **Chapter 5**, the City has met and exceeded its 2020 water use target. However, the City also realizes a portion of the observed conservation is due to the strict water use restrictions imposed during the drought. If those restrictions are lifted, the City will be diligent in continuing use of the above described DMMs.

The extensive metering program, replacement of turf, and replacement of over 10,000 high-water-use appliances (toilets and washing machines) over the last several years has helped the City maintain overall lower water consumption.

9.3 Water Use Objectives (Future Requirements)

As discussed in **Section 4.2.4.4**, the City is tracking the recommended water use efficiency standards and water use objectives developed due to Senate Bill 606 and Assembly Bill 1668. Currently no water use objectives have been adopted by the State, and are not anticipated to be adopted until 2022, but an indoor residential water use standard has been recommended by DWR, and additional standards are expected to be released in late 2021. The City is aware of the legislation and tracking the forthcoming water use objectives as they are available. The City is currently having ongoing discussions with DWR on clarifying the GIS-based approach for developing the overall water objective for residential customers. Alternatively, the City is also interested in using actual water use data (from the AMI system) to develop these objectives, following discussions and approval from DWR and SWRCB.

10 CITY OF FRESNO Plan Adoption, Submittal, and Implementation

This section provides guidance in the adoption, submittal, and implementation of the 2020 UWMP and WSCP, as well as processes for amending the adopted plans if needed.

This UWMP update has been prepared on a calendar-year basis and includes all water use and planning data for the 2020 calendar year. Additional details are provided in the preceding chapters.

IN THIS SECTION

- Public Hearing Notices
- Plan Adoption and Submittal

10.1 Notice of Public Hearing

The City has notified the County of Fresno, the only city or county in which the City provides water, of its intent to review the UWMP and consider changes to the plan. The City also notified the City of Clovis of plan preparation. Both of these governmental entities as well as a host of local water purveyors and agencies (**Table 2-1**) were notified of the preparation of the UWMP and public hearing and were encouraged to participate in the development of this plan update. Copies of the notification letters are included in **Appendix L**.

Consistent with the legislative requirements for public noticing, the City published two notices in the Fresno Bee, at least five days apart over a two-week period, providing the date and time of the public hearing. The notices were published on July 1, 2021, and July 8, 2021.

10.2 Public Hearing and Adoption

The City held a public hearing and adopted the 2020 UWMP on July 15, 2021. A copy of the adopting resolution is included in **Appendix M**. Before the public hearing, notices were published notifying the public of the date and time of the hearing.

10.3 Plan Submittal

Once the 2020 UWMP and WSCP have been adopted, a copy of the 2020 UWMP and WSCP and any subsequent amendments will be submitted to DWR, the State Library, and the County of Fresno.

10.4 Public Availability

Once the plan has been adopted, a hard copy will be made available for public reference at the City of Fresno Department of Public Utilities office at City Hall (located at 2600 Fresno Street) and the Water Division office (located at 1910 E. University Avenue). Additionally, an electronic copy will be uploaded to the City of Fresno website and made available for public reference.

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Applied Development Economics, Inc. and Mintier Harnish Associates. (2017). *Fresno County 2050 Growth.*

California Department of Finance. (2020, May). *E-4 Population Estimates for Cities, Counties, and the State.* Retrieved from State of California Department of Finance: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-4/2010-20/

California Department of Water Resources. (Feb 2016). *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use.*

California Department of Water Resources. (January 2006). *Bulletin 118 - San Joaquiv Valley Groundwater Basin, Kings Subbasin.*

California Department of Water Resources, State Water Resources Control Board. (November 2018). *Making Water Conservation a California Way of Life.*

California Regional Water Qulaity Control Board. (2018). Order R5-2018-0080 Waste Discharge Requirements for Cities of Fresno and Clovis Regional Wastewater Reclamation Facility .

Carollo. (2010). Recycled Water Master Plan. City of Fresno.

Carollo. (2019). Citywide Recycled Water Demand and Southwest Recycled Water System Analysis . City of Fresno.

CH2MHill. (1992). *City of Fresno Metropolitan Water Resources Management Plan, Phase 1 Report, Volume II or II, Appendix B Hydrogeologic Conditions in the FCMA.*

City of Fresno Development and Resource Management Department. (2014). *Fresno General Plan .*

City of Fresno Development and Resource Management Department. (2017). *Fresno General Plan 2015 - 2023 Housing Element.*

City of Fresno Planning and Development Department. (2020). *2019 Housing Element Annual Progress Report.*

Department of Water Resources. (2018). *Guidance for Climate Change Data Use during Groundwater Sustainability Plan.*

First Carbon Solutions. (2014). *Master Environmental Impact Report General Plan and Development Code Update City of Fresno, Fresno County, California.*

Fresno City Water, Engineering Department. (1940). Average of Groundwater Depth for City of Wells Log.

History of SJRECWA Exchange Contractors. (n.d.). Retrieved 03 18, 2021, from San Joaquin River Exchange Contractrs Water Authority: http://www.sjrecwa.net/about/history/

John Carollo Engineers. (1969). *Report on Water Resources City of Fresno.*

Kings River Water Association and Kings River Conservation District. (June 2003). *The Kings River Handbook, pg. 7.*

LSA. (2020). *Fresno General Plan Public Review Draft Program Environmental Impact Report.*

Partida, C. K. (2020, November 15). Planning for a shorter rainy season and more frequent extreme storms in California. *California WaterBlog*. Retrieved from https://californiawaterblog.com/2020/11/15/planning-for-a-shorter-rainy-season-and-more-frequent-extreme-storms-in-california/

Persad, G. G. (2020, October). Inter-model agreement on projected shifts in California hydroclimate characteristics critical to water management. *Climatic Change*. Retrieved from https://doi.org/10.1007/s10584-020-02882-4

Provost & Pritchard. (November 2019). *North Kings Groundwater Sustainability Plan.* North Kings Groundwater Sustainability Agency.

WateReuse Research Foundation. (2013). *Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment.*

West Yost Associates. (January 2014). *City of Fresno Metropolitan Water Resources Management Plan Update Addendum.*

WRIME. (2007). The Integrated Groundwater and Surface Water Model prepared for the Kings Basin Integrated Regional Water Management Authority.

A

2020 UWMP Checklist

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1
x	x	Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Executive Summary
x	x	Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Chapter 2, Section 10.2
x	x	Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.1
x	x	Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.1, Section 10.1
x		Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	N/A
	x	Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A
x	x	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Section 3.1 and 3.2
x	x	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Table 3-2 Section 3.3
x	x	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Table 3-3 Section 3.4.1
x	x	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.3.1
x	x	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Table 3-3 Section 3.4.1
x	x	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Table 3-1 Section 3.1.1, Section 4.2.4.1, Table 4-3, Figure 4-3,
x	x	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2
x	x	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Losses included Section 4.2.2, City has not adopted loss standards

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Table 4-5 Section 4.2.4.2
x	x	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.5.2
x	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Table 4-1 Section 4.2.2
x	optional	Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Table 4-9 Section 4.3
x	x	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.4
x		Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Table 5-1 Section 5.4 Appendix C
x		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.5 Appendix C
	x	Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
x		Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	N/A
x		Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	N/A
x		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Appendix C
x	x	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 6.1-6.4 Section 7.1.3
x	x	Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change*.	System Supplies	Section 6.8.2.1
x	x	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.8
x	x	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.7
x	x	Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Table 6-7 and Table 6-8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.1
x	x	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.1 Appendix G
x	x	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.1.1
x	x	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	N/A
x	x	Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.1.2
x	x	Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.1.6 Figure 6-6
x	x	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.1.5 Table 6-1
x	x	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6-6
x	x	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.4.2, Appendix B Table 6-3R
x	x	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.4.4 Table 6-5
x	x	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.4.4
x	x	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.4.4 Table 6-6
x	x	Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.4.5
x	x	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.4.5
x	x	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.5
x	x	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.4.2, Appendix B Table 6-3R

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.7
x	x	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.9
x	x	Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1.1
x	x	Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.1.2
x	x	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.1.4
x	x	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.1.3.3
x	x	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.1.3
x	x	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.1.4 Table 7-1, Table 7-2, and Table 7-3
x	x	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.1.3 and 7.1.4
x	x	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Appendix J
x	x	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Appendix J - Section 1.2
x	x	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Appendix J - Section 1.10

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Appendix J - Section 1.3
x	x	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Appendix J - Section 1.3
x	x	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Appendix J - Section 1.4 Table 2
x	x	Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Appendix J - Section 1.4 Figure 2
x	x	Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Appendix J - Section 1.5.3 Table 4
x	x	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Appendix J - Section 1.5.2 Table 3
x	x	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Appendix J - Section 1.5.4
x	x	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Appendix J - Section 1.5.1
x	x	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Appendix J - Section 1.5.2 Table 3
x	x	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Appendix J - Section 1.5.6
x	x	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Appendix J - Section 1.6
x	x	Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Appendix J - Section 1.6
x		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Appendix J - Section 1.7
x		Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Appendix J - Section 1.8
x	x	Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Appendix J - Section 1.8
x	x	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.9
x	x	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.9
x		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Appendix J - Section 1.9
x		Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Appendix J - Section 1.10
x		Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Appendix J - Section 1.12
x	x	Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Appendix J - Section 1.13
x	x	Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Appendix J - Section 1.13
	x	Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A
x		Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Section 9.1
x		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 10.2
x	x	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.1, Table 2-1, Appendix L

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Appendix L
x	x	Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Appendix L
x	x	Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Appendix M
x	x	Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A
x	x	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	TBD

B

DWR Standardized Tables

2-1R | Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020
CA1010007	CITY OF FRESNO	139,523	121,994
	Total:	**139,523**	**121,994**
Note: Data provided by City of Fresno Water Division			

2-2 | Public Water Systems

Type of Plan	Member of RUWMP	Member of Regional Alliance	Name of RUWMP or Regional Alliance
Individual UWMP	No	No	N/A

2-3 | Agency Identification

Type of Supplier	Year Type	First Day of Year		Unit Type
		DD	MM	
Retailer	Calendar Years			Acre Feet (AF)

Conversion to Gallons: *325851*
Conversion to Gallons per Day: *892.7425*

2-4R | Water Supplier Information Exchange

Wholesale Water Supplier Name
United States Bureau of Reclamation
Fresno Irrigation District

3-1R | Current & Projected Population

Population Served	2020	2025	2030	2035	2040	2045
Total	550,217	609,433	674,677	719,327	765,278	812,529

4-1R | Actual Demands for Water

Use Type	Additional Description	Level of Treatment When Delivered	2020 Volume
Single Family		Drinking Water	60,065
Multi-Family		Drinking Water	18,842
Commercial		Drinking Water	16,971
Industrial		Drinking Water	5,729
Institutional/Governmental	See Note 1	Drinking Water	---
Landscape		Drinking Water	10,478
Other	Travel Meters	Drinking Water	340
Losses		Drinking Water	9,568
Groundwater Recharge		Raw Water	42,686
		Total:	**164,679**

Notes:
1. Institutional and Governmental water usage is included in the Commercial use type.

4-2R | Projected Demands for Water

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Single Family		76,255	80,429	82,934	85,437	87,936
Multi-Family		19,000	20,654	21,737	22,831	23,935
Commercial		19,052	21,135	22,587	24,041	25,496
Industrial		7,410	9,003	9,922	10,841	11,758
Institutional/Governmental	See Note 1					
Landscape		4,490	5,035	5,422	5,809	6,196
Other	Travel Meters	200	200	200	200	200
Losses		10,097	10,900	11,408	11,917	12,426
Groundwater Recharge	Raw Water	62,700	65,400	68,100	70,800	73,500
Total:		**199,204**	**212,756**	**222,310**	**231,876**	**241,447**

Notes:
1. Institutional and Governmental water usage is included in the Commercial use type.

4-3R | Total Gross Water Use

	2020	2025	2030	2035	2040	2045
Potable and Raw Water From Table 4-1R and 4-2R	164,679	199,204	212,756	222,310	231,876	241,447
Recycled Water Demand From Table 6-4R	4,757					
Total Water Use:	**169,436**	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**

Note: Recycled water supply is a potable water offset, thus the recycled water demand in years 2025-2045 is included in the potable and raw water demand total.

4-4R | 12 Month Water Loss Audit Reporting

Report Period Start Date		Volume of Water Loss*
MM	YYYY	
1	2016	9,036
1	2017	10,235
1	2018	9,028
1	2019	9,059
1	2020	9,568

*For years 2016, through 2019, volume of water loss is taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet. For 2020 the volume of water loss is estimates as the difference in metered water produced and entered into the distribution system and metered consumption.

4-5R | Inclusion in Water Use Projections

Are Future Water Savings Included in Projections? Refer to Appendix K of UWMP Guidebook.	Yes
Section or page number where the citations utilized in the demand projects can it be found:	Section 4.2.4.2
Are Lower Income Residential Demands Included in Projections?	Yes

5-1R | Baselines & Targets Summary

Baseline Period	Start Year	End Year	Average Baseline GPCD*	Confirmed 2020 Target *
10-15 Year	1999	2008	309	247
5 Year	2003	2007	304	N/A

*All values are in Gallons per Capita per Day (GPCD)

5-2R | 2020 Compliance

Actual 2020 GPCD*	Optional Adjustments to 2020 GPCD					2020 GPCD* (Adjusted if applicable)	Supplier Achieved Targeted Reduction in 2020
	Extraordinary Events*	Economic Adjustment*	Weather Normalization*	Total Adjustments*	Adjusted 2020 GPCD*		
198	0	0	0	0	0	0	Yes

*All values are in Gallons per Capita per Day (GPCD)

6-1R | Groundwater Volume Pumped

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial Basin	San Joaquin Groundwater Basin: Kings Subbasin	99,107	105,211	76,796	54,609	55,028
	Total:	**99,107**	**105,211**	**76,796**	**54,609**	**55,028**

6-2R | Wastewater Collected within Service Area in 2020

The supplier will complete the table.						
			Percentage of 2020 service area covered by wastewater collection system (optional):			
			Percentage of 2020 service area population covered by wastewater collection system (optional):			
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	**Wastewater Volume Metered or Estimated**	**Wastewater Volume Collected from UWMP Service Area in 2020**	**Name of Wastewater Agency Receiving Collected Wastewater**	**Wastewater Treatment Plant Name**	**Wastewater Treatment Plant Located within UWMP Area**	**WWTP Operation Contracted to a Third Party**
City of Fresno	Metered	63,652	**City of Fresno**	RWRF	Yes	No
City of Fresno	Metered	325	**City of Fresno**	NFWRF	Yes	No
	Total:	**63,977**				
Note: Wastewater Volume in units of AF						

6-3R | Wastewater Treatment & Discharge Within Service Area in 2020

The supplier will complete the table.											
Wastewater Treatment Plant Name	**Discharge Location Name or Identifier**	**Discharge Location Description**	**Wastewater Discharge ID Number**	**Method of Disposal**	**Plant Treats Wastewater Generated Outside the Service Area**	**Treatment Level**	**2020 Volumes**				
							Wastewater Treated	**Discharged Treated Wastewater**	**Recycled Within Service Area**	**Recycled Outside of Service Area**	**Instream Flow Permit Requirement**
RWRF	Treatment Site	Onsite Percolation Ponds	WDR Order R5-2018-0080	Percolation ponds	Yes	Secondary, Undisinfected	63,652	58,949	-	3,845	-
RWRF	Treatment Site	Onsite Percolation Ponds	WDR Order R5-2018-0080	Percolation ponds	Yes	Tertiary			858	-	-
NFWRF	Treatment Site	Onsite Pond	WDR Order R5-2014-0162	Percolation ponds	No	Tertiary	325	271	54	-	-
						Total:	**63,977**	**59,220**	**912**	**3,845**	**-**

6-4R | Recycled Water Direct Beneficial Uses Within Service Area

The supplier will complete the table.										
Name of Supplier Producing (Treating) the Recycled Water:			City of Fresno							
Name of Supplier Operating the Recycled Water Distribution System:			City of Fresno							
Supplemental Volume of Water Added in 2020:										0%
Source of 2020 Supplemental Water:			N/A							
Beneficial Use Type	**Potential Beneficial Uses of Recycled Water**	**Amount of Potential Uses of Recycled Water**	**General Description of 2020 Uses**	**Level of Treatment**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Agricultural Irrigation	Non-food crop irrigation	7,900	Irrigate non-food crops	Secondary, Undisinfected	3,845	7,900	7,900	7,900	7,900	7,900
Landscape Irrigation (excludes golf courses)	Landscape Irrigation	5,800	Landscape irrigation, distribtued through the southwest recycled water distribution system	Tertiary	858	5,800	5,800	5,800	5,800	5,800
Agricultural Irrigation	Food crop irrigation	410	Irrigate limited food crops, distribtued through the southwest recycled water distribution system	Tertiary	-	410	410	410	410	410
Golf Course Irrigation	Landscape Irrigation	110	Copper River Golf Course	Tertiary	54	110	110	110	110	110
				Total:	**4,757**	**14,220**	**14,220**	**14,220**	**14,220**	**14,220**
Internal Reuse (Not included in Statewide Recycled Water Volume).					11	30	30	30	30	30

6-5R | 2015 Recycled Water Use Projection Compared to 2020 Actual

The supplier will complete the table.

Use Type	2015 Projection for 2020	2020 Actual Use
Agricultural Irrigation	14,200	3,845
Landscape Irrigation (excludes golf courses)	4,300	858
Golf Course Irrigation		54
Commercial Use		
Industrial Use	1,400	
Geothermal and Other Energy Production		
Seawater Intrusion Barrier		
Recreational Impoundment		
Wetlands or Wildlife Habitat		
Groundwater Recharge (IPR)*	1,300	
Surface Water Augmentation (IPR)*		
Direct Potable Reuse		
Total:	**21,200**	**4,757**

6-6R | Methods to Expand Future Recycled Water Use

The supplier will complete the table below.			
Name of Action	**Description**	**Planned Implementation Year**	**Expected Increase of Recycled Water Use**
Build Infrastructure	Recycled Water Distribution System Expansion	2021	5,000
		Total:	**5,000**

6-7R | Expected Future Water Supply Projects or Programs

Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.						
Page Location for Narrative in UWMP:			Section 6.7			
Name of Future Projects or Programs	**Joint Project with Other Suppliers**	**Agency Name**	**Description**	**Planned Implementation Year**	**Planned for Use in Year Type**	**Expected Increase in Water Supply to Supplier**
Expansion of Tertiary Recycled Water Treatment	No		See Section 6.7		All Year Types	
Expansion of Surface Water Treatment Capacity	No		See Section 6.7		All Year Types	
Expansion of Groundwater Recharge Program	No		See Section 6.7		All Year Types	

6-8R | Actual Water Supplies

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield
Groundwater (not desalinated)		55,028	Drinking Water	
Surface water (not desalinated)	USBR CVP	37,447	Drinking Water	
Surface water (not desalinated)	FID Contract	71,292	Drinking Water	
Recycled Water	RWRF	858	Recycled Water	
Recycled Water	NFWRF	54	Recycled Water	
	Total:	**164,679**		**-**

6-8DS | Source Water Desalination

Neither groundwater nor surface water are reduced in salinity prior to distribution. The supplier will not complete the table.

6-9R | Projected Water Supplies

Water Supply	Additional Detail on Water Supply	Projected Water Supply									
		2025		2030		2035		2040		2045	
		Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield
Groundwater (not desalinated)	Kings Subbasin	138,090		143,630		149,100		154,490		159,820	
Surface water (not desalinated)	USBR CVP	60,000		60,000		60,000		60,000		60,000	
Surface water (not desalinated)	FID Contract	125,030		131,600		131,600		131,600		131,600	
Recycled Water	NFWRF Tertiary Disinfected	5,800		5,800		5,800		5,800		5,800	
Recycled Water	RWRF Tertiary Disinfected	110		110		110		110		110	
Total:		**329,030**	**-**	**341,140**	**-**	**346,610**	**-**	**352,000**	**-**	**357,330**	**-**

7-1R | Basis of Water Year Data (Reliability Assessment)

Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP.	
Page Location for Narrative in UWMP:	See Section 7.1.3 in the UWMP

7-2R | Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals From Table 6-9R	329,030	341,140	346,610	352,000	357,330
Demand Totals From Table 4-3R	199,204	212,756	222,310	231,876	241,447
Difference:	**129,826**	**128,384**	**124,300**	**120,124**	**115,883**

7-3R | Single Dry Year Supply & Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals	189,852	195,392	200,862	206,252	211,582
Demand Totals	164,092	176,132	184,174	192,228	200,287
Difference:	**25,760**	**19,260**	**16,688**	**14,024**	**11,295**

7-4R | Multiple Dry Years Supply & Demand Comparison

		2025	2030	2035	2040	2045
First Year	**Supply Totals**	273,725	279,265	284,735	290,125	295,455
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**74,521**	**66,509**	**62,425**	**58,249**	**54,008**
Second Year	**Supply Totals**	274,626	280,166	285,636	291,026	296,356
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**75,422**	**67,410**	**63,326**	**59,150**	**54,909**
Third Year	**Supply Totals**	217,568	223,108	228,578	233,968	239,298
	Demand Totals	190,267	193,637	197,736	201,753	205,708
	Difference:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
Fourth Year	**Supply Totals**	189,852	195,392	200,862	206,252	211,582
	Demand Totals	162,551	165,920	170,020	174,036	177,992
	Difference:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
Fifth Year	**Supply Totals**	314,840	320,380	325,850	331,240	336,570
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**115,636**	**107,624**	**103,540**	**99,364**	**95,123**

7-5 | Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

2021	**Gross Water Use**	184,910
	Total Supplies	240,905
	Surplus/Shortfall without WSCP Action	**55,995**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**55,995**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2022	**Gross Water Use**	187,827
	Total Supplies	244,448
	Surplus/Shortfall without WSCP Action	**56,621**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**56,621**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2023	**Gross Water Use**	170,051
	Total Supplies	196,200
	Surplus/Shortfall without WSCP Action	**26,149**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**26,149**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2024	**Gross Water Use**	151,432
	Total Supplies	178,164
	Surplus/Shortfall without WSCP Action	**26,732**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**26,732**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2025	**Gross Water Use**	196,504
	Total Supplies	300,911
	Surplus/Shortfall without WSCP Action	**104,407**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**104,407**
	Resulting Percent Use Reduction from WSCP Action	**0%**

8-1 | Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage[1]	Water Shortage Condition
0		No water shortage condition. Corresponds with year-round water use measures listed in Section 1.5.1 and demand reduction measures listed for "All" stages in Table 3.
1	0-10%	Stage 1 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 100% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 2 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10-25%	Stage 2 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 90% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 3 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
3	25-35%	Stage 3 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 75% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 4 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
4	35-50%	Stage 4 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 65% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 5 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
5	>50%	Stage 5 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 50% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment.

[1]Shortage levels indicate the gap between supply and demand compared to normal-year conditions. The Annual Assessment incorporates a 10% buffer on top of projected demands for conservative planning.
[2]Water year types were defined 2006 San Joaquin River Restoration Settlement Agreement for USBR allocations and characterized in Section 6.2 of the City's 2020 UWMP.

8-2 | Demand Reduction Actions

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap?[1]	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement[2]
All	Expand Public Information Campaign	Not Applicable	Community outreach includes classroom presentations, outreach educational information, and water tours. Increase communication as drought stages increase.	Not Applicable
All	Improve Customer Billing	Not Applicable	Water bills show customer usage vs. average usage for the customer category. Increase customer notifications of high water use based on advanced metering infrastructure (AMI) data as drought stages increase.	Not Applicable
All	Offer Water Use Surveys	Not Applicable	Use water leak surveys with all community members.	Not Applicable
All	Provide Rebates for Landscape Irrigation Efficiency	Not Applicable	The City offers rebates for micro-irrigation conversions, soil moisture sensors, smart irrigation controller, and rain sensors to improve efficiencies.	Not Applicable
All	Provide Rebates for Turf Replacement	Not Applicable	The City provides rebates for community members who wish to replace their turf with a drought-resistant garden.	Not Applicable
All	Provide Rebates on Plumbing Fixtures and Devices	Not Applicable	The City offers rebates on a variety of high-efficiency plumbing fixtures, such as washers, toilets, and urinals.	Not Applicable
All	Decrease Line Flushing	Not Applicable	The City uses NO-DES for regular pipe flushing to eliminate discharging water.	Not Applicable
All	Reduce System Water Loss	Not Applicable	The City has a comprehensive system water loss reduction program in place. Increase efforts to correct water system losses as drought stages increase.	Not Applicable
1	Decrease Line Flushing	0 to 100% of shortage gap	For dead-end flushing where the NO-DES truck cannot be used, reduce normal flushing time.	Not Applicable
1	Increase Water Waste Patrols	0 to 100% of shortage gap	Increase monitoring of AMI reporting and communication with customers; Conduct patrols based on public input.	Not Applicable
1	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Voluntary limits: Summer: three days/week Winter: one day/week	No
2	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: three days/week Winter: one day/week	Yes
3	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: two days/week Winter: one day/week	Yes
4	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: one day/week Winter: one day/week	Yes
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	The City provides rebates for community members who wish to replace their turf with a drought resistant garden	No
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, and building washdowns where non-potable or recycled water is sufficient.	Yes
4	Other — Prohibit vehicle washing except at facilities using recycled or recirculating water	0 to 100% of shortage gap	Prohibit washing cars, boats, trailers, aircraft, or other vehicles, except at commercial or fleet vehicle-washing facilities using water recycling equipment.	Yes
4	Pools and Spas - Require covers for pools and spas	0 to 100% of shortage gap	Require covers for swimming pools when not in use.	No
4	Other	0 to 100% of shortage gap	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City manager.	Not Applicable
4	Other	0 to 100% of shortage gap	Prohibit use of outdoor misters.	No
5	Landscape — Prohibit all landscape irrigation	0 to 100% of shortage gap	Prohibit outdoor irrigation year-round.	Yes
5	Moratorium or Net Zero Demand Increase on New Connections	0 to 100% of shortage gap	The City will temporarily limit or ban new water service connections within the service area.	Not Applicable

[1]Reduction in the shortage gap is estimated and can vary significantly.
[2]Refer to WSCP Section 1.7 for Penalties for Water Wastage.

8-3R | Supply Augmentation & Other Actions

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap?	Additional Explanation or Reference
1 to 5	Transfers	As Needed	Purchase or exchange available USBR or FID surface water
1 to 5	Other Purchases	As Needed	Interconnection with City of Clovis for use in emergencies

10-1R | Notification to Cities & Counties

City	60 Day Notice	Notice of Public Hearing	Other
City of Clovis	Yes	Yes	
County	**60 Day Notice**	**Notice of Public Hearing**	**Other**
County of Fresno	Yes	Yes	
Other	**60 Day Notice**	**Notice of Public Hearing**	**Other**
Bakman Water Company	Yes	Yes	
Fresno Irrigation District	Yes	Yes	
Fresno Metropolitan Flood Control District	Yes	Yes	
Friant Water Authority	Yes	Yes	
Garfield Water District	Yes	Yes	
Malaga County Water District	Yes	Yes	
North Kings Groundwater Sustainabilty Agency	Yes	Yes	
Pinedale County Water District	Yes	Yes	
United Stated Bureau of Reclamation South-Central California Area Office	Yes	Yes	

C

SBx7-7 Tables and Verification Form

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
309	247
NOTES:	

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
304	288	247	247
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES:			

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
190	278	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	189.745674	189.745674	YES
NOTES:								

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	550,217
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	121,994	-	-	-	-	-	**121,994**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Groundwater
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	55,028	-	55,028

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- NESWTF
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	20,724		20,724

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- SESWTF
This water source is *(check one)* **:**	

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	45,367		45,367

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- T-3 SWTF

This water source is *(check one)* **:**

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	875		875

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Enter Name of Source 5

This water source is *(check one)* **:**

☐	The supplier's own water source
☐	A purchased or imported source

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water *Fm SB X7-7 Table 4*	**2020 Population** *Fm SB X7-7 Table 3*	**2020 GPCD**
121,994	550,217	**198**
NOTES:		

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
198	-	-	-	-	198	247	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

D

City of Fresno's Reduce Delta Reliance Reporting

Appendix D - Delta Reliance

1. Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action (e.g., a proposed project) in the Sacramento-San Joaquin Delta (Delta), prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.

Anyone may appeal a certification of consistency. If the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency. The covered action may be implemented if either: 1) no appeal is filed; or 2) the Delta Stewardship Council denies the appeal to the revised certification of consistency.

The City of Fresno (City) contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 af of Class 1 water through an agreement originally executed in January 1961. Although the Friant Division of the CVP does not pull water from the Delta, the project was developed through an exchange agreement reached in 1939 with the Delta-Mendota supply that provides water to the Exchange Contractors[1] with historic pre-1914 San Joaquin River water rights. As restrictions on Delta exports have hindered USBR from making deliveries to the Delta-Mendota Canal, the Exchange Contractors can call on their historic rights, which reduces the Friant Division Class 1 allocations. As such, the City is required to demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta.

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

[1] The Exchange Contractors are the benefactors of the historic pre-1914 water rights established by Miller and Lux. These contracts include: Central California Irrigation District; San Luis Canal Company; Firebaugh Canal Water District; and Columbia Canal Company, per http://www.sjrecwa.net/history.html (accessed March 10, 2021).

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);

(2) That failure has significantly caused the need for the export, transfer, or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self- reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

The analysis and documentation provided below include all the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

2. Methodology

As stated in WR P1(c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for improved regional self-reliance and measurable reduction in Delta reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta. The expected outcomes for the City's regional self-reliance and reduced Delta reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 issued in March 2020 (Guidebook Appendix C), including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources.

All data were obtained from planning documents adopted by the City Council, including the current and previous UWMPs and Metropolitan Water Resource Management Plan (Metro Plan) and represent average or normal water year conditions. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the UWMP Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

To calculate the expected outcomes for improved regional self-reliance and reduced Delta reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from the City's 2008 UWMP. Consistent with the 2010 baseline data approach, the expected outcomes for improved regional self-reliance and reduced Delta reliance for 2015 and 2020 were taken from the City's 2010 and 2015 UWMPs, respectively. Expected outcomes for 2025-2045 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

3. Demonstration of Regional Self-Reliance

3.1 Service Area Demands without Water Use Efficiency

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as the City that do not explicitly quantify water use efficiency savings in their UWMPs can calculate their embedded water use efficiency savings based on changes in forecasted per capita water use since the baseline.

Agencies that explicitly calculate and report water use efficiency savings in their UWMP will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. **Table 1** (included at the end of this appendix) shows the results of this adjustment for the City. Supporting narratives and documentation for all the data shown in Table 1 are provided below.

Service Area Demands with Water Use Efficiency

The service area demands shown in Table 1 represent the total water demands for the City's service area. The demand data shown in Table 1 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 6-5
- 2015: Fresno 2010 UWMP, Table 7-2
- 2020: Fresno 2015 UWMP, Table 4-4
- 2025-2045: Fresno 2020 UWMP, Table 4-6

Non-Potable Water Demands

The non-potable water demands shown in Table 1 represent recycled water use that offsets potable water use in the City's service area. The demand data shown in Table 1 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 10-7
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14
- 2025-2045: Fresno 2020 UWMP, Table 4-7

Potable Service Area Demands with Water Use Efficiency

Subtract "Non-Potable Water Demands" from "Service Area Demands with Water Use Efficiency."

Service Area Population

The population data shown in Table 1 were collected from the following sources:

- Baseline (2010) and 2015: Fresno 2015 UWMP, Table 5-1
- 2020-2045: Fresno 2020 UWMP, Table 3-3

Estimated Water Use Efficiency Since Baseline

The "Per Capita Water Use" calculated using "Potable Service Area Demands with Water Use Efficiency" divided by "Service Area Population". The "Change in Per Capita Water Use from Baseline" was then calculated by comparing with 2010 Per Capita Water Use. Finally, the "Estimated Water Use Efficiency Since Baseline" was calculated by multiplying the "Change in Per Capita Water Use from Baseline" by the population for one (1) year.

Service Area Water Demands without Water Use Efficiency

Add "Service Area Demands with Water Use Efficiency" to "Estimated Water Use Efficiency Since Baseline."

3.2 Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table 2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in **Table 2** (included at the end of this appendix) represent efforts to improve regional self-reliance for the City's entire service area and include the total contributions of the City and its customers. Supporting narratives and documentation for all of the data shown in Table 2 are provided below.

Estimated Water Use Efficiency Since Baseline

The water use efficiency information shown in Table 2 is taken directly from Table 1.

Water Recycling

The water recycling information shown in Table 2 is taken from the Non-Potable Water Demands row in Table 1.

Local and Regional Water Supply and Storage Programs

The values shown in Table 2 represent groundwater supplies considering both natural recharge and intentional recharge. The supply data shown in Table 2 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-9
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14

- 2025-2045: Fresno 2020 UWMP, Table 6-8

Other Programs and Projects the Contribute to Regional Self-Reliance

The values shown in Table 2 represent Kings River supplies considering both contracted supplies and recycled water exchange supplies. The supply data shown in Table 2 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-11
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-5
- 2025-2045: Fresno 2020 UWMP, Table 6-8

Water Supplies Contributing to Regional Self Reliance

Sum of:

- Estimated Water Use Efficiency Since Baseline
- Water Recycling
- Local and Regional Water Supply and Storage Programs
- Other Programs and Projects the Contribute to Regional Self-Reliance

Percent of Water Supplies Contributing to Regional Self-Reliance

"Water Supplies Contributing to Regional Self Reliance" divided by "Service Area Water Demands without Water Use Efficiency" (from Section 3.1).

3.3 Conclusions

The results shown in Table 2 demonstrate that the City's service area is measurably improving its regional self-reliance. The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City's regional self-reliance:

- Near-term (2025): The expected outcome for normal water year regional self-reliance is expected to increase by 129,700 AFY from the 2010 baseline; this represents an increase of about 31 percent of 2025 normal water year demands (Table 2).
- Long-term (2045): The expected outcome for normal water year regional self-reliance is expected to increase by more than 191,600 AFY from the 2010 baseline, this represents an increase of about 14 percent of 2045 normal water year retail demands (Table 2).

The results show that the City is measurably improving regional self-reliance, both as an amount of water used and as a percentage of water used.

4. Demonstration of Reduced Reliance on the Delta

The City's service area reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures.

4.1 Calculation of Reliance on Water Supplies from the Delta Watershed

The calculation of reliance on water supplies from the Delta watershed, shown in **Table 3** (included at the end of this appendix), is based on the following assumptions.

CVP/SWP Contract Supplies

The City water supplies with a connection to the Delta watershed are CVP/SWP Contract Supplies. The supply data shown in Table 3 is for anticipated average yield from the City's USBR contract and were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-6
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14
- 2025-2045: Fresno 2020 UWMP, Table 6-2

Water Supplies from the Delta Watershed

Equal to "CVP/SWP Contract Supplies."

Percent Change in Supplies from the Delta Watershed

Divides "Water Supplies from the Delta Watershed" by "Service Area Demands without Water Use Efficiency" (from Section 3.1) and calculates changes from the 2010 baseline.

4.2 Conclusions

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City's Delta reliance on supplies from the Delta watershed:

- Near-term (2025): The expected outcome for normal water year reliance on supplies from the Delta watershed is expected to decrease by 4,520 AF from the 2010 baseline. With Delta water representing 25.5% of service area water demand without water use efficiency, this represents a decrease from the 2010 baseline of 10.1% (Table 3).
- Long-term (2045): The expected outcome for normal water year reliance on supplies from the Delta watershed is expected to decrease by 4,520 AF from the 2010 baseline. With Delta water representing 19.5% of service area water demand without water use efficiency, this represents a decrease from the 2010 baseline of 16.2% (Table 3).

The results shown in Table 3 demonstrate that City is measurably reducing reliance on the Delta, both as an amount of water used and as a percentage of water used.

5. UWMP Implementation

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta[.]*

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Chapter 6 of the City's 2020 UWMP summarizes the implementation of future water projects and continued progress in developing a diversified water portfolio to meet the City's water needs.

6. 2015 UWMP Appendix L

The information contained in this appendix is also intended to be a new Appendix L attached to the City's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). The City provided notice of the availability of the draft 2020 UWMP, 2020 WSCP, and a new Appendix L to the 2015 UWMP and the public hearing to consider adoption of the documents in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix L to the 2015 UWMP, and the 2020 WSCP were posted on the City's website, fresno.gov, on June 28, 2021, more than 14 days in advance of the public hearing on July 15, 2021. The notice of availability of the documents was sent to the City's customers, as well as cities and counties in the City's service area. Copies of the notification letter sent to the customers and cities and counties in the City's service area are included in the 2020 UWMP Appendix L. Thus, this Appendix D to the City's 2020 UWMP, which was adopted with the City's 2020 UWMP, will also be recognized and treated as Appendix L to the City's 2015 UWMP.

The City held the public hearing for the draft 2020 UWMP, draft Appendix L to the 2015 UWMP, and draft 2020 WSCP on July 15, 2021, at a regular City Council meeting, held online due to COVID-19 concerns. At the meeting, the City Council determined that the 2020 UWMP and the 2020 WSCP accurately represent the water resources plan for the City's service area. In addition, the City Council determined that Appendix L to the 2015 UWMP and Appendix D to the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 2021-196, 2021-197, and 2021-198, the City Council adopted the 2020 UWMP, the 2020 WSCP, and Appendix L to the 2015 UWMP and authorized their submittal to the State of California. Copies of the resolutions are included in the 2020 UWMP Appendix M.

Table 1. Calculation of Service Area Water Demands without Water Use Efficiency (UWMP Table C-1 and Table C-2)

Table C-1: Optional Calculation of Water Use Efficiency -To be completed if Water Supplier does not specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	163,300	172,900	168,200	136,579	147,505	154,434	161,372	168,318
Non-Potable Water Demands	750	1,000	9,500	14,220	14,220	14,220	14,220	14,220
Potable Service Area Demands with Water Use Efficiency Accounted For	162,550	171,900	158,700	122,359	133,285	140,214	147,152	154,098

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Population	505,315	525,575	550,217	609,433	674,677	719,327	765,278	812,529

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Per Capita Water Use (GPCD)	287	292	257	179	176	174	172	169
Change in Per Capita Water Use from Baseline (GPCD)		5	(30)	(108)	(111)	(113)	(116)	(118)
Estimated Water Use Efficiency Since Baseline		(2,833)	18,294	73,684	83,745	91,180	99,023	107,277

Table C-2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	163,300	172,900	168,200	136,579	147,505	154,434	161,372	168,318
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	(2,833)	18,294	73,684	83,745	91,180	99,023	107,277
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Table 2. Calculation of Supplies Contributing to Regional Self-Reliance (UWMP Table C-3)

Table C-3: Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Estimated Water Use Efficiency since Baseline	-	(2,833)	18,294	73,684	83,745	91,180	99,023	107,277
Water Recycling	750	1,000	9,500	14,220	14,220	14,220	14,220	14,220
Stormwater Capture and Use								
Advanced Water Technologies								
Conjunctive Use Projects								
Local and Regional Water Supply and Storage Projects	88,800	76,100	132,480	138,090	143,630	149,100	154,490	159,820
Other Programs and Projects the Contribute to Regional Self-Reliance	131,750	117,400	116,000	125,030	131,600	131,600	131,600	131,600
Water Supplies Contributing to Regional Self-Reliance	221,300	191,667	276,274	351,024	373,195	386,100	399,333	412,917

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	221,300	191,667	276,274	351,024	373,195	386,100	399,333	412,917
Change in Water Supplies Contributing to Regional Self-Reliance		(29,633)	54,974	129,724	151,895	164,800	178,033	191,617

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	135.5%	112.7%	148.1%	166.9%	161.4%	157.2%	153.4%	149.8%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		-22.8%	12.6%	31.4%	25.9%	21.7%	17.8%	14.3%

Table 3. Reliance on Water Supplies from the Delta Watershed (UWMP Table C-4)

Table C-4: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680
Delta/Delta Tributary Diversions								
Transfers and Exchanges of Supplies from the Delta Watershed								
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680
Change in Water Supplies from the Delta Watershed		-	(5,600)	(4,520)	(4,520)	(4,520)	(4,520)	(4,520)

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	35.6%	34.2%	28.2%	25.5%	23.2%	21.9%	20.6%	19.5%
Change in Percent of Water Supplies from the Delta Watershed		-1.4%	-7.4%	-10.1%	-12.4%	-13.8%	-15.0%	-16.2%

E

AWWA Water Audits

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association

? Click to access definition

+ Click to add a comment

Water Audit Report for: City of Fresno (1010007)

Reporting Year: 2016 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	112,398.020	acre-ft/yr	3			acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration

Enter positive % or value for over-registration

WATER SUPPLIED: 112,398.020 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

				Pcnt:	Value:	
Billed metered:	9	103,038.468	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	42.876	acre-ft/yr			
Unbilled unmetered:	5	280.995	acre-ft/yr		280.995	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 103,362.339 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 9,035.681 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:	280.995	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,041.226	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		257.596	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,579.817 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 7,455.864 acre-ft/yr

WATER LOSSES: 9,035.681 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 9,359.552 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,810.39	miles
Number of active AND inactive service connections:	9	143,916	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 3 50.0 psi

COST DATA

Total annual cost of operating water system:	10	$71,848,500	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$1.86	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	5	$152.10	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Customer metering inaccuracies

3: Variable production cost (applied to Real Losses)

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Reporting Worksheet

WAS v5.0

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+ Click to add a comment

Water Audit Report for: City of Fresno
Reporting Year: 2017 (1/2017 - 12/2017)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	121,079.641	acre-ft/yr	5			acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 121,079.641 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	9	110,520.840	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	48.124	acre-ft/yr			
Unbilled unmetered:	5	276.052	acre-ft/yr		276.052	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 110,845.016 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

10,234.625 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		302.699	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,116.858	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		276.302	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,695.859 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 8,538.766 acre-ft/yr

WATER LOSSES: 10,234.625 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 10,558.801 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,854.4	miles
Number of active AND inactive service connections:	9	146,212	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 4 — 50.0 psi

COST DATA

Total annual cost of operating water system:	10	$76,015,350	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$2.01	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$175.42	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

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+ Click to add a comment

Water Audit Report for: City of Fresno
Reporting Year: 2018 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	120,065.780	acre-ft/yr	8			acre-ft/yr
Water imported:	n/a		acre-ft/yr				acre-ft/yr
Water exported:	n/a		acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 120,065.780 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	9	110,710.560	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	8	27.129	acre-ft/yr			
Unbilled unmetered:	5	300.164	acre-ft/yr		300.164	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 111,037.853 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 9,027.927 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		300.164	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,118.563	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		276.776	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,695.503 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 7,332.423 acre-ft/yr

WATER LOSSES: 9,027.927 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 9,355.220 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,854.7	miles
Number of active AND inactive service connections:	9	146,608	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	10	53.3	psi

COST DATA

Total annual cost of operating water system:	10	$82,960,821	$/Year	
Customer retail unit cost (applied to Apparent Losses):	10	$2.33	$/1000 litres	
Variable production cost (applied to Real Losses):	5	$178.06	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software: Worksheet

FWAS v6.0

American Water Works Association.

Water Audit Report for: City of Fresno

Audit Year: 2019 | Jan 01 2019 - Dec 31 2019 | Calendar

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	n	g	115,544.090	Acre-ft/Yr	n	g	5.00%	percent	under-registration	VOSEA
WI	Water Imported:	n	g	0.000	Acre-ft/Yr						WIEA
WE	Water Exported:	n	g	0.000	Acre-ft/Yr						WEEA
	WATER SUPPLIED:			121,625.358	Acre-ft/Yr						

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	n	g		106,485.360	Acre-ft/Yr		
BUAC	Billed Unmetered:	n	g		0.000	Acre-ft/Yr		
UMAC	Unbilled Metered:	n	g		52.635	Acre-ft/Yr		
UUAC	Unbilled Unmetered:	n	g	3	266.213	Acre-ft/Yr	0.25%	default
	AUTHORIZED CONSUMPTION:				106,804.208	Acre-ft/Yr		

Default option selected for Unbilled Unmetered, with automatic data grading of 3

WATER LOSSES

14,821.149 Acre-ft/Yr

Apparent Losses

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	3	266.213	Acre-ft/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n	g		1,076.141	Acre-ft/Yr	1.00%	percent	under-registration
UC	Unauthorized Consumption:	n	g	3	266.213	Acre-ft/Yr	0.25%	default	
	Apparent Losses:				1,608.568	Acre-ft/Yr			

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Real Losses

	Real Losses:				13,212.581	Acre-ft/Yr
	WATER LOSSES:				14,821.149	Acre-ft/Yr

NON-REVENUE WATER

	NON-REVENUE WATER:				15,139.998	Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g		1,862.2	miles (including fire hydrant lead lengths)
Nc	Number of service connections:	n	g		147,633	(active *and* inactive)
	Service connection density:				79	conn./mile main

	Are customer meters typically located at the curbstop/property line?				Yes
Lp		n	g	10	

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n	g		50.0	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	$2.33	$/1000 gallons (US)	Total Annual Operating Cost		
VPC	Variable Production Cost:	n	g	$230.95	$/acre-ft	$106,528,917	$/yr (optional input)	

WATER AUDIT DATA VALIDITY TIER:

Click 'g' for 10 parameter(s), then complete all visible data grading questions to enable the Data Validity Score to calculate

go to dashboard

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[^]:		gal/conn/day
Unit Real Losses[=]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

F

DWR Population Tool Output

WUEdata - Fresno City Of

Sign Out

Please print this page to a PDF and include as part of your UWMP submittal.

Confirmation Information

Generated By	Water Supplier Name	Confirmation #	Generated On
Heather Freed	Fresno City Of	8103177726	3/17/2021 12:16:56 PM

Boundary Information

Census Year	Boundary Filename	Internal Boundary ID
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515

Baseline Period Ranges

10 to 15-year baseline period

Number of years in baseline period: 10

Year beginning baseline period range: 1996

Year ending baseline period range[1]: 2005

5-year baseline period

Year beginning baseline period range: 2003

Year ending baseline period range[2]: 2007

[1] The ending year must be between December 31, 2004 and December 31, 2010.

[2] The ending year must be between December 31, 2007 and December 31, 2010.

Persons per Connection

Year	Census Block Level Total Population	Number of Connections *	Persons per Connection
1990	**364,084**		**4.23**
1991	-	-	4.23
1992	-	-	4.24
1993	-	-	4.24
1994	-	-	4.25
1995	-	-	4.26
1996	-	-	4.26
1997	-	-	4.27
1998	-	-	4.27
1999	-	-	4.28
2000	**439,062**	**102476**	**4.28**
2001	-	-	4.29
2002	-	-	4.29
2003	-	-	4.30
2004	-	-	4.30
2005	-	-	4.31
2006	-	-	4.32
2007	-	-	4.32
2008	-	-	4.33
2009	-	-	4.33
2010	**505,315**	**116373**	**4.34**
2011	-	-	4.28
2012	-	-	4.28
2013	-	-	4.28
2014	-	-	4.28
2015	-	-	4.28
2020	**-**	**-**	**4.41 ****

Population Using Persons-Per-Connection

Year		Number of Connections *	Persons per Connection	Total Population
10 to 15 Year Baseline Population Calculations				
Year 1	1996		4.26	
Year 2	1997		4.27	
Year 3	1998		4.27	
Year 4	1999		4.28	
Year 5	2000	102476	4.28	**439,062**
Year 6	2001		4.29	
Year 7	2002		4.29	
Year 8	2003		4.30	
Year 9	2004		4.30	
Year 10	2005		4.31	
5 Year Baseline Population Calculations				
Year 1	2003		4.30	
Year 2	2004		4.30	
Year 3	2005		4.31	
Year 4	2006		4.32	
Year 5	2007		4.32	
2020 Compliance Year Population Calculations				
2020		124862	4.41 **	**550,217**

Hide Print Confirmation

QUESTIONS / ISSUES? CONTACT THE WUEDATA HELP DESK
MWELO QUESTIONS / ISSUES? CONTACT THE MWELO HELP DESK

G

North Kings Subbasin Groundwater Sustainability Plan

Reference the North Kings Subbasin Groundwater Sustainability Plan online: https://www.northkingsgsa.org/groundwater-sustainability-plan/

H

City of Fresno's Central Valley Project Contract

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

LONG-TERM RENEWAL CONTRACT BETWEEN THE UNITED STATES
AND
CITY OF FRESNO
PROVIDING FOR PROJECT WATER SERVICE
FROM FRIANT DIVISION

THIS CONTRACT, made this 18 day of August, 2005, in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between the UNITED STATES OF AMERICA, hereinafter referred to as the United States, and the CITY OF FRESNO, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States has constructed and is operating the Central Valley Project (Project), California, for diversion, storage, carriage, distribution and beneficial use, for flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation, protection and restoration, generation and distribution of electric energy, salinity control, navigation and other beneficial uses, of waters of the Sacramento River, the American River, the Trinity River, and the San Joaquin River and their tributaries; and

[2nd] WHEREAS, the United States constructed Friant Dam (thereby creating Millerton Lake) and the Friant-Kern and Madera Canals, hereinafter collectively referred to as the Friant Division facilities, which will be used in part for the furnishing of water to the Contractor pursuant to the terms of this Contract; and

[3rd] WHEREAS, pursuant to Section 8 of the Act of June 17, 1902 (32 Stat. 388), the United States has acquired water rights and other rights to the flows of the San Joaquin River, including without limitation the permits issued as the result of Decision 935 by the California State Water Resources Control Board and the contracts described in subdivision (n) of Article 3 of this Contract, pursuant to which the Contracting Officer develops, diverts, stores and delivers Project Water stored or flowing through Millerton Lake in accordance with State and Federal law for the benefit of Project Contractors in the Friant Division; and

[3.1] WHEREAS, the water supplied to the Contractor pursuant to this Contract is Project Water developed through the exercise of the rights described in the third Explanatory Recital of this Contract; and

[4th] WHEREAS, the Contractor and the United States entered into Contract No. 14-06-200-8901, which established terms for the delivery to the Contractor of Project Water from the Friant Division from March 1, 1966, to February 28, 2006, hereinafter referred to as the Existing Contract; and

[5th] WHEREAS, the Contractor and the United States have, pursuant to Subsection 3404(c)(3) of the Central Valley Project Improvement Act (CVPIA), subsequently entered into a Binding Agreement identified as Binding Agreement No. 14-06-200-8901-BA, which sets out the terms pursuant to which the Contractor agreed to renew the Existing Contract before its expiration date after completion of the programmatic environmental impact statement and other appropriate environmental documentation and negotiation of a renewal contract, and which also sets out the consequences of a subsequent decision not to renew; and

[6th] WHEREAS, Section 3404(c) of the CVPIA provides for long-term renewal of the Existing Contract following completion of appropriate environmental documentation, including a programmatic environmental impact statement (PEIS) pursuant to the National Environmental Policy Act (NEPA) analyzing the direct and indirect impacts and benefits of implementing the CVPIA and the potential renewal of all existing contracts for Project Water; and

[7th] WHEREAS, the United States has completed the PEIS and all other appropriate environmental review necessary to provide for long-term renewal of the Existing Contract; and

[8th] WHEREAS, the Contractor has requested the long-term renewal of the Existing Contract, pursuant to the terms of the Existing Contract, Federal Reclamation law, and the laws of the State of California, for water service from the Project; and

[9th] WHEREAS, the United States has determined that the Contractor has fulfilled all of its obligations under the Existing Contract; and

[10th] WHEREAS, the Contractor has demonstrated to the satisfaction of the Contracting Officer that the Contractor has utilized the Project Water supplies available to it for reasonable and beneficial use and/or has demonstrated projected future demand for water use such that the Contractor has the capability and expects to utilize fully for reasonable and beneficial use the quantity of Project Water to be made available to it pursuant to this Contract; and

[11th] WHEREAS, water obtained from the Project has been relied upon by urban and agricultural areas within California for more than 50 years, and is considered by the Contractor as an essential portion of its water supply; and

[12th] WHEREAS, the economies of regions within the Project, including the Contractor's, depend upon the continued availability of water, including water service from the Project; and

[13th] WHEREAS, the Secretary intends through coordination, cooperation, and partnerships to pursue measures to improve water supply, water quality, and reliability of the Project for all Project purposes; and

[14th] WHEREAS, the mutual goals of the United States and the Contractor include: to provide for reliable Project Water supplies; to control costs of those supplies; to achieve repayment of the Project as required by law; to guard reasonably against Project Water shortages; to achieve a reasonable balance among competing demands for use of Project Water; and to comply with all applicable environmental statutes, all consistent with the legal obligations of the United States relative to the Project; and

[15th] WHEREAS, the parties intend by this Contract to develop a more cooperative relationship in order to achieve their mutual goals; and

[15.1] WHEREAS, during uncontrolled seasons, Friant Division Project Contractors utilize undependable Class 2 Water in their service areas to, among other things, assist in the management and alleviation of groundwater overdraft in the Friant Division service area, provide opportunities for environmental enhancement, including restoration of the San Joaquin River below Friant Dam, minimize flooding along the San Joaquin River, encourage optimal water management, and maximize the reasonable and beneficial use of the water; and

[15.2] WHEREAS, the parties desire and intend that this Contract not provide a disincentive to the Friant Division Project Contractors continuing to carry out the beneficial activities set out in the Explanatory Recital immediately above; and

[16th] WHEREAS, the United States and the Contractor are willing to enter into this Contract pursuant to Federal Reclamation law on the terms and conditions set forth below;

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby mutually agreed by the parties hereto as follows:

DEFINITIONS

1. When used herein unless otherwise distinctly expressed, or manifestly incompatible with the intent of the parties as expressed in this Contract, the term:

(a) "Calendar Year" shall mean the period January 1 through December 31, both dates inclusive;

(b) "Charges" shall mean the payments required by Federal Reclamation law in addition to the Rates and Tiered Pricing Component specified in this Contract as determined annually by the Contracting Officer pursuant to this Contract;

(b2) "Class 1 Water" shall mean that supply of water stored in or flowing through Millerton Lake which, subject to the contingencies hereinafter described in Articles 3, 11, and 12 of this Contract, will be available for delivery from Millerton Lake and the Friant-Kern and Madera Canals as a dependable water supply during each Year;

(b3) "Class 2 Water" shall mean that supply of water which can be made available subject to the contingencies hereinafter described in Articles 3, 11, and 12 of this Contract for delivery from Millerton Lake and the Friant-Kern and Madera Canals in addition to the supply of Class 1 Water. Because of its uncertainty as to availability and time of occurrence, such water will be undependable in character and will be furnished only if, as, and when it can be made available as determined by the Contracting Officer;

(c) "Condition of Shortage" shall mean a condition respecting the Project during any Year such that the Contracting Officer is unable to deliver sufficient water to meet the Contract Total;

(d) "Contracting Officer" shall mean the Secretary of the Interior's duly authorized representative acting pursuant to this Contract or applicable Federal Reclamation law or regulation;

(e) "Contract Total" shall mean the maximum amount of Class 1 Water, plus the maximum amount of Class 2 Water to which the Contractor is entitled under subdivision (a) of Article 3 of this Contract;

(f) "Contractor's Service Area" shall mean the area to which the Contractor is permitted to provide Project Water under this Contract as described in Exhibit "A" attached hereto, which may be modified from time to time in accordance with Article 35 of this Contract without amendment of this Contract;

(g) "CVPIA" shall mean the Central Valley Project Improvement Act, Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

(h-i) Omitted;

(j) "Full Cost Rate" shall mean an annual rate as determined by the Contracting Officer that shall amortize the expenditures for construction properly allocable to the Project irrigation or M&I functions, as appropriate, of facilities in service including all O&M deficits funded, less payments, over such periods as may be required under Federal Reclamation law or applicable contract provisions. Interest will accrue on both the construction expenditures and funded O&M deficits from October 12, 1982, on costs outstanding at that date, or from the date incurred in the case of costs arising subsequent to October 12, 1982, and shall be calculated in accordance with subsections 202(3)(B) and (3)(C) of the RRA. The Full Cost Rate includes actual operation, maintenance, and replacement costs consistent with Section 426.2 of the Rules and Regulations for the RRA;

(k-l) Omitted;

(m) "Irrigation Water" shall mean water made available from the Project that is used primarily in the production of agricultural crops or livestock, including domestic use incidental thereto, and watering of livestock;

(n) Omitted;

(n2) "Long Term Historic Average" shall mean the average of the final forecast of Water Made Available to the Contractor pursuant to this Contract and the contract referenced in the fourth Explanatory Recital of this Contract;

(o) "Municipal and Industrial (M&I) Water" shall mean Project Water, other than Irrigation Water, made available to the Contractor. M&I Water shall include water used for human use and purposes such as the watering of landscaping or pasture for animals (e.g., horses) which are kept for personal enjoyment or water delivered to land holdings operated in units of less than five acres unless the Contractor establishes to the satisfaction of the Contracting Officer that the use of water delivered to any such landholding is a use described in subdivision (m) of this Article;

(p) "M&I Full Cost Water Rate" shall mean the Full Cost Rate applicable to the delivery of M&I Water;

(q) "Operation and Maintenance" or "O&M" shall mean normal and reasonable care, control, operation, repair, replacement (other than capital replacement), and maintenance of Project facilities;

(r) "Operating Non-Federal Entity" shall mean the Friant Water Authority, its successors or assigns, a non-Federal entity which has the obligation to operate and maintain all or a portion of the Friant Division facilities pursuant to an agreement with the United States, and which may have funding obligations with respect thereto;

(s) "Project" shall mean the Central Valley Project owned by the United States and managed by the Department of the Interior, Bureau of Reclamation;

(t) "Project Contractors" shall mean all parties who have water service contracts for Project Water from the Project with the United States pursuant to Federal Reclamation law;

(u) "Project Water" shall mean all water that is developed, diverted, stored, or delivered by the Secretary in accordance with the statutes authorizing the Project and in accordance with the terms and conditions of water rights acquired pursuant to California law;

(v) "Rates" shall mean the payments determined annually by the Contracting Officer in accordance with the then-current applicable water ratesetting policies for the Project, as described in subdivision (a) of Article 7 of this Contract;

(w) Omitted;

(x) "Secretary" shall mean the Secretary of the Interior, a duly appointed successor, or an authorized representative acting pursuant to any authority of the Secretary and through any agency of the Department of the Interior;

(y) "Tiered Pricing Component" shall be the incremental amount to be paid for each acre-foot of Water Delivered as described in subdivision (j) of Article 7 of this Contract;

(z) "Water Delivered" or "Delivered Water" shall mean Project Water diverted for use by the Contractor at the point(s) of delivery approved by the Contracting Officer;

(aa) "Water Made Available" shall mean the estimated amount of Project Water that can be delivered to the Contractor for the upcoming Year as declared by the Contracting Officer, pursuant to subdivision (a) of Article 4 of this Contract;

(bb) "Water Scheduled" shall mean Project Water made available to the Contractor for which times and quantities for delivery have been established by the Contractor and Contracting Officer, pursuant to subdivision (b) of Article 4 of this Contract; and

(cc) "Year" shall mean the period from and including March 1 of each Calendar Year through the last day of February of the following Calendar Year.

TERM OF CONTRACT

2. (a) This Contract supersedes the Existing Contract and shall be effective on the date first hereinabove written through February 28, 2045. In the event the Contractor wishes to renew this Contract beyond February 28, 2045, the Contractor shall submit a request for renewal in writing to the Contracting Officer no later than two years prior to the date this Contract expires.

(b) Omitted.

(c) Provided the Contractor is complying with all terms and conditions of this Contract and all legal obligations of the Contractor, if any, set forth in an enforceable court order, final judgment and/or settlement relating to restoration of the San Joaquin River, this Contract shall be renewed for successive periods of up to 40 years each, which periods shall be consistent with the then-existing Reclamation-wide policy, under terms and conditions mutually agreeable to the parties and consistent with Federal and State law. The Contractor shall be afforded the opportunity to comment to the Contracting Officer on the proposed adoption and application of any revised policy applicable to the delivery of M&I Water that would limit the term of any subsequent renewal contract with the Contractor for the furnishing of M&I Water to less than 40 years.

(d) The Contracting Officer shall make a determination ten years after the date of execution of this Contract, and every five years thereafter during the term of this Contract, of whether a conversion to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939 can be accomplished. The Contracting Officer anticipates that during the term of this Contract, all authorized Project construction expected to occur will have occurred, and on that basis the Contracting Officer agrees upon such completion to allocate all costs that are properly assignable to the Contractor, and agrees further that, at any time after such allocation is made, and subject to satisfaction of the conditions set out in this subdivision, this Contract shall, at the request of the Contractor, be converted to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939, subject to applicable Federal law and under stated terms and conditions mutually agreeable to the Contractor and the Contracting Officer. A condition for such conversion to occur shall be a determination by the Contracting Officer that, account being taken of the amount credited to return by the Contractor as provided for under Federal Reclamation law, the remaining amount of construction costs assignable for ultimate return by the Contractor can probably be repaid to the United States within the term of a contract under subsection 9(c)(1). If the remaining amount of costs that are properly assignable to the Contractor cannot be determined during the term of this Contract, the Contracting Officer shall notify the Contractor, and provide the reason(s) why such a determination could not be made. Further, the Contracting Officer shall make such a determination as soon thereafter as possible so as to permit, upon request of the Contractor and satisfaction of the conditions set out above, conversion to a contract under subsection 9(c)(1). In the event such determination of costs has not been made at a time which allows conversion of this Contract during the term of this

Contract or the Contractor has not requested conversion of this Contract within such term, the parties shall incorporate in any subsequent renewal contract as described in subdivision (c) of this Article a provision that carries forth in substantially identical terms the provisions of this subdivision.

WATER TO BE MADE AVAILABLE AND DELIVERED TO THE CONTRACTOR

3. (a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 60,000 acre-feet of Class 1 Water for M&I purposes. Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract.

(b) Omitted.

(c) The Contractor shall utilize the Project Water in accordance with all applicable legal requirements.

(d) The Contractor shall make reasonable and beneficial use of all water furnished pursuant to this Contract. Groundwater recharge programs (direct, indirect, or in lieu), groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted within the Contractor's Service Area which are consistent with applicable State law and result in use consistent with Federal Reclamation law will be allowed: Provided, That any direct recharge program(s) is (are) described in the Contractor's water conservation plan submitted pursuant to Article 26 of this Contract: Provided further, That such water conservation plan demonstrates sufficient lawful uses exist in the

Contractor's Service Area so that using a long-term average, the quantity of Delivered Water is demonstrated to be reasonable for such uses and in compliance with Federal Reclamation law. Groundwater recharge programs, groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted outside the Contractor's Service Area may be permitted upon written approval of the Contracting Officer, which approval will be based upon environmental documentation, Project Water rights, and Project operational concerns. The Contracting Officer will address such concerns in regulations, policies, or guidelines.

(e) The Contractor shall comply with requirements applicable to the Contractor in biological opinion(s) prepared as a result of a consultation regarding the execution of this Contract undertaken pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, that are within the Contractor's legal authority to implement. The Existing Contract, which evidences in excess of 39 years of diversions for M&I purposes of the quantities of water provided in subdivision (a) of Article 3 of this Contract, will be considered in developing an appropriate baseline for the biological assessment(s) prepared pursuant to the ESA, and any other needed environmental review. Nothing herein shall be construed to prevent the Contractor from challenging or seeking judicial relief in a court of competent jurisdiction with respect to any biological opinion or other environmental documentation referred to in this Article.

(f) Subject to subdivisions (l) and (n) of Article 3 of this Contract, following the declaration of Water Made Available under Article 4 of this Contract, the Contracting Officer will make a determination whether Project Water, or other water available to the Project, can be made

available to the Contractor in addition to the Contract Total under Article 3 of this Contract during the Year without adversely impacting other Project Contractors. At the request of the Contractor, the Contracting Officer will consult with the Contractor prior to making such a determination. Subject to subdivisions (l) and (n) of Article 3 of this Contract, if the Contracting Officer determines that Project Water, or other water available to the Project, can be made available to the Contractor, the Contracting Officer will announce the availability of such water and shall so notify the Contractor as soon as practicable. The Contracting Officer will thereafter meet with the Contractor and other Project Contractors capable of taking such water to determine the most equitable and efficient allocation of such water. If the Contractor requests the delivery of any quantity of such water, the Contracting Officer shall make such water available to the Contractor in accordance with applicable statutes, regulations, guidelines, and policies.

(g) The Contractor may request permission to reschedule for use during the subsequent Year some or all of the Water Made Available to the Contractor during the current Year referred to as "carryover." The Contractor may request permission to use during the current Year a quantity of Project Water which may be made available by the United States to the Contractor during the subsequent Year referred to as "preuse." The Contracting Officer's written approval may permit such uses in accordance with applicable statutes, regulations, guidelines, and policies.

(h) The Contractor's right pursuant to Federal Reclamation law and applicable State law to the reasonable and beneficial use of Water Delivered pursuant to this Contract during the term thereof and any subsequent renewal contracts, as described in Article 2 of this Contract, during the terms thereof shall not be disturbed so long as the Contractor shall fulfill all of its obligations

under this Contract and any renewals thereof. Nothing in the preceding sentence shall affect the Contracting Officer's ability to impose shortages under Article 11 or subdivision (b) of Article 12 of this Contract or applicable provisions of any subsequent renewal contracts.

(i) Project Water furnished to the Contractor pursuant to this Contract may be delivered for other than M&I purposes upon written approval by the Contracting Officer in accordance with the terms and conditions of such approval.

(j) The Contracting Officer shall make reasonable efforts to protect the water rights and other rights described in the third Explanatory Recital of this Contract necessary for the Project and to provide the water available under this Contract. The Contracting Officer shall not object to participation by the Contractor, in the capacity and to the extent permitted by law, in administrative proceedings related to the water rights and other rights described in the third Explanatory Recital of this Contract: Provided, That the Contracting Officer retains the right to object to the substance of the Contractor's position in such a proceeding: Provided further, That in such proceedings the Contracting Officer shall recognize the Contractor has a legal right under the terms of this Contract to use Project Water.

(k) Project Water furnished to the Contractor during any month designated in a schedule or revised schedule submitted by the Contractor and approved by the Contracting Officer shall be deemed to have been accepted by the Contractor as Class 1 Water to the extent that Class 1 Water is called for in such schedule for such month and shall be deemed to have been accepted as Class 2 Water to the extent Class 2 Water is called for in such schedule for such month. If in any month the Contractor diverts a quantity of water in addition to the total amount of Class 1 Water and

Class 2 Water set forth in the Contractor's approved schedule or revised schedule for such month, such additional diversions shall be charged first against the Contractor's remaining Class 2 Water supply available in the current Year. To the extent the Contractor's remaining Class 2 Water supply available in the current Year is not sufficient to account for such additional diversions, such additional diversions shall be charged against the Contractor's remaining Class 1 Water supply available in the current Year. To the extent the Contractor's remaining Class 1 Water and Class 2 Water supplies available in the current Year are not sufficient to account for such additional diversions, such additional diversions shall be charged first against the Contractor's available Class 2 Water supply and then against the Contractor's available Class 1 Water supply, both for the following Year. Payment for all additional diversions of water shall be made in accordance with Article 7 of this Contract.

(l) If the Contracting Officer determines there is a Project Water supply available at Friant Dam as the result of an unusually large water supply not otherwise storable for Project purposes or infrequent and otherwise unmanaged flood flows of short duration, such water will be made available to the Contractor and others under Section 215 of the RRA pursuant to the priorities specified below if the Contractor enters into a temporary contract with the United States not to exceed one year for the delivery of such water or, as otherwise provided for in Federal Reclamation law and associated regulations. Such water may be identified by the Contractor either (i) as additional water to supplement the supply of Class 1 Water and/or Class 2 Water made available to it pursuant to this Contract or, (ii) upon written notification to the Contracting Officer, as water to be credited against the Contractor's Class 2 Water supply available pursuant to this Contract. The Contracting Officer

shall make water determined to be available pursuant to this subsection according to the following priorities: first, to long-term contractors for Class 1 Water and/or Class 2 Water within the Friant Division; second, to long-term contractors in the Cross Valley Division of the Project. The Contracting Officer will consider and seek to accommodate requests from other parties for Section 215 Water for use within the area identified as the Friant Division service area in the environmental assessment developed in connection with the execution of this Contract.

(m) Nothing in this Contract, nor any action or inaction of the Contractor or Contracting Officer in connection with the implementation of this Contract, is intended to override, modify, supersede, or otherwise interfere with any term or condition of the water rights and other rights referred in the third Explanatory Recital of this Contract.

(n) The rights of the Contractor under this Contract are subject to the terms of the contract for exchange waters, dated July 27, 1939, between the United States and the San Joaquin and Kings River Canal and Irrigation Company, Incorporated, et al., (hereinafter referred to as the Exchange Contractors), Contract No. I1r-1144, as amended. The United States agrees that it will not deliver to the Exchange Contractors thereunder waters of the San Joaquin River unless and until required by the terms of said contract, and the United States further agrees that it will not voluntarily and knowingly determine itself unable to deliver to the Exchange Contractors entitled thereto from water that is available or that may become available to it from the Sacramento River and its tributaries or the Sacramento-San Joaquin Delta those quantities required to satisfy the obligations of the United States under said Exchange Contract and under Schedule 2 of the Contract for Purchase of Miller and Lux Water Rights (Contract No. I1r-1145, dated July 27, 1939).

TIME FOR DELIVERY OF WATER

4. (a) On or about February 20 of each Calendar Year, the Contracting Officer shall announce the Contracting Officer's expected declaration of the Water Made Available. Such declaration will be expressed in terms of both Water Made Available and the Long Term Historic Average and will be updated monthly, and more frequently if necessary, based on then-current operational and hydrologic conditions and a new declaration with changes, if any, to the Water Made Available will be made. The Contracting Officer shall provide forecasts of Project operations and the basis of the estimate, with relevant supporting information, upon the written request of the Contractor. Concurrently with the declaration of the Water Made Available, the Contracting Officer shall provide the Contractor with the updated Long-Term Historic Average.

(b) On or before each March 1 and at such other times as necessary, the Contractor shall submit to the Contracting Officer a written schedule, satisfactory to the Contracting Officer, showing the monthly quantities of Project Water to be delivered by the United States to the Contractor pursuant to this Contract for the Year commencing on such March 1. The Contracting Officer shall use all reasonable means to deliver Project Water according to the approved schedule for the Year commencing on such March 1.

(c) The Contractor shall not schedule Project Water in excess of the quantity of Project Water the Contractor intends to put to reasonable and beneficial use within the Contractor's Service Area or to sell, transfer, or exchange pursuant to Article 9 of this Contract during any Year.

(d) Subject to the conditions set forth in subdivision (a) of Article 3 of this Contract, the United States shall deliver Project Water to the Contractor in accordance with the initial

schedule submitted by the Contractor pursuant to subdivision (b) of this Article, or any written revision(s), satisfactory to the Contracting Officer, thereto submitted within a reasonable time prior to the date(s) on which the requested change(s) is/are to be implemented: Provided, That the total amount of water requested in that schedule or revision does not exceed the quantities announced by the Contracting Officer pursuant to the provisions of subdivision (a) of Article 3, and the Contracting Officer determines that there will be sufficient capacity available in the appropriate Friant Division facilities to deliver the water in accordance with that schedule: Provided further, That the Contractor shall not schedule the delivery of any water during any period as to which the Contractor is notified by the Contracting Officer or Operating Non-Federal Entity that Project facilities required to make deliveries to the Contractor will not be in operation because of scheduled O&M.

(e) The Contractor may, during the period from and including November 1 of each Year through and including the last day of February of that Year, request delivery of any amount of the Class 1 Water estimated by the Contracting Officer to be made available to it during the following Year. The Contractor may, during the period from and including January 1 of each Year (or such earlier date as may be determined by the Contracting Officer) through and including the last day of February of that Year, request delivery of any amount of Class 2 Water estimated by the Contracting Officer to be made available to it during the following Year. Such water shall hereinafter be referred to as preuse water. Such request must be submitted in writing by the Contractor for a specified quantity of preuse water and shall be subject to the approval of the Contracting Officer. Payment for preuse water so requested shall be at the appropriate rate(s) for the following Year in accordance with Article 7 of this Contract and shall be made in advance of delivery of any preuse water. The

Contracting Officer shall deliver such preuse water in accordance with a schedule or any revision thereof submitted by the Contractor and approved by the Contracting Officer, to the extent such water is available and to the extent such deliveries will not interfere with the delivery of Project Water entitlements to other Friant Division contractors or the physical maintenance of the Project facilities. The quantities of preuse water delivered pursuant to this subdivision shall be deducted from the quantities of water that the Contracting Officer would otherwise be obligated to make available to the Contractor during the following Year: Provided, That the quantity of preuse water to be deducted from the quantities of either Class 1 Water or Class 2 Water to be made available to the Contractor in the following Year shall be specified by the Contractor at the time the preuse water is requested or as revised in its first schedule for the following Year submitted in accordance with subdivision (b) of this Article, based on the availability of the following Year water supplies as determined by the Contracting Officer.

POINT OF DIVERSION AND RESPONSIBILITY FOR DISTRIBUTION OF WATER

5. (a) Project Water scheduled pursuant to subdivision (b) of Article 4 of this Contract shall be delivered to the Contractor at a point or points of delivery either on Project facilities or another location or locations mutually agreed to in writing by the Contracting Officer and the Contractor.

(b) The Contracting Officer, either directly or through its written agreement(s) with the Operating Non-Federal Entity, shall make all reasonable efforts to maintain sufficient flows and levels of water in the Friant-Kern Canal to deliver Project Water to the Contractor at specific turnouts established pursuant to subdivision (a) of this Article.

(c) The Contractor shall not deliver Project Water to land outside the Contractor's Service Area unless approved in advance by the Contracting Officer.

(d) All Water Delivered to the Contractor pursuant to this Contract shall be measured and recorded with equipment furnished, installed, operated, and maintained by the United States or the Operating Non-Federal Entity at the point or points of delivery established pursuant to subdivision (a) of this Article. Upon the request of either party to this Contract, the Contracting Officer shall investigate, or cause to be investigated by the appropriate Operating Non-Federal Entity, the accuracy of such measurements and shall take any necessary steps to adjust any errors appearing therein. For any period of time when accurate measurements have not been made, the Contracting Officer shall consult with the Contractor and the responsible Operating Non-Federal Entity prior to making a final determination of the quantity delivered for that period of time.

(e) Neither the Contracting Officer nor any Operating Non-Federal Entity shall be responsible for the control, carriage, handling, use, disposal, or distribution of Water Delivered to the Contractor pursuant to this Contract beyond the delivery points specified in subdivision (a) of this Article. The Contractor shall indemnify the United States, its officers, employees, agents, and assigns on account of damage or claim of damage of any nature whatsoever for which there is legal responsibility, including property damage, personal injury, or death arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such Project Water Delivered beyond such delivery points, except for any damage or claim arising out of: (i) acts or omissions of the Contracting Officer or any of its officers, employees, agents, or assigns, including the Operating Non-Federal Entity, with the intent of creating the situation resulting in any damage or claim;

(ii) willful misconduct of the Contracting Officer or any of its officers, employees, agents, or assigns, including the Operating Non-Federal Entity; (iii) negligence of the Contracting Officer or any of its officers, employees, agents, or assigns including the Operating Non-Federal Entity; or (iv) damage or claims resulting from a malfunction of facilities owned and/or operated by the United States or responsible Operating Non-Federal Entity.

MEASUREMENT OF WATER WITHIN THE CONTRACTOR'S SERVICE AREA

6. (a) Within five years of the date of Contract execution, the Contractor will have an established measuring program satisfactory to the Contracting Officer. The Contractor shall ensure that all surface water delivered for M&I purposes is measured at each M&I service connection. The water measuring devices or water measuring methods of comparable effectiveness must be acceptable to the Contracting Officer. The Contractor shall be responsible for installing, operating, and maintaining and repairing all such measuring devices and implementing all such water measuring methods at no cost to the United States. The Contracting Officer acknowledges that the Contractor has a metering plan (Exhibit "C") setting forth the milestones and schedule that the Contractor will implement to comply with the requirements of this Article. Beginning January 2006, the Contractor shall provide an annual written report to the Contracting Officer describing the Contractor's metering plan implementation progress. The Contractor shall use the information obtained from such water measuring devices or water measuring methods to ensure its proper management of the water, to bill water users for water delivered by the Contractor; and, if applicable, to record water delivered for M&I purposes by customer class as defined in the Contractor's water conservation plan provided for in Article 26 of this Contract. Nothing herein contained, however, shall preclude the Contractor from

establishing and collecting any charges, assessments, or other revenues authorized by California law. The Contractor shall include a summary of all its annual surface water deliveries in the annual report described in subdivision (c) of Article 26.

(b) To the extent the information has not otherwise been provided, upon execution of this Contract, the Contractor shall provide to the Contracting Officer a written report describing the measurement devices or water measuring methods being used or to be used to implement subdivision (a) of this Article and identifying the M&I service connections or alternative measurement programs approved by the Contracting Officer, at which such measurement devices or water measuring methods are being used, and, if applicable, identifying the locations at which such devices and/or methods are not yet being used including a time schedule for implementation at such locations. The Contracting Officer shall advise the Contractor in writing within 60 days as to the adequacy, and necessary modifications, if any, of the measuring devices or water measuring methods identified in the Contractor's report and if the Contracting Officer does not respond in such time, they shall be deemed adequate. If the Contracting Officer notifies the Contractor that the measuring devices or methods are inadequate, the parties shall within 60 days following the Contracting Officer's response, negotiate in good faith the earliest practicable date by which the Contractor shall modify said measuring devices and/or measuring methods as required by the Contracting Officer to ensure compliance with subdivision (a) of this Article.

(c) All new surface water delivery systems installed within the Contractor's Service Area after the effective date of this Contract shall also comply with the measurement provisions described in subdivision (a) of this Article.

(d) The Contractor shall inform the Contracting Officer and the State of California in writing by April 30 of each Year of the monthly volume of surface water delivered within the Contractor's Service Area during the previous Year.

(e) The Contractor shall inform the Contracting Officer and the Operating Non-Federal Entity on or before the 20th calendar day of each month of the quantity of M&I Water taken during the preceding month.

(f) In the event the provisions of subdivision (a) of this Article or any portion thereof, are challenged in a judicial proceeding, the parties agree to meet and confer promptly and as often as necessary to employ their reasonable best efforts to coordinate their response to the challenge and, as appropriate, develop revisions to this Contract.

RATES AND METHOD OF PAYMENT FOR WATER

7. (a) The Contractor shall pay the United States as provided in this Article for all Delivered Water at Rates, Charges, and the Tiered Pricing Component established in accordance with (i) the Secretary's then-existing ratesetting policy for M&I Water. Such ratesetting policies shall be amended, modified, or superseded only through a public notice and comment procedure; (ii) applicable Federal Reclamation law and associated rules and regulations, or policies; and (iii) other applicable provisions of this Contract. Payments shall be made by cash transaction, electronic funds transfer, or any other mechanism as may be agreed to in writing by the Contractor and the Contracting Officer. The Rates, Charges, and Tiered Pricing Component applicable to the Contractor upon execution of this Contract are set forth in Exhibit "B", as may be revised annually.

(b) The Contracting Officer shall notify the Contractor of the Rates, Charges, and Tiered Pricing Component as follows:

(1) Prior to July 1 of each Calendar Year, the Contracting Officer shall provide the Contractor an estimate of the Charges for Project Water that will be applied to the period October 1, of the current Calendar Year, through September 30, of the following Calendar Year, and the basis for such estimate. The Contractor shall be allowed not less than two months to review and comment on such estimates. On or before September 15 of each Calendar Year, the Contracting Officer shall notify the Contractor in writing of the Charges to be in effect during the period October 1 of the current Calendar Year, through September 30, of the following Calendar Year, and such notification shall revise Exhibit "B."

(2) Prior to October 1 of each Calendar Year, the Contracting Officer shall make available to the Contractor an estimate of the Rates and Tiered Pricing Component for Project Water for the following Year and the computations and cost allocations upon which those Rates are based. The Contractor shall be allowed not less than two months to review and comment on such computations and cost allocations. By December 31 of each Calendar Year, the Contracting Officer shall provide the Contractor with the final Rates and Tiered Pricing Component to be in effect for the upcoming Year, and such notification shall revise Exhibit "B."

(c) At the time the Contractor submits the initial schedule for the delivery of Project Water for each Year pursuant to subdivision (b) of Article 4 of this Contract, the Contractor shall make an advance payment to the United States equal to the total amount payable pursuant to the applicable Rate(s) set under subdivision (a) of this Article, for the Project Water scheduled to be

delivered pursuant to this Contract during the first two calendar months of the Year. Before the end of the first month and before the end of each calendar month thereafter, the Contractor shall make an advance payment to the United States, at the Rate(s) set under subdivision (a) of this Article, for the Water Scheduled to be delivered pursuant to this Contract during the second month immediately following. Adjustments between advance payments for Water Scheduled and payments at Rates due for Water Delivered shall be made before the end of the following month: Provided, That any revised schedule submitted by the Contractor pursuant to Article 4 of this Contract which increases the amount of Water Delivered pursuant to this Contract during any month shall be accompanied with appropriate advance payment, at the Rates then in effect, to assure that Project Water is not delivered to the Contractor in advance of such payment. In any month in which the quantity of Water Delivered to the Contractor pursuant to this Contract equals the quantity of Water Scheduled and paid for by the Contractor, no additional Project Water shall be delivered to the Contractor unless and until an advance payment at the Rates then in effect for such additional Project Water is made. Final adjustment between the advance payments for the Water Scheduled and payments for the quantities of Water Delivered during each Year pursuant to this Contract shall be made as soon as practicable but no later than April 30th of the following Year, or 60 days after the delivery of Project Water carried over under subdivision (g) of Article 3 of this Contract if such water is not delivered by the last day of February.

(d) The Contractor shall also make a payment in addition to the Rate(s) in subdivision (c) of this Article to the United States for Water Delivered, at the Charges and the appropriate Tiered Pricing Component then in effect, before the end of the month following the

month of delivery. The payments shall be consistent with the quantities of M&I Water Delivered as shown in the water delivery report for the subject month prepared by the Operating Non-Federal Entity or, if there is no Operating Non-Federal Entity, by the Contracting Officer. Such water delivery report shall be the basis for payment of Charges and Tiered Pricing Component by the Contractor, and shall be provided to the Contractor by the Operating Non-Federal Entity or the Contracting Officer (as applicable) within five days after the end of the month of delivery. The water delivery report shall be deemed a bill for the payment of Charges and the applicable Tiered Pricing Component for Water Delivered. Adjustment for overpayment or underpayment of Charges shall be made through the adjustment of payments due to the United States for Charges for the next month. Any amount to be paid for past due payment of Charges and the Tiered Pricing Component shall be computed pursuant to Article 20 of this Contract.

(e) The Contractor shall pay for any Water Delivered under subdivision (a), (f), or (g) of Article 3 of this Contract as determined by the Contracting Officer pursuant to applicable statutes, associated regulations, any applicable provisions of guidelines or ratesetting policies: Provided, That the Rate for Water Delivered under subdivision (f) of Article 3 of this Contract shall be no more than the otherwise applicable Rate for M&I Water under subdivision (a) of this Article.

(f) Payments to be made by the Contractor to the United States under this Contract may be paid from any revenues available to the Contractor.

(g) All revenues received by the United States from the Contractor relating to the delivery of Project Water or the delivery of non-Project water through Project facilities shall be

allocated and applied in accordance with Federal Reclamation law and the associated rules or regulations, and the then-current Project ratesetting policies for M&I Water.

(h) The Contracting Officer shall keep its accounts pertaining to the administration of the financial terms and conditions of its long-term contracts, in accordance with applicable Federal standards, so as to reflect the application of Project costs and revenues. The Contracting Officer shall, each Year upon request of the Contractor, provide to the Contractor a detailed accounting of all Project and Contractor expense allocations, the disposition of all Project and Contractor revenues, and a summary of all water delivery information. The Contracting Officer and the Contractor shall enter into good faith negotiations to resolve any discrepancies or disputes relating to accountings, reports, or information.

(i) The parties acknowledge and agree that the efficient administration of this Contract is their mutual goal. Recognizing that experience has demonstrated that mechanisms, policies, and procedures used for establishing Rates, Charges, and Tiered Pricing Components, and/or for making and allocating payments, other than those set forth in this Article may be in the mutual best interest of the parties, it is expressly agreed that the parties may enter into agreements to modify the mechanisms, policies, and procedures for any of those purposes while this Contract is in effect without amending this Contract.

(j) (1) Beginning at such time as the total of the deliveries of Class 1 Water and Class 2 Water in a Year exceed 80 percent of the Contract Total, then before the end of the month following the month of delivery the Contractor shall make an additional payment to the United States equal to the applicable Tiered Pricing Component. The Tiered Pricing Component for the total of the

deliveries of Class 1 Water and Class 2 Water in excess of 80 percent of the Contract Total, but less than or equal to 90 percent of the Contract Total, shall equal one-half of the difference between the Rate established under subdivision (a) of this Article and the M&I Full Cost Water Rate. The Tiered Pricing Component for the total of the deliveries of Class 1 Water and Class 2 Water which exceeds 90 percent of the Contract total shall equal the difference between (i) the Rate established under subdivision (a) of this Article and (ii) the M&I Full Cost Water Rate.

(2) Omitted.

(3) For purposes of determining the applicability of the Tiered Pricing Component pursuant to this Article, Water Delivered shall include Project Water that the Contractor transfers to others but shall not include Project Water transferred and delivered to the Contractor.

(k) For the term of this Contract, Rates under the respective ratesetting policies will be established to recover only reimbursable O&M (including any deficits) and capital costs of the Project, as those terms are used in the then-current Project ratesetting policies, and interest, where appropriate, except in instances where a minimum Rate is applicable in accordance with the relevant Project ratesetting policy. Changes of significance in practices which implement the Contracting Officer's ratesetting policies will not be implemented until the Contracting Officer has provided the Contractor an opportunity to discuss the nature, need, and impact of the proposed change.

(l) Except as provided in subsections 3405(a)(1)(B) and 3405(f) of the CVPIA, the Rates for Project Water transferred by the Contractor shall be the Contractor's Rates adjusted upward or downward to reflect the changed costs, if any, incurred by the Contracting Officer in the

delivery of the transferred Project Water to the transferee's point of delivery in accordance with the then-applicable Project ratesetting policy.

(m) Omitted.

(n) Omitted.

8. Omitted.

SALES, TRANSFERS, OR EXCHANGES OF WATER

9. (a) The right to receive Project Water provided for in this Contract may be sold, transferred, or exchanged to others for reasonable and beneficial uses within the State of California if such sale, transfer, or exchange is authorized by applicable Federal and State laws, and applicable guidelines or regulations then in effect. No sale, transfer, or exchange of Project Water under this Contract may take place without the prior written approval of the Contracting Officer, except as provided for in subdivision (b) of this Article, and no such sales, transfers, or exchanges shall be approved absent all appropriate environmental documentation including, but not limited to, documents prepared pursuant to the NEPA and ESA. Such environmental documentation should include, as appropriate, an analysis of groundwater impacts and economic and social effects, including environmental justice, of the proposed water transfers on both the transferor and transferee.

(b) In order to facilitate efficient water management by means of water transfers of the type historically carried out among Project Contractors located within the same geographical area and to allow the Contractor to participate in an accelerated water transfer program during the term of this Contract, the Contracting Officer shall prepare, as appropriate, all necessary environmental

documentation including, but not limited to, documents prepared pursuant to NEPA and ESA, analyzing annual transfers within such geographical areas, and the Contracting Officer shall determine whether such transfers comply with applicable law. Following the completion of the environmental documentation, such transfers addressed in such documentation shall be conducted with advance notice to the Contracting Officer, but shall not require prior written approval by the Contracting Officer. Such environmental documentation and the Contracting Officer's compliance determination shall be reviewed every five years and updated, as necessary, prior to the expiration of the then-existing five-year period. All subsequent environmental documentation shall include an alternative to evaluate not less than the quantity of Project Water historically transferred within the same geographical area.

(c) For a water transfer to qualify under subdivision (b) of this Article, such water transfer must: (i) be for irrigation purposes for lands irrigated within the previous three years, for M&I use, groundwater recharge, water banking, or fish and wildlife resources; not lead to land conversion; and be delivered to established cropland, wildlife refuges, groundwater basins or M&I use; (ii) occur within a single Year; (iii) occur between a willing seller and a willing buyer; (iv) convey water through existing facilities with no new construction or modifications to facilities and be between existing Project Contractors and/or the Contractor and the United States, Department of the Interior; and (v) comply with all applicable Federal, State, and local or tribal laws and requirements imposed for protection of the environment and Indian Trust Assets, as defined under Federal law.

APPLICATION OF PAYMENTS AND ADJUSTMENTS

10. (a) The amount of any overpayment by the Contractor of the Contractor's O&M, capital, and deficit (if any) obligations for the Year shall be applied first to any current liabilities of the Contractor arising out of this Contract then due and payable. Overpayments of more than $1,000 shall be refunded at the Contractor's request. In lieu of a refund, any amount of such overpayment, at the option of the Contractor, may be credited against amounts to become due to the United States by the Contractor. With respect to overpayment, such refund or adjustment shall constitute the sole remedy of the Contractor or anyone having or claiming to have the right to the use of any of the Project Water supply provided for herein. All credits and refunds of overpayments shall be made within 30 days of the Contracting Officer obtaining direction as to how to credit or refund such overpayment in response to the notice to the Contractor that it has finalized the accounts for the Year in which the overpayment was made.

(b) All advances for miscellaneous costs incurred for work requested by the Contractor pursuant to Article 25 of this Contract shall be adjusted to reflect the actual costs when the work has been completed. If the advances exceed the actual costs incurred, the difference will be refunded to the Contractor. If the actual costs exceed the Contractor's advances, the Contractor will be billed for the additional costs pursuant to Article 25.

TEMPORARY REDUCTIONS--RETURN FLOWS

11. (a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make

all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract.

(b) The Contracting Officer or Operating Non-Federal Entity may temporarily discontinue or reduce the quantity of Water Delivered to the Contractor as herein provided for the purposes of investigation, inspection, maintenance, repair, or replacement of any of the Project facilities or any part thereof necessary for the delivery of Project Water to the Contractor, but so far as feasible the Contracting Officer or Operating Non-Federal Entity will give the Contractor due notice in advance of such temporary discontinuance or reduction, except in case of emergency, in which case no notice need be given: Provided, That the United States shall use its best efforts to avoid any discontinuance or reduction in such service. Upon resumption of service after such reduction or discontinuance, and if requested by the Contractor, the United States will, if possible, deliver the quantity of Project Water which would have been delivered hereunder in the absence of such discontinuance or reduction.

(c) The United States reserves the right to all seepage and return flow water derived from Water Delivered to the Contractor hereunder which escapes or is discharged beyond the Contractor's Service Area: Provided, That this shall not be construed as claiming for the United States any right to seepage or return flow being put to reasonable and beneficial use pursuant to this Contract within the Contractor's Service Area by the Contractor or those claiming by, through, or under the Contractor.

CONSTRAINTS ON THE AVAILABILITY OF WATER

12. (a) In its operation of the Project, the Contracting Officer will use all reasonable means to guard against a Condition of Shortage in the quantity of water to be made available to the Contractor pursuant to this Contract. In the event the Contracting Officer determines that a Condition of Shortage appears probable, the Contracting Officer will notify the Contractor of said determination as soon as practicable.

(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer, or actions taken by the Contracting Officer to meet legal obligations then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom.

(c) The United States shall not execute contracts which together with this Contract, shall in the aggregate provide for furnishing during the life of this Contract or any renewals hereof Class 1 Water in excess of 800,000 acre-feet per Year or Class 2 Water in excess of 1,401,475 acre-feet per Year: Provided, That, subject to subdivision (l) of Article 3 of this Contract, the limitation placed on Class 2 Water contracts shall not prohibit the United States from entering into temporary contracts of one year or less in duration for delivery of Project Water to other entities if such water is not necessary to meet the schedules as may be submitted by all Friant Division long-term water service contractors entitled to receive Class 1 Water and/or Class 2 Water under their water service contracts. Nothing in this subdivision shall limit the Contracting Officer's ability to take actions that result in the availability of new water supplies to be used for Project purposes and

allocating such new supplies: Provided, That the Contracting Officer shall not take such actions until after consultation with the Friant Division Project Contractors.

(d) The Contracting Officer shall not deliver any Class 2 Water pursuant to this or any other contract for water service heretofore or hereafter entered into any Year unless and until the Contracting Officer determines that the cumulative total quantity of Class 1 Water specified in subdivision (c) of this Article will be available for delivery in said Year. If the Contracting Officer determines there is or will be a shortage in any Year in the quantity of Class 1 Water available for delivery, the Contracting Officer shall apportion the available Class 1 Water among all contractors entitled to receive such water that will be made available at Friant Dam in accordance with the following:

(1) A determination shall be made of the total quantity of Class 1 Water at Friant Dam which is available for meeting Class 1 Water contractual commitments, the amount so determined being herein referred to as the available supply.

(2) The total available Class 1 supply shall be divided by the Class 1 Water contractual commitments, the quotient thus obtained being herein referred to as the Class 1 apportionment coefficient.

(3) The total quantity of Class 1 Water under Article 3 of this Contract shall be multiplied by the Class 1 apportionment coefficient and the result shall be the quantity of Class 1 Water required to be delivered by the Contracting Officer to the Contractor for the respective Year, but in no event shall such amount exceed the total quantity of Class 1 Water specified in subdivision (a) of Article 3 of this Contract.

(e) If the Contracting Officer determines there is less than the quantity of Class 2 Water which the Contractor otherwise would be entitled to receive pursuant to Article 3 of this Contract, the quantity of Class 2 Water which shall be furnished to the Contractor by the Contracting Officer will be determined in the manner set forth in paragraphs (1), (2), and (3), of subdivision (d) of this Article substituting the term "Class 2" for the term "Class 1."

(f) In the event that in any Year there is made available to the Contractor, by reason of any shortage or apportionment as provided in subdivisions (a), (d), or (e) of this Article, or any discontinuance or reduction of service as set forth in subdivision (b) of Article 11 of this Contract, less than the quantity of water which the Contractor otherwise would be entitled to receive hereunder, there shall be made an adjustment on account of the amounts already paid to the Contracting Officer by the Contractor for Class 1 Water and Class 2 Water for said Year in accordance with Article 10 of this Contract.

13. Omitted.

RULES AND REGULATIONS

14. (a) The parties agree that the delivery of Project Water or use of Federal facilities pursuant to this Contract is subject to Federal Reclamation law, as amended and supplemented, and the rules and regulations promulgated by the Secretary of the Interior under Federal Reclamation law.

(b) The terms of this Contract are subject to any enforceable order, judgment, and/or settlement in NRDC v. Patterson, No. CIVS 88-1658-LKK-EM and shall be timely modified as necessary to effectuate or facilitate any final order, judgment, or settlement in said litigation.

(c) Omitted.

WATER AND AIR POLLUTION CONTROL

15. The Contractor, in carrying out this Contract, shall comply with all applicable water and air pollution laws and regulations of the United States and the State of California, and shall obtain all required permits or licenses from the appropriate Federal, State, or local authorities.

QUALITY OF WATER

16. (a) Project facilities used to deliver Project Water to the Contractor pursuant to this Contract shall be operated and maintained to enable the United States to deliver Project Water to the Contractor in accordance with the water quality standards specified in subsection 2(b) of the Act of August 26, 1937 (50 Stat. 865), as added by Section 101 of the Act of October 27, 1986 (100 Stat. 3050) or other existing Federal laws. The United States is under no obligation to construct or furnish water treatment facilities to maintain or to improve the quality of Water Delivered to the Contractor pursuant to this Contract. The United States does not warrant the quality of Water Delivered to the Contractor pursuant to this Contract.

(b) The O&M of Project facilities shall be performed in such manner as is practicable to maintain the quality of raw water made available through such facilities at the highest level reasonably attainable as determined by the Contracting Officer. The Contractor shall be responsible for compliance with all State and Federal water quality standards applicable to surface and subsurface agricultural drainage discharges generated through the use of Federal or Contractor facilities or Project Water provided by the Contractor within the Contractor's Service Area.

WATER ACQUIRED BY THE CONTRACTOR OTHER THAN FROM THE UNITED STATES

17. (a) Omitted.

(b) Water or water rights now owned or hereafter acquired by the Contractor, other than from the United States, may be stored, conveyed, and/or diverted through Project facilities, subject to the completion of appropriate environmental documentation, with the approval of the Contracting Officer and the execution of any contract determined by the Contracting Officer to be necessary, consistent with the following provisions:

(1) The Contractor may introduce non-Project water into Project facilities and deliver said water within the Contractor's Service Area subject to payment to the United States and/or to any applicable Operating Non-Federal Entity of an appropriate rate as determined by the applicable Project ratesetting policy, the RRA, and the Project use power policy, if such Project use power policy is applicable, each as amended, modified, or superseded from time to time.

(2) Delivery of such non-Project water in and through Project facilities shall only be allowed to the extent such deliveries do not: (i) interfere with other Project purposes as determined by the Contracting Officer; (ii) reduce the quantity or quality of water available to other Project Contractors; (iii) interfere with the delivery of contractual water entitlements to any other Project Contractors; or (iv) interfere with the physical maintenance of the Project facilities.

(3) Neither the United States nor the Operating Non-Federal Entity shall be responsible for control, care, or distribution of the non-Project water before it is introduced into or after it is delivered from the Project facilities. The Contractor hereby releases and agrees to defend

and indemnify the United States and the Operating Non-Federal Entity, and their respective officers, agents, and employees, from any claim for damage to persons or property, direct or indirect, resulting from the acts of the Contractor its officers', employees', agents', or assigns' act(s) in (i) extracting or diverting non-Project water from any source, or (ii) diverting such non-Project water into Project facilities.

(4) Diversion of such non-Project water into Project facilities shall be consistent with all applicable laws, and if involving groundwater, consistent with any groundwater management plan for the area from which it was extracted.

(5) After Project purposes are met, as determined by the Contracting Officer, the United States and the Contractor shall share priority to utilize the remaining capacity of the facilities declared to be available by the Contracting Officer for conveyance and transportation of non-Project water prior to any such remaining capacity being made available to non-Project contractors.

OPINIONS AND DETERMINATIONS

18. (a) Where the terms of this Contract provide for actions to be based upon the opinion or determination of either party to this Contract, said terms shall not be construed as permitting such action to be predicated upon arbitrary, capricious, or unreasonable opinions or determinations. Both parties, notwithstanding any other provisions of this Contract, expressly reserve the right to seek relief from and appropriate adjustment for any such arbitrary, capricious, or unreasonable opinion or determination. Each opinion or determination by either party shall be provided in a timely manner. Nothing in subdivision (a) of Article 18 of this Contract is intended to

or shall affect or alter the standard of judicial review applicable under Federal law to any opinion or determination implementing a specific provision of Federal law embodied in statute or regulation.

(b) The Contracting Officer shall have the right to make determinations necessary to administer this Contract that are consistent with the expressed and implied provisions of this Contract, the laws of the United States and of the State of California, and the rules and regulations promulgated by the Secretary of the Interior. Such determinations shall be made in consultation with the Contractor to the extent reasonably practicable.

COORDINATION AND COOPERATION

19. (a) In order to further their mutual goals and objectives, the Contracting Officer and the Contractor shall communicate, coordinate, and cooperate with each other, and with other affected Project Contractors, in order to improve the operation and management of the Project. The communication, coordination, and cooperation regarding operations and management shall include, but not be limited to, any action which will or may materially affect the quantity or quality of Project Water supply, the allocation of Project Water supply, and Project financial matters including, but not limited to, budget issues. The communication, coordination, and cooperation provided for hereunder shall extend to all provisions of this Contract. Each party shall retain exclusive decision making authority for all actions, opinion, and determinations to be made by the respective party.

(b) Within 120 days following the effective date of this Contract, the Contractor, other affected Project Contractors, and the Contracting Officer shall arrange to meet with interested Project Contractors to develop a mutually agreeable, written Project-wide process, which may be amended as necessary, separate and apart from this Contract. The goal of this process shall be to

provide, to the extent practicable, the means of mutual communication and interaction regarding significant decisions concerning Project operation and management on a real-time basis.

(c) It is the intent of the Secretary to improve water supply reliability. To carry out this intent:

(1) The Contracting Officer will, at the request of the Contractor, assist in the development of integrated resource management plans for the Contractor. Further, the Contracting Officer will, as appropriate, seek authorizations for implementation of partnerships to improve water supply, water quality, and reliability.

(2) The Secretary will, as appropriate, pursue program and project implementation and authorization in coordination with Project Contractors to improve the water supply, water quality, and reliability of the Project for all Project purposes.

(3) The Secretary will coordinate with Project Contractors and the State of California to seek improved water resource management.

(4) The Secretary will coordinate actions of agencies within the Department of the Interior that may impact the availability of water for Project purposes.

(5) The Contracting Officer shall periodically, but not less than annually, hold division level meetings to discuss Project operations, division level water management activities, and other issues as appropriate.

(d) Without limiting the contractual obligations of the Contracting Officer under the other Articles of this Contract, nothing in this Article shall be construed to limit or constrain the Contracting Officer's ability to communicate, coordinate, and cooperate with the Contractor or other

interested stakeholders or to make decisions in a timely fashion as needed to protect health, safety, or the physical integrity of structures or facilities.

CHARGES FOR DELINQUENT PAYMENTS

20. (a) The Contractor shall be subject to interest, administrative, and penalty charges on delinquent installments or payments. When a payment is not received by the due date, the Contractor shall pay an interest charge for each day the payment is delinquent beyond the due date. When a payment becomes sixty (60) days delinquent, the Contractor shall pay an administrative charge to cover additional costs of billing and processing the delinquent payment. When a payment is delinquent ninety (90) days or more, the Contractor shall pay an additional penalty charge of six (6%) percent per year for each day the payment is delinquent beyond the due date. Further, the Contractor shall pay any fees incurred for debt collection services associated with a delinquent payment.

(b) The interest charge rate shall be the greater of the rate prescribed quarterly in the Federal Register by the Department of the Treasury for application to overdue payments, or the interest rate of one-half of one (0.5%) percent per month prescribed by Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest charge rate shall be determined as of the due date and remain fixed for the duration of the delinquent period.

(c) When a partial payment on a delinquent account is received, the amount received shall be applied, first to the penalty, second to the administrative charges, third to the accrued interest, and finally to the overdue payment.

EQUAL OPPORTUNITY

21. During the performance of this Contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of payment or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without discrimination because of race, color, religion, sex, or national origin.

(c) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Contracting Officer, advising the said labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Contractor will furnish all information and reports required by said amended Executive Order and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the Contracting Officer and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in said amended Executive Order, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of said amended Executive Order, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT

22. (a) The obligation of the Contractor to pay the United States as provided in this Contract is a general obligation of the Contractor notwithstanding the manner in which the obligation may be distributed among the Contractor's water users and notwithstanding the default of individual water users in their obligations to the Contractor.

(b) The payment of charges becoming due hereunder is a condition precedent to receiving benefits under this Contract. The United States shall not make water available to the Contractor through Project facilities during any period in which the Contractor may be in arrears in the advance payment of water rates due the United States. The Contractor shall not furnish water made available pursuant to this Contract for lands or parties which are in arrears in the advance payment of water rates levied or established by the Contractor.

(c) With respect to subdivision (b) of this Article, the Contractor shall have no obligation to require advance payment for water rates which it levies.

COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS

23. (a) The Contractor shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other applicable civil rights laws, as well as with their respective implementing regulations and guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

(b) These statutes require that no person in the United States shall, on the grounds of race, color, national origin, handicap, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving financial assistance from the Bureau of Reclamation. By executing this Contract, the Contractor agrees to immediately take any measures necessary to implement this obligation, including permitting officials of the United States to inspect premises, programs, and documents.

(c) The Contractor makes this agreement in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or other Federal financial assistance extended after the date hereof to the Contractor by the Bureau of Reclamation, including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Contractor recognizes and agrees that such Federal assistance will be extended in reliance on the representations and agreements made in this Article, and that the United States reserves the right to seek judicial enforcement thereof.

24. Omitted.

CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

25. In addition to all other payments to be made by the Contractor pursuant to this Contract, the Contractor shall pay to the United States, within 60 days after receipt of a bill and detailed statement submitted by the Contracting Officer to the Contractor for such specific items of direct cost incurred by the United States for work requested by the Contractor associated with this Contract plus indirect costs in accordance with applicable Bureau of Reclamation policies and procedures. All such amounts referred to in this Article shall not exceed the amount agreed to in writing in advance by the Contractor. This Article shall not apply to costs for routine contract administration.

WATER CONSERVATION

26. (a) Prior to the delivery of water provided from or conveyed through Federally constructed or Federally financed facilities pursuant to this Contract, the Contractor shall be implementing an effective water conservation and efficiency program based on the Contractor's water conservation plan that has been determined by the Contracting Officer to meet the conservation and efficiency criteria for evaluating water conservation plans established under Federal law. The water conservation and efficiency program shall contain definite water conservation objectives, appropriate economically feasible water conservation measures, and time schedules for meeting those objectives. Continued Project Water delivery pursuant to this Contract shall be contingent upon the Contractor's continued implementation of such water conservation program. In the event the Contractor's water conservation plan or any revised water conservation plan completed pursuant to subdivision (d) of Article 26 of this Contract have not yet been determined by the Contracting Officer to meet such

criteria, due to circumstances which the Contracting Officer determines are beyond the control of the Contractor, water deliveries shall be made under this Contract so long as the Contractor diligently works with the Contracting Officer to obtain such determination at the earliest practicable date, and thereafter the Contractor immediately begins implementing its water conservation and efficiency program in accordance with the time schedules therein.

(b) Should the amount of M&I Water delivered pursuant to subdivision (a) of Article 3 of this Contract equal or exceed 2,000 acre-feet per Year, the Contractor shall implement the Best Management Practices identified by the time frames issued by the California Urban Water Conservation Council for such M&I Water unless any such practice is determined by the Contracting Officer to be inappropriate for the Contractor.

(c) The Contractor shall submit to the Contracting Officer a report on the status of its implementation of the water conservation plan on the reporting dates specified in the then-existing conservation and efficiency criteria established under Federal law.

(d) At five-year intervals, the Contractor shall revise its water conservation plan to reflect the then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law and submit such revised water management plan to the Contracting Officer for review and evaluation. The Contracting Officer will then determine if the water conservation plan meets Reclamation's then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law.

(e) If the Contractor is engaged in direct groundwater recharge, such activity shall be described in the Contractor's water conservation plan.

EXISTING OR ACQUIRED WATER OR WATER RIGHTS

27. Except as specifically provided in Article 17 of this Contract, the provisions of this Contract shall not be applicable to or affect non-Project water or water rights now owned or hereafter acquired by the Contractor or any user of such water within the Contractor's Service Area. Any such water shall not be considered Project Water under this Contract. In addition, this Contract shall not be construed as limiting or curtailing any rights which the Contractor or any water user within the Contractor's Service Area acquires or has available under any other contract pursuant to Federal Reclamation law.

OPERATION AND MAINTENANCE BY OPERATING NON-FEDERAL ENTITY

28. (a) The O&M of a portion of the Project facilities which serve the Contractor, and responsibility for funding a portion of the costs of such O&M, have been transferred to the Operating Non-Federal Entity by separate agreement between the United States and the Operating Non-Federal Entity. That separate agreement shall not interfere with or affect the rights or obligations of the Contractor or the United States hereunder.

(b) The Contracting Officer has previously notified the Contractor in writing that the O&M of a portion of the Project facilities which serve the Contractor has been transferred to the Operating Non-Federal Entity, and therefore, the Contractor shall pay directly to the Operating Non-Federal Entity, or to any successor approved by the Contracting Officer under the terms and conditions of the separate agreement between the United States and the Operating Non-Federal Entity described in subdivision (a) of this Article, all rates, charges, or assessments of any kind, including any assessment for reserve funds, which the Operating Non-Federal Entity or such successor

1007 determines, sets, or establishes for (i) the O&M of the portion of the Project facilities operated and
1008 maintained by the Operating Non-Federal Entity or such successor, or (ii) the Friant Division's share
1009 of the operation, maintenance, and replacement costs for physical works and appurtenances
1010 associated with the Tracy Pumping Plant, the Delta-Mendota Canal, the O'Neill Pumping/Generating
1011 Plant, the Federal share of the O'Neill Forebay, the Mendota Pool, and the Federal share of San Luis
1012 Unit joint use conveyance and conveyance pumping facilities. Such direct payments to the Operating
1013 Non-Federal Entity or such successor shall not relieve the Contractor of its obligation to pay directly
1014 to the United States the Contractor's share of the Project Rates, Charges, and Tiered Pricing
1015 Component(s) except to the extent the Operating Non-Federal Entity collects payments on behalf of
1016 the United States in accordance with the separate agreement identified in subdivision (a) of this
1017 Article.

1018 (c) For so long as the O&M of any portion of the Project facilities serving the
1019 Contractor is performed by the Operating Non-Federal Entity, or any successor thereto, the
1020 Contracting Officer shall adjust those components of the Rates for Water Delivered under this
1021 Contract representing the cost associated with the activity being performed by the Operating
1022 Non-Federal Entity or its successor.

1023 (d) In the event the O&M of the Project facilities operated and maintained by the
1024 Operating Non-Federal Entity is re-assumed by the United States during the term of this Contract, the
1025 Contracting Officer shall so notify the Contractor, in writing, and present to the Contractor a revised
1026 Exhibit "B" which shall include the portion of the Rates to be paid by the Contractor for Project
1027 Water under this Contract representing the O&M costs of the portion of such Project facilities which

have been re-assumed. The Contractor shall, thereafter, in the absence of written notification from the Contracting Officer to the contrary, pay the Rates, Charges, and Tiered Pricing Component(s) specified in the revised Exhibit "B" directly to the United States in compliance with Article 7 of this Contract.

CONTINGENT UPON APPROPRIATION OR ALLOTMENT OF FUNDS

29. The expenditure or advance of any money or the performance of any obligation of the United States under this Contract shall be contingent upon appropriation or allotment of funds. Absence of appropriation or allotment of funds shall not relieve the Contractor from any obligations under this Contract. No liability shall accrue to the United States in case funds are not appropriated or allotted.

BOOKS, RECORDS, AND REPORTS

30. (a) The Contractor shall establish and maintain accounts and other books and records pertaining to administration of the terms and conditions of this Contract, including: the Contractor's financial transactions, water supply data, and Project land and right-of-way agreements; water use data; and other matters that the Contracting Officer may require. Reports thereon shall be furnished to the Contracting Officer in such form and on such date or dates as the Contracting Officer may require. Subject to applicable Federal laws and regulations, each party to this Contract shall have the right during office hours to examine and make copies of the other party's books and records relating to matters covered by this Contract.

(b) Notwithstanding the provisions of subdivision (a) of this Article, no books, records, or other information shall be requested from the Contractor by the Contracting Officer unless such books, records, or information are reasonably related to the administration or performance of this Contract. Any such request shall allow the Contractor a reasonable period of time within which to provide the requested books, records, or information.

(c) At such time as the Contractor provides information to the Contracting Officer pursuant to subdivision (a) of this Article, a copy of such information shall be provided to the Operating Non-Federal Entity.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

31. (a) The provisions of this Contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this Contract or any right or interest therein shall be valid until approved in writing by the Contracting Officer.

(b) The assignment of any right or interest in this Contract by either party shall not interfere with the rights or obligations of the other party to this Contract absent the written concurrence of said other party.

(c) The Contracting Officer shall not unreasonably condition or withhold approval of any proposed assignment.

SEVERABILITY

32. In the event that a person or entity who is neither (i) a party to a Project contract, nor (ii) a person or entity that receives Project Water from a party to a Project contract, nor (iii) an association or other form of organization whose primary function is to represent parties to Project contracts, brings an action in a court of competent jurisdiction challenging the legality or enforceability of a provision included in this Contract and said person, entity, association, or organization obtains a final court decision holding that such provision is legally invalid or unenforceable and the Contractor has not intervened in that lawsuit in support of the plaintiff(s), the parties to this Contract shall use their best efforts to (i) within 30 days of the date of such final court decision identify by mutual agreement the provisions in this Contract which must be revised and

(ii) within three months thereafter promptly agree on the appropriate revision(s). The time periods specified above may be extended by mutual agreement of the parties. Pending the completion of the actions designated above, to the extent it can do so without violating any applicable provisions of law, the United States shall continue to make the quantities of Project Water specified in this Contract available to the Contractor pursuant to the provisions of this Contract which were not found to be legally invalid or unenforceable in the final court decision.

RESOLUTION OF DISPUTES

33. Should any dispute arise concerning any provisions of this Contract, or the parties' rights and obligations thereunder, the parties shall meet and confer in an attempt to resolve the dispute. Prior to the Contractor commencing any legal action, or the Contracting Officer referring any matter to Department of Justice, the party shall provide to the other party 30 days' written notice of the intent to take such action: Provided, That such notice shall not be required where a delay in commencing an action would prejudice the interests of the party that intends to file suit. During the 30-day notice period, the Contractor and the Contracting Officer shall meet and confer in an attempt to resolve the dispute. Except as specifically provided, nothing herein is intended to waive or abridge any right or remedy that the Contractor or the United States may have.

OFFICIALS NOT TO BENEFIT

34. No Member of or Delegate to Congress, Resident Commissioner, or official of the Contractor shall benefit from this Contract other than as a water user or landowner in the same manner as other water users or landowners.

CHANGES IN CONTRACTOR'S SERVICE AREA

35. (a) While this Contract is in effect, no change may be made in the Contractor's Service Area, by inclusion or exclusion of lands, dissolution, consolidation, merger, or otherwise, except upon the Contracting Officer's written consent.

(b) Within 30 days of receipt of a request for such a change, the Contracting Officer will notify the Contractor of any additional information required by the Contracting Officer for processing said request, and both parties will meet to establish a mutually agreeable schedule for timely completion of the process. Such process will analyze whether the proposed change is likely to: (i) result in the use of Project Water contrary to the terms of this Contract; (ii) impair the ability of the Contractor to pay for Project Water furnished under this Contract or to pay for any Federally-constructed facilities for which the Contractor is responsible; and (iii) have an impact on any Project Water rights applications, permits, or licenses. In addition, the Contracting Officer shall comply with the NEPA and the ESA. The Contractor will be responsible for all costs incurred by the Contracting Officer in this process, and such costs will be paid in accordance with Article 25 of this Contract.

FEDERAL LAWS

36. By entering into this Contract, the Contractor does not waive its rights to contest the validity or application in connection with the performance of the terms and conditions of this Contract of any Federal law or regulation: Provided, That the Contractor agrees to comply with the terms and conditions of this Contract unless and until relief from application of such Federal law or regulation to the implementing provision of the Contract is granted by a court of competent jurisdiction.

NOTICES

37. Any notice, demand, or request authorized or required by this Contract shall be deemed to have been given, on behalf of the Contractor, when mailed, postage prepaid, or delivered to the Area Manager, South-Central California Area Office, 1243 "N" Street, Fresno, California 93721, and on behalf of the United States, when mailed, postage prepaid, or delivered to the City of Fresno, Public Utilities Director, 2600 Fresno Street, Room 3065, Fresno, California 93721-3624. The designation of the addressee or the address may be changed by notice given in the same manner as provided in this Article for other notices.

CONFIRMATION OF CONTRACT

38. The Contractor, after the execution of this Contract, shall furnish to the Contracting Officer evidence that pursuant to the laws of the State of California the Contractor is a legally constituted entity, and the Contract is lawful, valid, and binding on the Contractor. This Contract shall not be binding on the United States until such evidence has been provided to the Contracting Officer's satisfaction.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
James E Jackson
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

(SEAL)

CITY OF FRESNO

By: _____
City Manager

Attest:

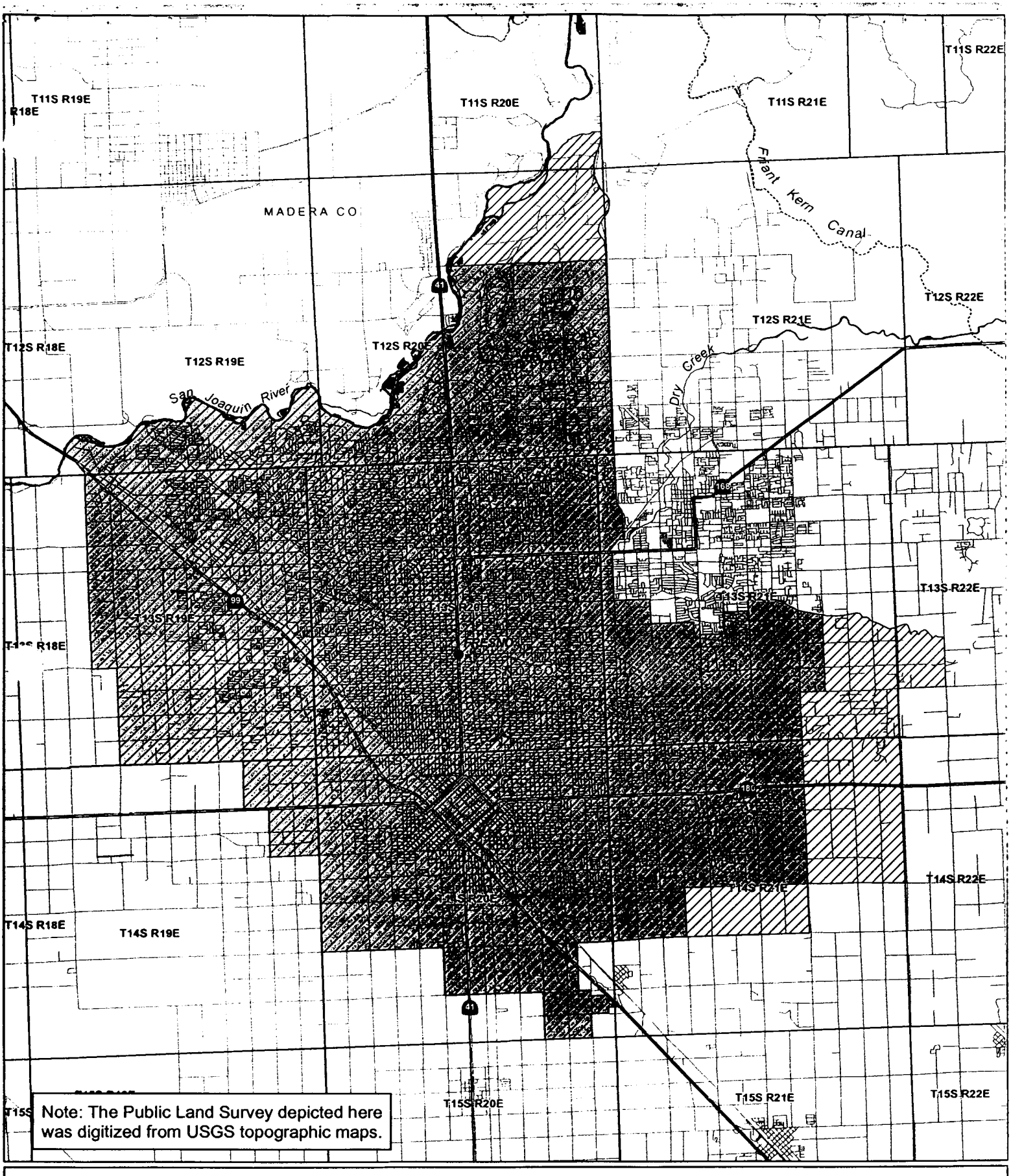
By: Rebecca E Klisch
City Clerk 7-25-05

By: _____
Public Utilities Director

Approved as to form:

Hilda Cantu Montez
City Attorney

(I:\LTRC\Final Draft LTRC's – Fresno, Tracy\City of Fresno R. O. Final Draft Contract 05-04-2005.doc)



Contractor's Proposed Service Area (Sphere of Influence)

Contractor's Current Service Area

City of Fresno

Contract No. 14-06-200-8901-LTR1

EXHIBIT A

Miles

0 0.5 1 2 3 4

Date: October 26, 2004

File Name: N:\districts\contracts\city_of_fresno\city_of_fresno2.mxd

214-208-12705

EXHIBIT B
CITY OF FRESNO
WATER RATES AND CHARGES

	2005 Rates Per Acre-Foot M&I Water
O&M AND COST-OF-SERVICE RATES:	
Capital Rates:	$20.04
O&M Rates:	
Water Marketing	$ 3.89
Storage	$ 6.67
Conveyance	*
Deficit Rates:	
Non-Interest Bearing	
Interest Bearing	$53.53
CFO/PER Adj. Rate **	$ 1.70
TOTAL COST-OF-SERVICE RATES (COS):	$85.83
M&I FULL-COST RATE	$97.15
Tiered Pricing Component>80%<=90% of Contract Total [Full Cost Rate – COS Rate /2]:	$ 5.66
Tiered Pricing Component>90% of Contract Total [Full Cost Rate – COS Rate]:	$11.32
SURCHARGES UNDER PUB. L. 102-575 TO RESTORATION FUND***	
Friant Surcharge [3406(c)(1)]	$ 7.00
Restoration Payments [3407(d)(2)(A)]	$15.87

* Conveyance and Conveyance Pumping Operation and Maintenance Costs were removed for ratesetting purposes and are to be billed directly to the water authorities.

** Chief Financial Officer (CFO) Adjustment and Provision for Replacement (PFR) Credit are being distributed over a 5-year period beginning in FY2003 for the contractors that requested that the costs be deferred.

*** The surcharges are payments in addition to the water rates and were determined pursuant to Title XXXIV of Public Law 102-575. Restoration fund surcharges under P. L. 102-575 are on a fiscal year basis (10/1-9/30).

EXHIBIT C
METERING PLAN

Completion Date	Item	Comments
03/05*	Contract effective	
01/06	Implementation study	Select and obtain consultant study re implementation
01/06	Submit progress report to Bureau	
12/06	Confirmation of existing meters	Verify integrity and servicing of existing meters
01/07	Submit progress report to Bureau	
06/07	Secure installation contract	Begin implementation of consultant recommendations
12/07	Draft rate ordinance	Initial development of tiered rate structure
01/08	Submit progress report to Bureau	
01/08	Initiate retrofit	Begin installation of meters on existing dwellings
12/08	Meter installation progress	29% (30,000 of approximately 105,000 units installed)
01/09	Submit progress report to Bureau	
12/09	Meter installation progress	43% (45,000 units)
01/10	Submit progress report to Bureau	
03/10	Impose new rate ordinance (fees based on metered use)	New rate structure applicable to currently metered customers. Rates to be effective as new meter installations occur.
12/10	Meter installation progress	62% (65,000 units)
01/11	Submit progress report to Bureau	
12/11	Adopt new rate ordinance	81% (85,000 units)
01/12	Submit compliance report to Bureau	
12/12	Meter installation progress	100% (105,000 units)
01/13	Submit completion report	Retrofit complete.

Schedule subject to change due to unforeseen circumstances.

*This date will be revised at the time the contract is executed on behalf of the United States.

Amendment to Contract
No. 14-06-200-8901-LTR1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

AMENDMENT TO LONG-TERM RENEWAL CONTRACT BETWEEN
THE UNITED STATES
AND
CITY OF FRESNO
PROVIDING FOR PROJECT WATER SERVICE FROM FRIANT DIVISION

THIS CONTRACT AMENDMENT, is made this 6th day of April, 2007, in pursuance generally of the Act of Congress of June 17, 1902 (32 Stat. 388), and the acts amendatory thereof or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between THE UNITED STATES OF AMERICA, hereinafter referred to as the United States, and, CITY OF FRESNO, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States and the Contractor entered into a contract dated August 18, 2005, designated Contract No. 14-06-200-8901-LTR1, providing for water service from the Central Valley Project, hereinafter referred to as the "Existing Contract;" and

[2nd] WHEREAS, pursuant to subdivision (b) of Article 14 of the Existing Contract, the terms of the Existing Contract are subject to any enforceable order, judgment and/or settlement in *NRDC* v. *Patterson*, No. CIVS 88-1658-LKK-EM (now styled *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH) and that the Existing Contract shall be timely modified as necessary to effectuate or facilitate any final order, judgment or settlement in said litigation; and

[3rd] WHEREAS, the parties to said litigation have reached agreement on a global resolution of all Claims for Relief in the Seventh Amended Complaint, on the terms and conditions stated in the Stipulation of Settlement dated September 13, 2006, designated Exhibit 1 in the Order Approving Stipulation dated October 23, 2006; and

[4th] WHEREAS, the parties hereto desire to amend the Existing Contract as required by said Stipulation of Settlement.

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby agreed as follows:

1. Subdivision (a) of Article 3 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, and the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 60,000 acre-feet of Class 1 Water for M&I purposes. The quantity of Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract."

2. Subdivision (a) of Article 11 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law, and the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract."

3. Subdivision (b) of Article 12 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer or actions taken by the Contracting Officer to meet legal obligations, including but not limited to obligations pursuant to the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom."

4. Subdivision (b) of Article 14 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(b) The terms of this Contract are subject to the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH. Nothing in this Contract shall be interpreted to limit or interfere with the full implementation of this Settlement, Order, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement."

5. Except as specifically amended herein, the Existing Contract is valid and shall continue in full force and effect as originally written and executed.

IN WITNESS WHEREOF, the parties hereto have executed this Contract Amendment as of the day and year first above written.

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
James E. Turner
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

THE UNITED STATES OF AMERICA

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

CITY OF FRESNO

(SEAL)

By: _____
City Manager

By: _____
Public Utilities Director

Attest:

By: _____
City Clerk (3/26/07)

Approved as to form:

By: _____
City Attorney

City of Fresno and Fresno Irrigation District Agreements

REVISED, AMENDED AND RESTATED COOPERATIVE AGREEMENT BETWEEN FRESNO IRRIGATION DISTRICT AND CITY OF FRESNO FOR WATER UTILIZATION AND CONVEYANCE

THIS AGREEMENT is entered into as of December 20, 2016 by and between the Fresno Irrigation District, an irrigation district (herein called "District") and City of Fresno, a municipal corporation (herein called "City").

WITNESSETH:

WHEREAS, District is an irrigation district organized and existing under the laws of the State of California and is the owner of certain water supplies, water rights and a water distribution system that can convey water to lands both within and outside District boundaries; and

WHEREAS, City is a municipal corporation with boundaries largely overlapping those of District and is the owner of a water distribution system for the distribution of water to lands both in and outside the exterior boundaries of City; and

WHEREAS, District and City have heretofore entered into a cooperative program of water utilization between said parties evidenced by a written agreement for such water utilization and conveyance dated August 12, 1970, which by its terms and by the terms of amendments thereto terminated on May 30, 1976; and

WHEREAS, District and City continued with said cooperative program and entered into a replacement contract for water utilization and conveyance dated May 25, 1976 ("1976 Agreement"); and

WHEREAS, District and City wish to amend and restate the 1976 Agreement in its entirety in order to continue with and expand said cooperative program to recognize changed circumstances affecting them via this Revised, Amended and Restated Cooperative Agreement between Fresno Irrigation District and City of Fresno for Water Utilization and Conveyance ; and

WHEREAS, certain provisions of this Agreement are specifically authorized by, and entered into pursuant to, Chapter 9 (commencing with Section 26670), Part 10, Division 11 of the California Water Code; and

WHEREAS, by agreement dated December 22, 2010 between City and the United States of America identified as Contract No. 14-06-200-8901D (the "City Bureau Contract"), City is entitled to purchase certain water from the United States; and

WHEREAS, by agreement dated December 22, 2010 between District and the United States of America identified as Contract No. 14-06-200-1122D (the "District Bureau Contract"), District is entitled to purchase certain water from the United States; and

WHEREAS, District holds rights to Kings River water and storage in Pine Flat Reservoir on the Kings River, subject to various contracts with the United States of America, water supply schedules and agreements by and among members of the Kings River Water Association and others, judicial and regulatory decrees, and the water rights governing the diversion and use of Kings River water, all as they may be amended or supplemented from time to time (collectively, the "Kings River Agreements"); and

WHEREAS, it is recognized by District and City that District is primarily charged with the distribution and delivery of water within District for Agricultural Use and that its canals and distribution system must primarily be used for that purpose; and

WHEREAS, it is recognized by both District and City that many inhabitants of District also require water for domestic, industrial or fire protection purposes supplied to them by City; and

WHEREAS, under the 1976 Agreement, Kings River water was available to City once lands within District boundaries with surface water allotments were annexed into City and were covered by the 1976 Agreement's contract rate for surface water delivery to City by District for those lands; and

WHEREAS, City and District now wish to limit the amount of Kings River water available to City to provide more certainty regarding water supply availability and to address City's current and anticipated needs and circumstances; and

WHEREAS, City and District are both committed to working cooperatively under the Sustainable Groundwater Management Act ("SGMA") so that the groundwater basin shared by City and District is sustainable and so that undesirable results (as defined in SGMA) are minimized or avoided; and

WHEREAS, City and District recognize that changes to the operations of the Central Valley Project have impacted the availability of water from said project; and

WHEREAS, City has heretofore used much of the water delivered to it under the 1976 Agreement for groundwater recharge because of City's historical reliance on groundwater, and therefore did not require delivery of water year around; and

WHEREAS, City desires to use more of its surface water for direct delivery to its water users and ratepayers while limiting its reliance on groundwater; and

WHEREAS, with the development of its surface water treatment facilities ("SWTFs") City now requires a long-term, reliable and certain surface water supply, deliverable continuously year around; and

WHEREAS, conveyance of raw surface water to the SWTFs on a continuous year around basis will require, among other things, (i) new conveyance infrastructure built by City to overcome certain operational challenges and/or interruptions to District's infrastructure to accommodate normal and routine maintenance of District's canals and pipelines than have historically delivered surface water to City, (ii) District to alter its operations and incur additional

costs to make Out of Season Deliveries, and (iii) the use of new management techniques by District, with the attendant costs, including without limitation water sales, purchases, transfers and exchanges, to meet the need for a continuous supply of surface water to City's SWTFs, all while addressing SGMA and other legal and regulatory requirements that impact the groundwater basin shared by District and City; and

WHEREAS, providing Out of Season Deliveries by District to City may also require the development of new water supplies and projects to provide the water being sought by City; and

WHEREAS, City acknowledges that District has a great depth of experience, knowledge and expertise in the management of surface water supply resources (including but not limited to water supply sales, purchases, transfers and exchanges); and

WHEREAS, City recognizes that the coordinated management of both District's and City's water supplies by District is desirable to maximize the use of the current water supplies and the future development of water supplies for both parties; and

WHEREAS, City has determined that it is in City's interest, and in the interest of its water users and ratepayers, to engage District to employ District's experience, knowledge and expertise on behalf of City in the management of City's Surface Water pursuant to the terms hereof in order to achieve City's and District's goals described herein and to accommodate City's desire for a continuous year around surface water supply, and District has agreed to be so engaged; and

WHEREAS, the changing conditions and manner of management of water supplies throughout the State of California, and other factors beyond the control of City and District, will require increased vigilance on the part of water purveyors in the Fresno area to cooperate with each other on long-range implementation strategies to improve the availability, reliability, and drought resiliency of water supplies; and

WHEREAS, through this Agreement and additional cooperative efforts, City, District and other entities in the region intend to capture of flood released waters, optimize existing water supply storage assets, develop new water supply storage assets, expand groundwater recharge capacities, engage in strategic water supply sales, transfers and exchanges and enhance the utilization of recycled and/or treated waters; and

WHEREAS, in light of SGMA, environmental regulations, water supply challenges and competition with other users and regions in the State for water supplies, City and District wish to further enhance their cooperative working relationship for the benefit of the water users and ratepayers they serve by entering into this Agreement to provide for strategic, long-range and coordinated water supply planning and management that will optimize water conservation, the efficient uses of water for agricultural and municipal uses, the capture of flood released water, the use of existing water supply storage assets, the development of new water supply storage assets, the expansion of groundwater recharge capacity, the effectiveness of strategic water supply sales, transfers, exchanges and purchases, and the enhancement of recycled water utilization.

NOW, THEREFORE, adopting the foregoing recitals as being applicable to this Agreement, it is mutually agreed as follows:

1. Term. The term of this Agreement shall be for a period commencing on the date it is executed by both District and City and ending at 12:00 o'clock p.m. on the last day of June in the year 2035, and thereafter until terminated by either party as of the last day of February of any subsequent year by written notice to the other party mailed prior to September 1st of the previous year. Upon the execution of this Agreement the 1976 Agreement and all amendments thereto shall be of no further force or effect, except that City agrees to pay District any monies owing or to become owing to District under and according to the terms of the 1976 Agreement, if any.

2. Agreement Subject to Other Obligations. This Agreement shall be at all times subject to all of the terms and conditions of the City Bureau Contract, the District Bureau Contract and the Kings River Agreements, and to the extent that any agreement contained herein is contrary to or inconsistent with any term or condition of those contracts or agreements, that contrary provision of this Agreement shall be unenforceable. In the event any such agreement contained herein shall become unenforceable, the entire Agreement may be terminated by the party adversely affected as of the last day of February of the next succeeding year, by written notice served upon the other party on or before the first day of September of the year preceding such termination.

3. Definitions. For the purpose of this Agreement, the following terms shall be defined as follows:

(a) "Agricultural Use" means the use of water primarily in the production of agricultural crops or livestock including but not restricted to domestic use incidental to such agricultural purposes, the watering of livestock, and underground water replenishment conducted by District.

(b) "City's Friant Supply" means all water to which City is entitled under the City Bureau Contract or otherwise as a result of City's status as a long-term repayment contractor for water service from the Friant Division of the Central Valley Project (CVP), including without limitation Class 1 water, Section 215 water, uncontrolled season water, unreleased restoration flows and recirculated water. City's Friant Supply shall not include any water available to District under the District Bureau Contract or as a result of District's status as a long-term repayment contractor in the Friant Division of the CVP, which water is not governed by this Agreement.

(c) "City's Kings River Supply" means the percentage of District's Kings River Supply available to be delivered to City in a Water Year under this Agreement.

(d) "District's Kings River Supply" means the Kings River water District may deliver to its water users under the Kings River Agreements and applicable judicial and regulatory decrees in a Water Year as the result of the calculated natural flow of the Kings River during that Water Year.

(e) "City's Surface Water" means all water available to City in a Water Year by means other than pumping from the underground water supply, including without limitation

City's Kings River Supply and City's Friant Supply and any surface water supply acquired or developed after the date of this Agreement.

(f) "City's Water Service Area" means all lands within the exterior boundaries of City, and also all lands outside such boundaries that are within the exterior boundaries of District, to which City now delivers water or hereafter consents to deliver water by means of the City Water System and that are not hereafter designated or assessed by District as lands receiving or to receive District Water Service.

(g) "City Water System" means the conduits, pipes and other facilities (including without limitation the SWTFs) owned by City and used by City to convey water to lands whether in or outside City.

(h) "District Water Service" means the furnishing of water by District directly to lands within District by means of the District Water System other than pumping conducted by a landowner or water user directly from the underground water supply upon the lands receiving such water.

(i) "District Water System" means the conduits, pipes, canals, pumping stations and other facilities owned and/or used by District to convey water to lands or facilities whether in or outside of District.

(j) "Excluded Areas" means those acres within the City's Water Service Area that are outside of the District's boundaries.

(k) "Included Acres" means those acres within the City's Water Service Area that are within the District's boundaries.

(l) "Municipal, Industrial and Domestic Uses" means the use of water other than for Agricultural Use, and underground water replenishment conducted by City.

(m) "Out of Season Deliveries" means deliveries of City's Surface Water via the District Water System during periods when District is not otherwise delivering irrigation water to its landowners or water users via the portions of the District Water System used to convey City's Surface Water to the points on the District Water System where City will assume physical control of the delivered water.

(n) "Point of Delivery" means, for water delivered to City via the District Water System, the headworks of the Gould Canal and the Fresno Canal as specified in the applicable schedule, for water delivered to City via the Friant-Kern Canal Raw Water Pipeline, the headworks of the Friant-Kern Canal Raw Water Pipeline, for water delivered to City via the South Raw Water Pipeline, the headworks of the Fresno Canal, and such other location(s) as City and District may mutually agree.

(o) "Transfer" means a water sale, transfer or exchange involving any of City's Friant Supply.

(p) "Water Year" means March 1 of one year through the last day of the following February when used in reference to City's Friant Supply and October 1 of one year through September 30 for the following year when used in reference to City's Kings River Supply or District's Kings River Supply.

4. Management of City's Surface Water. To fulfill the purposes of this Agreement, and to facilitate the continuous and year around supply of water to City's Water System and facilities, District shall undertake, and is hereby appointed by City as City's exclusive agent for the management of City's Surface Water pursuant and subject to the terms of this Agreement, including but not limited to subsection 4(f) below. District's management authority and responsibilities shall terminate with respect to any of City's Surface Water upon delivery of that water to City.

(a) The management authority hereby granted to District shall include without limitation the exclusive right to:

i. Direct the storage and release of City's Surface Water;

ii. Schedule, order and provide for the delivery of City's Surface Water to District's points of diversion;

iii. Facilitate the reasonable and beneficial use of City's Surface Water and other water supplies available to City, while also providing for delivery of water to the applicable Point(s) of Delivery as specified in this Agreement;

iv. Pursue and implement Transfers pursuant to this Agreement; and

v. Take all other actions associated with the management and administration of City's Surface Water prior to its delivery to the applicable Point of Delivery in furtherance of the goals provided in subsection 4(f).

(b) District shall not voluntarily take any action that would:

i. Breach City's Bureau Contract or any other agreement governing any of City's Surface Water;

ii. Result in a long-term reduction in amount of City's Surface Water; or

iii. Result in management or use of City Surface Water inconsistent with the goals provided in subsection 4(f) below, unless City provides prior written authorization of such management or use.

(c) Notwithstanding District's management of City's Surface Water, City shall be solely responsible for, and shall timely pay, all charges and other amounts payable in connection with any of City's Surface Water.

(d) Subject to the express rights of City under this Agreement, City shall take no action that interferes with District's management of City's Surface Water as long as District provides the deliveries thereof in accordance with Section 5.

(e) District shall coordinate with City to define and identify uses of City's Surface Water that benefit City's water users and ratepayers. This coordination shall be performed as described in this subsection.

i. As frequently as appropriate and necessary, and at least annually, City and District shall confer to review available water supply information and data, including without limitation: precipitation, snow pack, and runoff conditions; water storage conditions; relevant environmental programs and projects; forecasted Municipal, Industrial and Domestic Uses; surface water delivery priorities for City; forecasted groundwater pumping required to meet City's forecasted Municipal, Industrial and Domestic Uses; and other pertinent information and data related to water supply availability and water demands for the relevant Water Year(s). City and District shall also confer regarding the anticipated availability of City's Friant Supply, if any, for Transfers.

ii. City will be responsible for providing periodic updates to the City Council and City administration. At least annually, City staff shall provide an informational workshop to the City Council, summarizing ongoing water supply conditions, the implementation of this Agreement and fulfillment of the water supply goals as listed in 4(f), as well as any anticipated water supply issues of concern for the relevant Water Year(s). District shall make reasonable efforts to coordinate with City staff to provide any data, information, and materials required for this annual informational workshop to the City Council.

iii. It is understood that during any given Water Year it may be necessary to adjust the water supply planning forecast established pursuant to the above described process as water supply availability and demands change, and additional information and data are obtained, reviewed, and assessed. City and District shall employ reasonable efforts to meet and confer as necessary to keep each party informed to the extent water supply conditions and plans may change through the relevant Water Year. City shall be responsible for providing informational updates to the City administration to the extent there are material changes to the water supply conditions in any given Water Year.

(f) District's management of City's Surface Water shall at all times be in furtherance of one or more of the following water supply goals:

i. Providing continuous year around water supply to City's SWTFs;

ii. Improving the water supply reliability and drought-resiliency for City;

iii. Improving the operation and utilization of City-owned recharge basins;

iv. Implementing conjunctive-use water management strategies to comply with the SGMA that directly benefit City's water users and ratepayers and indirectly benefit groundwater users in the North Kings Subbasin.

(g) Included as a part of the management of City's Surface Water as described above, District shall diligently pursue Transfers of any of City's Friant Supply that City advises District that City will not require during a particular Water Year ("Temporarily Unused Friant Water").

i. Upon identifying a potential Transfer opportunity, and prior to executing the Transfer, District shall notify City of the potential Transfer opportunity, and the water quantity, unit price, delivery dates and terms, and any other material matters associated with the Transfer. This is a notification procedure and not an approval procedure.

ii. All Transfers of Temporarily Unused Friant Water pursued by District shall be in full conformance with City's water supply goals as described in Section 4(f) or otherwise agreed by City and District, and shall be limited to supporting Agricultural Use rather than urban growth or development in other jurisdictions.

iii. City shall not be prohibited from unilaterally pursuing Transfers of Temporarily Unused Friant Water; provided, that any such Transfers shall first be discussed and coordinated with District before they are implemented and shall not be undertaken over District's reasonable objection and the benefits of any such Transfer shall be allocated in accordance with subsections (h), (i) and (j) below.

iv. For avoidance of doubt, District's obligations under this Section 4(g) are limited to making reasonable and diligent efforts to pursue Transfers of Temporarily Unused Friant Water, and City acknowledges that no assurances can be provided by District that such Transfers can be made or arranged.

(h) The benefits resulting from Transfers shall be allocated in accordance with this subsection. For purposes of this Section 4, "benefits" of a Transfer include, without limitation:

i. The difference between all costs incurred in connection with a Transfer and the amount(s) received as a result of the Transfer,

ii. Water returned as a result of a Transfer, and

iii. Water supply storage or conveyance capacities made available as a result of a Transfer.

To the extent benefits include payments, City shall be reimbursed for its actual and reasonable out of pocket expenses incurred for City's Friant Supply involved in the Transfer,

and each of the parties shall next be reimbursed for any actual and reasonable out of pocket expenses incurred in connection with the Transfer. The net revenue associated with a Transfer shall be the revenue remaining after all parties have been reimbursed their actual and reasonable expenses incurred for the Transfer.

(i) To the extent benefits of a Transfer consist of water supplies, water supply storage or conveyance capacities, the allocation of such benefits as between the parties shall be negotiated by the parties before the Transfer is implemented. In the event the parties cannot negotiate such allocation, the Transfer shall not be pursued.

(j) For each Transfer that generates net revenue, City and District agree that the net revenue shall be distributed and used as follows:

i. 25-percent of the net revenue shall be deposited with City's water enterprise fund;

ii. 25-percent of the net revenue shall be deposited with District for the inspection, operations, maintenance and repair of the District's Conveyance System, which City acknowledges provides a benefit to City ratepayers;

iii. 50-percent off the net revenue shall be deposited into a Water Supply Development Fund to be used to finance water supply development programs and projects that mutually-benefit City and District.

The Water Supply Development Fund shall be a restricted-use fund to be used exclusively for water supply programs and projects that improve water supply availability, reliability and drought resiliency for both District and City. Programs and projects that may be financed from the Water Supply Development Fund include, but are not limited to, water supply purchases, transfers, and exchanges; groundwater storage; and groundwater recharge. Expenditures for water supply purchases, transfers, and exchanges may include any carryover charges and conveyance charges that may be assessed by the State of California, the United States, or other agency, to store, transport and deliver surface water, for the mutual benefit of City and District, using state or federal storage and conveyance facilities.

The Water Supply Development Fund may receive contributions from City, District, and other public agencies approved by both City and District. The Water Supply Development Fund may not receive contributions from private persons, companies, businesses, or organizations.

Prior to encumbering funds from the Water Supply Development Fund, District and City shall mutually agree in writing on the recommended expenditure and the amount to be financed with the Water Supply Development Fund.

District shall serve as the fiscal agent for the Water Supply Development Fund and implement generally accepted public agency or governmental accounting practices in managing the fund assets. District shall subject the fund to an annual audit by independent auditors during the course of District's annual audit of its financial statements. The audit shall

be conducted in accordance with the generally accepted auditing standards by the independent certified public accountant auditing District's financial statements. Upon presentation of District's comprehensive audit report to the District Board of Directors, District shall provide City with a copy of District's audit report. At any time during the term of this Agreement, City may, at its own cost, request to review and audit the financial and accounting records associated with the Water Supply Development Fund. District shall have 30 working days to submit the requested records to City for review and audit.

In the event this Agreement terminates and uncommitted amounts remain in the Water Supply Development Fund, one half of all such amounts shall be promptly distributed free of any restrictions to each of the parties.

(k) By the 25th day of each month, District shall provide City with a written summary of District's utilization of City's Friant Supply for the previous month in substantially the form attached hereto as **Exhibit A**. The written summary will identify water volumes delivered to recharge basins, surface water treatment facilities, other Points of Delivery designated by City, and Transfers. The written summary may be delivered to City by email, facsimile or U.S. mail. For Transfers, the monthly report shall include information regarding the parties involved in the Transfer, the water quantity, unit price, delivery dates and terms, and any other material matters associated with the Transfer.

5. Water Made Available to City.

(a) Subject to all other provisions of this Agreement, District shall deliver to City during each applicable Water Year, for distribution and use by City within City's Water Service Area, each day of each year on a continuous basis in accordance with Section 8 of this Agreement, the City's Surface Water available during relevant Water Year(s) that can be diverted by District at the headworks of the Gould Canal, the Fresno Canal or the Friant-Kern Canal Raw Water Pipeline. City acknowledges that the water delivered may not be City's Surface Water, but rather other water controlled by District in the District Water System of similar quality and equal quantity, including without limitation water recovered from water banks, other water for which City's Surface Water is exchanged, and/or water purchased by District for delivery to City at District's cost, and that references in this Agreement to deliveries of City's Surface Water shall include deliveries thereof of a substitute supply by means of one or more exchanges, transfers, purchases or combinations thereof. At all times, District shall have the right to exchange and to convey for City in place thereof other water of similar quality and equal quantity (except sewer effluent or industrial wastes) available to District.

(b) City's Surface Water shall be deemed delivered to City when it reaches the Point of Delivery specified in the applicable schedule provided and approved under Section 8 of this Agreement, provided that for deliveries made via the District Water System, District shall thereafter convey such water to the points on the District Water System where City will assume physical control of the delivered water.

(c) The parties acknowledge that there may be times when the City Water System is undergoing routine or emergency repairs and maintenance, or subject to other conditions, that preclude City from accepting deliveries under this Agreement. Similarly, the parties

acknowledge that there may be times when the District Water System is undergoing routine or emergency repairs and maintenance, or subject to other conditions, that preclude District from delivering water to City under this Agreement. The parties shall cooperate with the other to minimize the impacts of such events, but neither shall be in breach of this Agreement as a result thereof.

(d) Water delivered to City under this Agreement shall be used by City within City's Water Service Area only for Municipal, Industrial and Domestic Uses, Agricultural Uses incidental thereto, and within the boundaries of District for recharge of the underground water supply by percolation.

City shall not sell, transfer, deliver or exchange any surface water or groundwater to or with any other person or entity without written consent of District first had and obtained.

However, this provision shall not prevent City from entering into separate agreements with any other entity which may have a similar agreement with District for the distribution and use of water received from District under such agreements, provided such separate agreements are entered into with the written consent of District first had and obtained and are subject to all the terms and conditions of this Agreement and District's agreements with such other entities.

(e) District has entered into this Agreement with the understanding that it is, and will continue to be, City's policy to (i) require urban growth to occur sequentially in designated growth areas around City, (ii) promote infill development with City's existing boundaries and (iii) facilitate the successful implementation of SGMA within the groundwater basin shared by City and District by conditioning land use and annexation decisions on the existence of an available water supply to support new development in annexed areas. Consistent with that understanding, for the term of this Agreement, as a condition of the provision of City water service, City shall require the proponent of any proposed development project located outside of City's Water Service Area boundary as of the date of this Agreement to:

i. Define the peak water demands, plus fire protection demands, required to meet the total water supply demands of the entire project at build-out conditions;

ii. Obtain a perpetual surface water supply allocation, right, entitlement or similar from District, or other surface water supply agency, to meet the peak water demands, plus fire protection demands, at build out conditions; and

iii. Dedicate, transfer or assign the perpetual surface water supply allocation, right, entitlement or similar to City.

Once the perpetual water supply has been dedicated, transferred, or assigned to City, the water supply shall be incorporated into City's Surface Water managed by District for City under this Agreement.

In addition, to improve, restore, and maintain the availability, reliability, and drought resiliency of the groundwater and surface water resources in the North Kings Subbasin,

City and District shall jointly advocate that all public water supply systems in the North Kings Subbasin should require the proponents of new development projects to obtain perpetual surface water supply rights, allocations, entitlements, and similar, in sufficient quantity, to meet the all demands at full build out.

(f) In furtherance of the parties' goals under this Agreement, City shall utilize City's Friant Supply to provide water to the City's SWTF served by the South Raw Water Pipeline (as defined below) for the purpose of serving the Excluded Area.

6. Raw Water Pipelines. As soon as reasonably practicable, City shall construct, at its sole cost and expense, two raw water pipelines to serve City's SWTFs (the "Raw Water Pipelines"). One Raw Water Pipeline shall be a direct connection from the Friant-Kern Canal to City's SWTF located at Mile Point 7.58 (the "Friant-Kern Canal Raw Water Pipeline"). The other Raw Water Pipeline shall be a direct connection from the Fresno Canal downstream of the headworks for such canal to City's SWTF located at Trimmer Spring Road (the "South Raw Water Pipeline"). City's T3 SWTF shall continue to be served by the Enterprise and Jefferson Canals that are a part of the District Water System. Once operational, the Raw Water Pipelines shall be used to convey portions of City's Surface Water directly to the SWTFs, and all costs of the operation, maintenance, repair and replacement of the Raw Water Pipelines shall be borne by City; provided, that District shall be entitled to utilize for its own purposes any capacity in the Raw Water Pipelines not required to deliver City's Surface Water, and District shall reimburse City upon demand for any operational costs incurred as a result of District's use of the Raw Water Pipelines. Any third-party property damages resulting from City's efforts and activities related to the operation, maintenance, repair, and replacement of the Raw Water Pipelines shall be received and processed by City in accordance with City's Risk Management policies and procedures.

7. City's Friant Supply. While this Agreement is in effect, City (i) shall not convey any interest in the City Bureau Contract to any party other than District, (ii) shall at all times maintain the City Bureau Contract in effect and (ii) shall not voluntarily decrease the quantity of City's Friant Supply to be made available to City thereunder without the written consent of District. City will use every effort to obtain its maximum entitlement to City's Friant Supply annually as it may become available, and will seek to maximize any other surface water opportunities that may be available to City via the Friant Division of the Central Valley Project. Nothing in this Agreement conveys any ownership interest in the City Bureau Contract to District, which shall at all times remain the sole property of City, nor does this Agreement convey any interest in the District Bureau Contract to City, which shall at all times remain the sole property of District.

8. Schedules of Delivery and Conveyance of Water.

(a) District shall deliver City's Surface Water to City in accordance with schedules provided from time to time by City for approval by District, which approval shall not be unreasonably withheld, delayed or conditioned. Such schedules shall set forth the amounts of water desired by City, the desired timing of deliveries, the facilities by which such water is to be delivered, and the point(s) on the District Water System where City will assume physical control of the delivered water. Deliveries of water by District will take into consideration all relevant

factors, including without limitation (i) the capacity and condition the applicable portions of the District Water System, (ii) City's Bureau Contract, (iii) the District Bureau Contract, (iv) the Kings River Agreements, (v) actual and anticipated water supply conditions, (vi) the requirements of other contracts between the District and third parties (including without limitation the City of Clovis and Fresno County Waterworks District No. 19) and (vii) all other factors pertaining to the distribution, apportionment and use of water available to District.

(b) All schedules submitted by City during each Water Year shall provide for the delivery during that Water Year of all of City's Surface Water that becomes available to City during that Water Year. Notwithstanding the foregoing, City may schedule up to 10,000 acre feet of City's Surface Water that becomes available to City during one Water Year for delivery in the succeeding Water Year ("Rescheduled Water"). City shall timely pay in full all costs imposed by third parties, including without limitation the United States Bureau of Reclamation, as the result of any Rescheduled Water requests or deliveries.

9. Conveyance Losses. City shall bear all losses incurred in the District Water System downstream of the applicable Point of Delivery; provided, that no such losses shall be assessed against City when District is delivering irrigation water to its landowners or water users via the portions of the District Water System used to convey City's Surface Water to the points on the District Water System where City will assume physical control of the delivered water. Conveyance losses chargeable to City shall be computed by multiplying the losses in that portion of any canal used for conveyance of City's Surface Water during the period such water is being so conveyed by the total amount of water being conveyed for City in that canal during such time, divided by the total amount of water flowing in that portion of that canal during the same period.

10. Use by District of Water Not Used by City.

(a) Except for Rescheduled Water, in the event City is unable to use or does not use any of City's Kings River Supply in any Water Year, City shall lose the right to receive such water, and District shall have the right to take and use such water for Agricultural Use in such manner as it may determine.

(b) Except for Rescheduled Water, in the event City is unable to use or does not use any part of City's Friant Supply and District reasonably concludes that it cannot effect a Transfer for all of such unused water as Temporarily Unused Friant Water as described in Section 4(g), City shall nevertheless take and pay for such unused water and District shall have the right to use such water for Agricultural Use, but City may require District to so use such water at such locations as City may direct; provided, however, in the event City does not direct the location at which said water shall be used in time that it may be so used or in the event the District Water System will not permit the conveyance of such water to such location when so directed, or if for any other reason the conveyance of such water to such location at that time is not feasible or practicable, District shall have the right to use such water upon the same conditions as are provided in Section 10(a). Such use of any such water by District shall not relieve City from any payments required to be made by it under the City Bureau Contract or under the terms of this Agreement and its use by District shall not require any payment from District to City.

(c) Except for Rescheduled Water, in the event City is unable to use or does not use any of City's Surface Water that is neither City's Kings River Supply or City's Friant Supply in any Water Year, City shall lose the right to receive such water, and District shall have the right to take and use such water for Agricultural Use in such manner as it may determine. In such event, insofar as the District Water System will permit, and insofar as otherwise may be practicable and equitable as to other landowners, District will use such water for irrigation or percolation in areas in City or east or northeast of City, and will discuss its use with City before it is used elsewhere. However, the ultimate decision concerning such use of such water shall be within the discretion of District.

11. Water Rights Not Transferred. As was the case under the 1976 Agreement, City acknowledges that its rights to City's Kings River Supply under this Agreement are contractual rights and not water rights. Nothing in this Agreement authorizes or shall be construed or deemed to constitute the sale or transfer of a water right from either party to the other and nothing in this Agreement shall constitute the dedication by either party of water or storage to a public use. No right in any water, storage right or water right owned by District or City shall be acquired or lost by virtue of this Agreement or the actions contemplated hereby. At no time shall City make any claim, assert any right or otherwise seek, confirm or perfect in any forum any legal or beneficial interest, right or title to any of District's water supply or storage rights except as expressly set forth herein.

12. City's Sewage Effluent. City shall retain its sewage effluent and recycled water within the boundaries of District for the term of this Agreement, except with the written consent of District first had and obtained. It is the intent of City and District to develop and execute a new agreement addressing such effluent and recycled water use, and this Agreement is to be interpreted so as to be consistent with such new agreement if and when it is executed by the parties.

13. Acreages and City's Kings River Supply.

(a) City's Water Service Area consists of Included Acres and Excluded Acres, and on an annual basis City and District shall prepare a map showing the total number of acres in each area as of the first day of March of each year. When so approved, said map shall be incorporated herein by reference as **Exhibit B** and shall become a part hereof. Said map shall be amended and reapproved by both parties as of the first day of March each year and added to this Agreement as an updated **Exhibit B**. However, City shall keep the District currently advised during the year of any new lands outside of City's Water Service Area to which it commences or consents to deliver water, and District shall keep City so advised as to any new lands designated or assessed by it as lands receiving or to receive District Water Service. When so amended and reapproved as of the first day of March of each year, said map shall conclusively establish the boundaries of and the acreage in each area for all purposes of this Agreement.

(b) City's Kings River Supply shall be the herein-contracted for percentage of District's Kings River Water Supply. Such percentage shall be based on the ratio of Included Acres within City's Water Service Area to the total acres within District's boundaries. In computing the acreage within the Included Acres, the entire acreage shall be measured including properties that may be exempt from assessment for taxation and including adjacent streets,

alleys, roads, highways and other public ways to the center lines thereof. As of the execution of Agreement, and based on the land area sizes defined above, City's Kings River Supply is 25.54 percent of the District's Kings River Supply.

(c) Notwithstanding any other provision of this Agreement, and notwithstanding increases in the Included Acres, City's Kings River Supply shall be limited to 29.00 percent of District's Kings River Supply. At such time when the ratio of Included Acres within City's Water Service Area to the total acres within District equals 29.00 percent, City's Kings River Supply shall remain fixed at 29.00 percent. City and District mutually agree that the increase percentages reflected in this Section 13 include allowances for moderate growth in Growth Area 1 of City's Sphere of Influence as shown in **Exhibit C** (as depicted as Figure IM-2 of the Fresno General Plan).

(d) To improve, restore, and maintain the availability, reliability, and drought resiliency of the groundwater and surface water resources in the North Kings Subbasin, District shall support, and to the extent it has the legal authority to do so shall require, the establishment of water supply limits on all municipal water systems in the North Kings Subbasin.

District acknowledges that it may enter into surface water utilization and conveyance agreements similar to this one with other municipalities in the Kings Subbasin that provide for the delivery of portions of District's Kings River Supply. Subject to the following paragraph of this Agreement, all such agreements entered into after the date of this Agreement shall provide that the percentage of District's Kings River Supply made available to the municipality entering into such agreement shall be determined in a manner similar and comparable to that applied to City in this Agreement.

Should the District enter into such a water utilization and conveyance agreement with another municipality in the Kings River Subbasin after the date of this Agreement that makes available a percentage of District's Kings River Supply to such municipality determined in a manner that is not similar and comparable to that applied to City in this Agreement, at City's request the parties shall negotiate in good faith an adjustment in City's Kings River Supply to apply the same methodology used, and provide the same percentage increase, as granted to the other municipality; provided, that to the extent such other municipality provides additional consideration to District for such different methodology, City shall provide comparable consideration if it requests that such different methodology be used for this Agreement. Any disputes arising as a result of such negotiation shall be resolved pursuant to Section 19.

14. Payment by City to District. In consideration of the water supplies and services provided by District to City under this Agreement, City shall pay to District each Water Year in which this Agreement is effective the following:

(a) The sum calculated by multiplying the number of Included Acres by the per acre assessment imposed as of March 1 of that Water Year on lands in District receiving District Water Service, plus the sum calculated by multiplying the number of Excluded Acres by the per acre assessment imposed as of March 1 of that Water Year on lands in District not receiving District Water Service. Amounts payable to District pursuant to this Section 14(a) shall be paid by City 60% on or before the 20th day of December preceding the Water Year for which such

amounts are due, and the remaining 40% shall be paid on or before the 20th day of June of the following Water Year. City and District acknowledge that during the term of this Agreement, District may convert its rate structure to include a volumetric charge. Concurrently with such a rate structure modification, the parties shall negotiate modifications to this Section 14 so that charges imposed on City under the revised District rate structure are equitable and comparable in proportion and magnitude to the charges imposed on other District customers receiving water for Agricultural Use. Without limiting the foregoing, any volumetric charges imposed on City shall be determined in the same manner as volumetric charges imposed on other District customers receiving water for Agricultural Use.

(b) An out of season water delivery fee determined in accordance with the procedure described in the attached **Exhibit D** for each acre foot of water delivered to City under this Agreement as an Out of Season Delivery (the "Water Delivery Fee"). The Water Delivery Fee shall be payable within 30 days after District delivers City an invoice for such fee indicating the amount of water delivered during the invoice period and the total Water Delivery Fee due. City acknowledges that such fee is in part to compensate District for additional costs and risks incurred for operating its system to make Out of Season Deliveries. No such fee shall be due for water deliveries to City under this Agreement that are not Out of Season Deliveries.

(c) A rescheduling fee for each acre foot of Rescheduled Water determined in accordance with the procedure described in the attached **Exhibit E** (the "Rescheduling Fee"). The Rescheduling Fee shall be payable annually after March 1 of each Water Year within 30 days after District delivers City an invoice for such fee indicating the amount of Rescheduled Water for the applicable Water Year and the total Rescheduling Fee due. City acknowledges that the Rescheduling Fee is necessary to compensate District for additional costs and risks incurred to reschedule water for City from one Water Year to the succeeding Water Year. The Rescheduled Water Fee shall not be applied to any of City's Friant Supply carried over in Millerton Lake, as the Bureau has established a separate fee schedule for City to reschedule City's Friant Water Supply from one Water Year to the succeeding Water Year.

(d) While this Agreement is in effect, District shall not impose District assessments or other charges on landowners within City's Water Service Area or adopt special "municipal and industrial" assessments, rates or charges that would be imposed on or as a result of water deliveries to City under this Agreement. Only the amounts described in this Agreement shall be imposed on any party as a result of deliveries of City's Surface Water by District to City.

(e) Time shall be of the essence for the making of the payments described in this Section 14. If any such payment is not made on the date provided, City shall pay to District in addition to said payment costs, penalties and interest equal to those provided by law to be paid by landowners within District for the late payment of assessments. Such costs, penalties and interest are in addition to any other remedy which District may have against City because of City's failure to pay said payment as above provided.

(f) City acknowledges and agrees that the amounts payable by City pursuant to this Section 14 will vary from year to year and may increase over time. City further acknowledges that, while some of such amounts will be determined with reference to District assessments on its landowners, no amounts payable by City under this Agreement are assessments on City's

landowners. City further agrees that, as they relate to City, such amounts will be imposed as a matter of contract and are not assessments, fees or charges to which Article XIIID of the California Constitution applies. City shall be permitted to participate in public hearings and meetings held in connection with rate-setting, but City shall not assert that Article XIIID of the California Constitution applies to payments required under this Agreement. If City makes such an assertion, this Agreement may be terminated by District in its entirety as of the last day of February of the next succeeding year by written notice served upon City. City shall be responsible to set its rates to its utility users in accordance with applicable law, and shall indemnify and defend District against any claims or legal actions commenced by City's water users or ratepayers to challenge the amounts payable by or to City.

15. Re-negotiations. City and District acknowledge that changed circumstances in the future may:

i. Result in material changes in the size of City's Water Service Area, the number of Excluded Acres and/or the number of Included Acres, and/or

ii. Render the amount of City's Kings River Supply as an increasing percentage of District's Kings River Water Supply inequitable.

Such changed circumstances could result from, among other causes:

i. Annexations or detachments from City and/or District;

ii. Updates in City's Urban Water Management Plan or the Fresno General Plan;

iii. Significant regional economic development projects that require the extension of the City Water System outside of City's Water Service Area. Significant regional economic development projects shall be those that qualify for federal, state, county, or local economic development incentives; or

iv. New legal, regulatory, or environmental requirements placed on water supply agencies by a state or federal government agency.

Should either party to this Agreement determine after January 1, 2036 that such changed circumstances have arisen, it may notify the other of such determination and request that the parties meet to discuss mutually acceptable changes in the number of Excluded Acres, the number of Included Acres and/or the percentage used to determine City's Kings River Supply. Neither party shall be required to engage in such discussions prior to January 1, 2036.

The parties shall thereupon meet in good faith in an attempt to reach agreement on such changes; provided, that if no such agreement is reached within 180 days of the initial meeting, neither party shall be obligated to continue such meetings.

The number of Excluded Acres, the number of Included Acres and City's Kings River Supply shall remain unchanged pending agreement on the changes, and therein documented by a written amendment to this Agreement and executed by both parties.

16. Protection of District Facilities. City shall not permit the development of any parcel of land or the use of any public utility or other easements affecting land within its boundaries if any of the District Water System is located on, under or adjacent to such parcel until City, the landowner and/or the developer enters into an agreement acceptable to District for the repair, rehabilitation, relocation, replacement, reconfiguration or pipelining of the facilities on the parcel, and on any adjacent parcels, all as District determines is necessary or appropriate in order to (i) avoid disruption of District operations or maintenance activities as a result of the development, (ii) make District facilities suitable for operation within a developed area, or (iii) address public safety concerns.

17. No Warranty of Quality. City recognizes that City's Surface Water will be "raw," non-potable and untreated, and that the amount of water included in City's Surface Water will vary from year to year due to a variety of factors beyond the control of District. City further recognizes that wastewater (both treated and untreated) and drainage water are sometimes discharged into the District's canals, and that such discharges from a number or sources will occur and/or continue during the term of this Agreement. Accordingly, except as expressly set forth in this Agreement, District makes no representations or warranties regarding the quality of the water or the amount of water to be delivered to City each Water Year. City recognizes that the treatment of City's Surface Water to make it potable shall be the sole responsibility of City, and City shall assume all risk and responsibility therefor. The character or quality of the water furnished or conveyed hereunder may vary from time to time for reasons including, but not restricted to, the application by District of chemicals to control aquatic and ditch bank weeds, and the open canals of District are always subject to possible pollution from outside sources. District does not guarantee in any respect or assume any responsibility for the chemical, bacterial or other quality of the water made available to City through the District Water System.

18. Indemnity. City and District each agree to indemnify the other and save the other free and harmless of and from any and all liability, damage, loss, cost or expense, incurred or suffered by the other, by reason of damage to the property of the other or injury to any other person or property arising out of its own conduct, acts, omissions or faults, in connection with any matter related to this contract.

19. Dispute Resolution.

(a) District and City staff shall exercise every effort to resolve disputes through the development of a consensus.

(b) To the extent District and City staff cannot promptly resolve an issue in dispute; the parties shall promptly convene a meeting of senior party representatives to attempt to resolve the dispute. Either party may request a dispute resolution meeting pursuant to this section by providing written notice to the other party, including a summary of the issue in dispute. District representatives shall be its Board chair or president and another Board member. City representatives shall be the Mayor and City Council President. These senior party representatives shall make reasonable efforts to meet as frequently and as promptly as possible to negotiate the terms and conditions of a resolution. If these party representatives are unable to resolve the dispute through this informal process within a reasonable period, either party may pursue any remedy it may have under law or equity.

(c) The dispute resolution process described above shall be limited to material disputes regarding matters related to Transfers, expenditures from the Water Supply Development Fund, changes in City's Kings River Supply, revisions of this Agreement pursuant to Section 13(d), City's Friant Supply, changes proposed for **Exhibits B or C**, calculation procedures for fees for Out Of Season Deliveries and Rescheduling Fees, and similar matters.

(d) In cases where a dispute arises between the parties that, if unresolved, may result in imminent danger to the public, health, safety or welfare, the parties shall not be obligated to engage in dispute resolution pursuant to this Section 19.

20. Defense of Agreement. In the event of litigation this Agreement, the parties shall cooperate to provide a joint defense of the litigation. Each party shall bear its own costs of such litigation, including attorneys' fees and expert witness fees.

21. No New Agency. This Agreement is not intended to create a new joint powers authority or other entity. Each party shall conduct itself under this Agreement in good faith, using its diligent best efforts to comply with this Agreement and to achieve the objectives of the parties set forth herein. Each party shall make its personnel and resources reasonably available as required to achieve the purposes of this Agreement.

22. Approvals. Except as expressly provided in this Agreement, compliance with all legal/regulatory requirements and governmental or other third party restrictions on the use or delivery of City's Surface Water to it City water users shall be the responsibility of City. District shall be excused from delivering any water supply under this Agreement if, by so doing, District would become subject to additional legal requirements or third party restrictions imposed on deliveries of water to City's water users.

23. Entire Agreement. This Agreement and each of the exhibits referred to herein, which are incorporated by this reference, constitute the entire agreement between the parties pertaining to the subject matter hereof and supersede all prior and contemporaneous agreements and/or obligations concerning these obligations which are merged into this Agreement. Each party has made its own independent investigation of the matters settled and is not relying upon any representation not specified herein.

24. Applicable Law. This Agreement shall be construed under and shall be governed by the laws of the State of California. Any action to interpret or enforce any aspect of this Agreement shall be brought in the California Superior Court of Fresno County, California. City and District hereby expressly waive any right to remove any action to a county other than Fresno County as permitted pursuant to California Code of Civil Procedure Section 394.

25. Construction of Agreement. This Agreement is the product of negotiation and preparation by and among each party hereto and its attorneys, and the parties agree that this Agreement shall not be deemed to have been prepared or drafted by any one party. Accordingly, the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

26. Modification of Agreement. No supplement, modification, waiver, or amendment with respect to this Agreement shall be binding unless executed in writing by the party against whom enforcement of such supplement, modification, waiver or amendment is sought.

27. Counterparts. This Agreement may be signed in any number of counterparts by the parties, each of which shall be deemed to be an original, and all of which together shall be deemed one and the same instrument. Facsimile or other electronic signatures shall be binding.

28. Further Acts. The parties shall reasonably cooperate with each and take such further actions as may be necessary, including the execution of all necessary further documents, to carry out the purpose and intent of this Agreement. Each of the parties shall diligently and in good faith proceed to negotiate such other agreements as may be necessary to implement this Agreement.

29. Binding Effect. This Agreement shall be of binding legal effect only when it has been executed by all of the parties. No rights or duties under this Agreement may be assigned or delegated by a party without the express written consent of the other party, which may be withheld in the sole and absolute discretion of such other party. Subject to the foregoing, this Agreement shall be binding upon and inure to the benefit of the successors and assigns of the parties.

30. Notice to Parties. Any notice or other communication given under the terms of this Agreement shall be in writing and shall be given personally, by facsimile or by certified mail, postage prepaid and return receipt requested. Any notice shall be delivered or addressed to the parties at the addresses or facsimile numbers set forth below or at such other address or facsimile numbers as shall be designated by notice in writing in accordance with the terms of this Agreement. The date of receipt of the notice shall be the date of actual personal service or facsimile transmission with written confirmation of successful transmission, or three days after the postmark on certified mail. All notices required under or regarding this Agreement shall be made in writing addressed as follows:

Fresno Irrigation District 2907 S Maple Avenue Fresno, CA 93725 Attn: General Manager Facsimile No.: 559-233-8227	City of Fresno 2600 Fresno Street Fresno, CA, 93721 Attn: Director of Public Utilities Facsimile No.: 559-498-1304

31. Attorneys' Fees. In the event of any action or arbitration between the parties seeking enforcement or interpretation of any of the terms and conditions of this Agreement, the prevailing party in such action shall be awarded, in addition to damages, injunctive or other relief, its reasonable costs and expenses, including, but not limited to, taxable costs and reasonable attorneys' fees.

32. Cumulative Rights; Waiver. No failure by any party to exercise, and no delay in exercising any rights, shall be construed or deemed to be a waiver thereof, nor shall any single or partial exercise by any party preclude any other or future exercise thereof or the exercise of any other right. Any waiver of any provision or of any breach of any provision of this Agreement

must be in writing, and any waiver by a party of any breach of any provision of this Agreement shall not operate as or be construed to be a waiver of any other breach of that provision or of any breach of any other provision of this Agreement.

33. Severability. Subject to the parties' rights under Section 2 of this Agreement, if any provision of this Agreement is determined by a court of competent jurisdiction to be invalid, illegal or unenforceable, such provision shall be automatically reformed so as to be valid, legal and enforceable to the maximum extent permitted and the balance of this Agreement shall remain in full force and effect notwithstanding such invalidity, illegality or unenforceability.

34. No Third Party Beneficiaries. This Agreement does not create, and shall not be construed to create, any rights enforceable by any person, partnership, corporation, joint venture, limited liability company, district or other form of organization or association of any kind that is not a party. Without limiting the generality of the foregoing, landowners, residents, water users and ratepayers of the parties are not intended to be third party beneficiaries of this Agreement.

35. Force Majeure. Notwithstanding any other provision of this Agreement, neither party shall be liable for any failure to perform resulting from any cause outside the reasonable control of that party. For purposes of this Agreement, routine and emergency repairs and maintenance of the District Water System shall be deemed causes outside of the reasonable control of District (including without limitation the annual shut down of the Enterprise Canal for maintenance), provided that District shall use reasonable efforts to schedule routine maintenance so as to avoid interference with deliveries of City's Surface Water.

//

IN WITNESS WHEREOF, the parties have executed this Agreement to be effective as of the date first above written.

"District"

The Fresno Irrigation District, a California irrigation district

By _____
Ryan Jacobsen, President

By _____
Gary R. Serrato, General Manager

ATTEST:

_____
Secretary

"City"

The City of Fresno, a municipal corporation

By: _____
Ashley Swearengin, Mayor

By _____
Bruce Rudd, City Manager

ATTEST:
Yvonne Spence, CMC
City Clerk

By: _____ 1/11/17
Deputy

APPROVED AS TO FORM:
City Attorney, Douglas Sloan

By: _____ 12/22/16
AMANDA FREEMAN, DEPUTY

ATTACHMENTS:

EXHIBITS

Exhibit A – Monthly Water Supply Utilization Report
Exhibit B – City Water Service Area Map
Exhibit C – Fresno General Plan Map
Exhibit D – Out of Season Delivery Cost Methodology
Exhibit E – Rescheduled Water Cost Methodology

EXHIBIT A

EXHIBIT A

CITY OF FRESNO FMFCD BASINS
MONTHLY REPORT (AC.FT.)
2015-2016

FMFCD BASINS IN FRESNO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Basin A													
Basin AB													
Basin AC													
Basin AD													
Basin AE													
Basin AF													
Basin AG													
Basin AH													
Basin AJ													
Basin AL													
Basin AO													
Basin AW2													
Basin AZ													
Basin BE													
Basin BF													
Basin BH													
Basin BM													
Basin BO													
Basin BQ													
Basin BU													
Basin BV													
Basin BW													
Basin BZ													
Basin CC													
Basin CL													
Basin CM													
Basin CN													
Basin CO2													
Basin CS													
Basin CW													
Basin CX													
Basin CY													
Basin CZ													
Basin DD													
Basin DH													
Basin EE													
Basin EF													
Basin EG													

CITY OF FRESNO FMFCD BASINS
MONTHLY REPORT (AC.FT.)
2015-2016

FMFCD BASINS IN FRESNO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Basin EL													
Basin EM													
Basin FF													
Basin GG													
Basin HH													
Basin II1													
Basin II2													
Basin J													
Basin JJ													
Basin K													
Basin KK													
Basin L													
Basin LL													
Basin MM													
Basin N													
Basin O													
Basin OO													
Basin P													
Basin R													
Basin RR1													
Basin RR2													
Basin RR3													
Basin S													
Basin T													
Basin TT													
Basin U													
Basin UU2													
Basin UU3													
Basin Y													
Basin Z													
Basin ZZ													
Fresno's FMFCD Total													

CITY OF FRESNO RECHARGE
MONTHLY REPORT (AC.FT.)
2015-2016

OTHER FRESNO RECHARGE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Leaky Acres													
Woodward Park													
Copper River Country Club													
Big Dry Detention													
Fancher Basin (South)													
Chestnut Ave. Basin													
North Central Basin													
Kearney Basin													
Big Dry Creek West of Winery Ave.													
Delivery System Recharge Fresno													
Copper River Country Club total is the amount exceeding the Phillips Ditch entitlement of 77 ac ft per month (during FID's irrigation season).													
Basin BF Water comes from Chestnut Ave. Basin													
Fresno's Total Recharge													
Fresno's SWTP N/E & T-3													
Fresno's Total Usage													

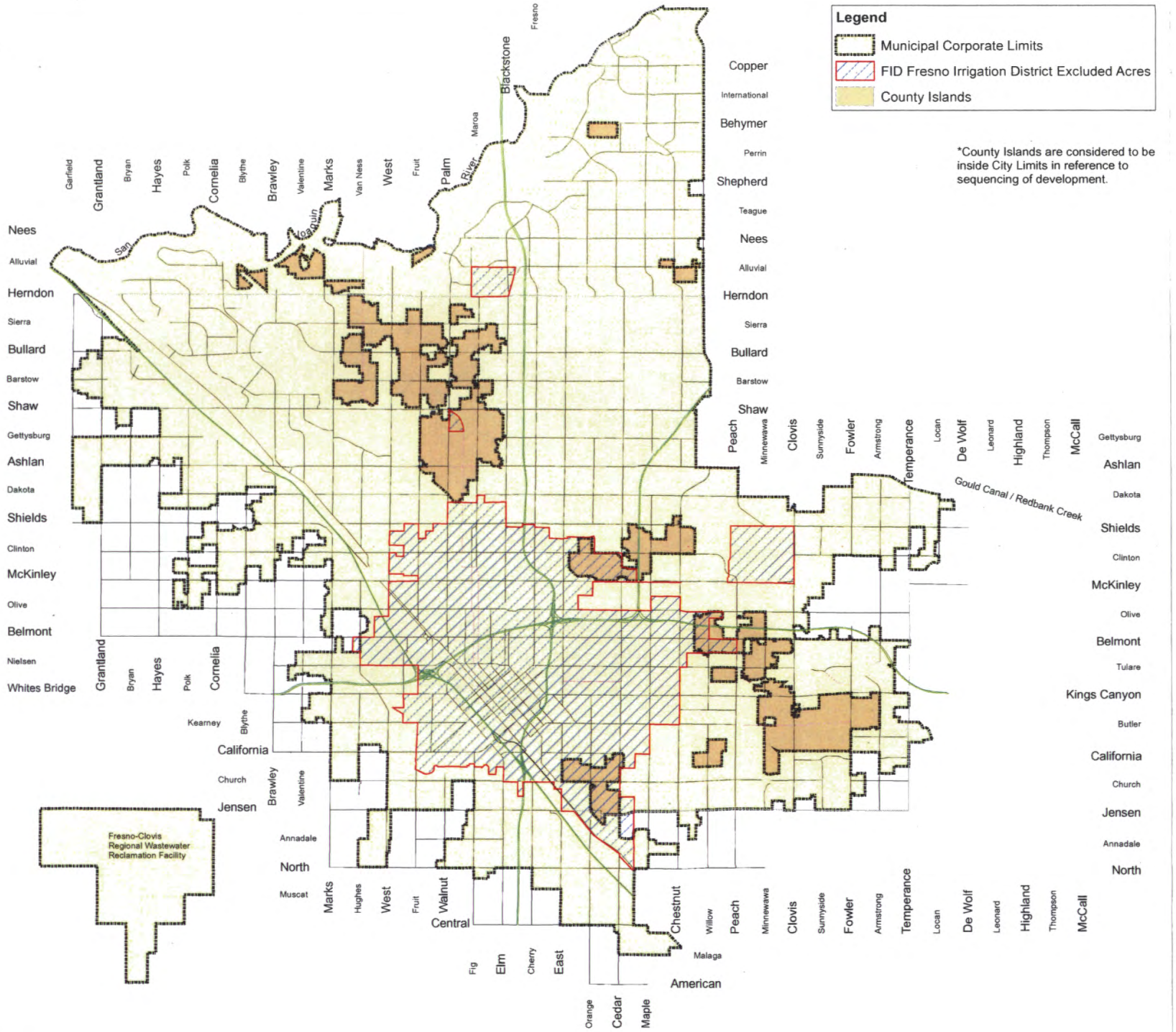
EXHIBIT B

City of Fresno
Water Service Area Boundary
Exhibit "B"
December 13, 2016

"The City's Water Service Area consists of Included Acres and Excluded Acres, and on an annual basis City and District shall revised this Exhibit B map to show the total number of acres in each area as of the first day of March of each year."



Miles
0 0.5 1 2 3



S:\USERS\PET\2016\Thomas Esqueda\Water Service Areas Map\Water Service Area Boundary Ex B Map.mxd

EXHIBIT C

EXHIBIT C

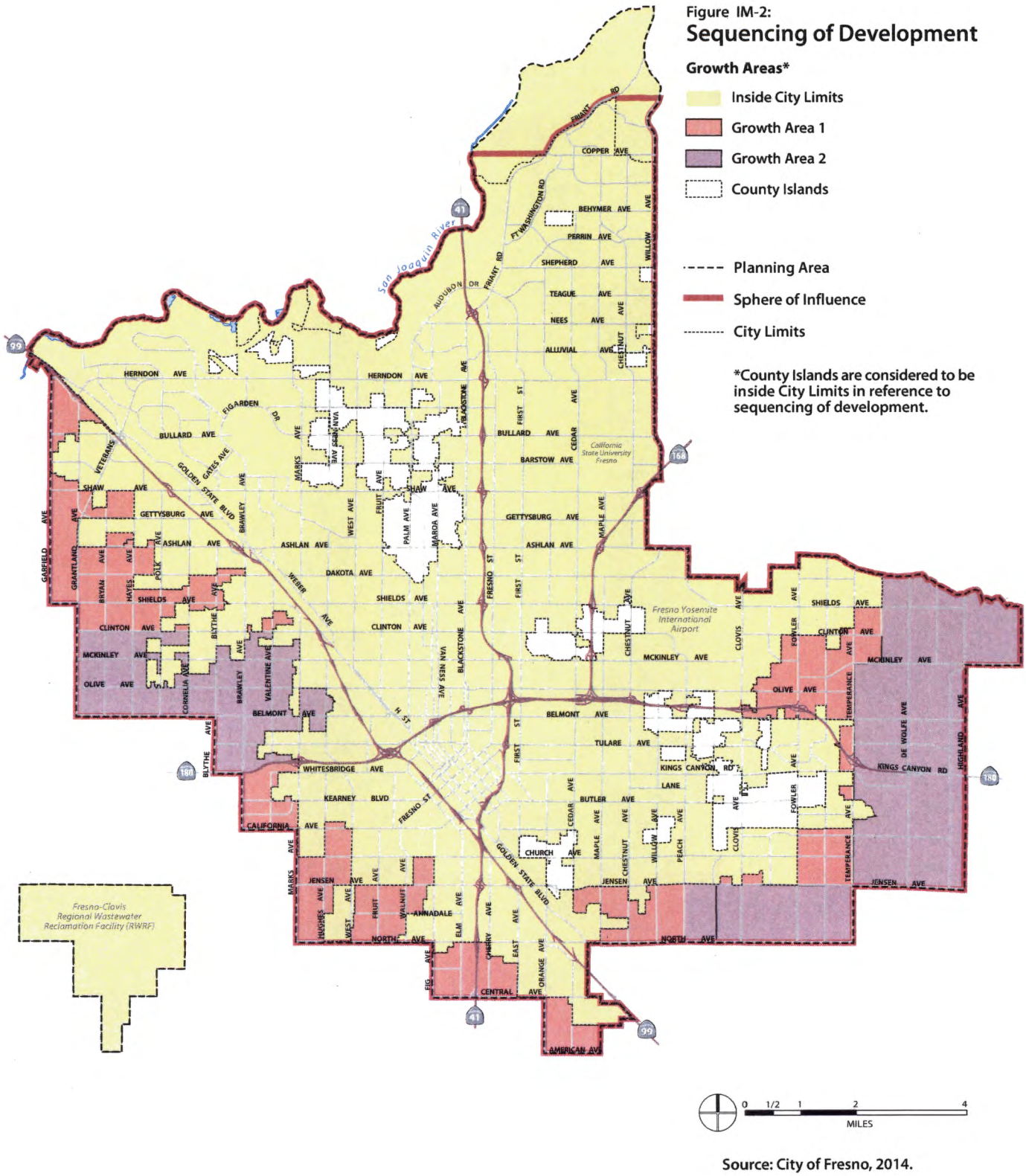

Figure IM-2:
Sequencing of Development
Growth Areas*
Inside City Limits
Growth Area 1
Growth Area 2
County Islands
Planning Area
Sphere of Influence
City Limits
*County Islands are considered to be inside City Limits in reference to sequencing of development.
San Joaquin River
Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF)
California State University Fresno
Fresno Yosemite International Airport
0 1/2 1 2 4
MILES
Source: City of Fresno, 2014.

EXHIBIT D

EXHIBIT D

The City will be responsible for paying the District for all costs associated with delivering water Out of Season Deliveries which will include but not limited to:

i. Staff time to deliver water (includes salary wage, labor burden and overhead.
ii. Cost to operate vehicles to operate and inspect the canal system.
iii. Power costs associated with running District's SCADA/Telemetry system, automated gate valves, flow meters, automated trash screens, etc.
iv. Repairs to the canals system which are caused by water running outside the normal irrigation season. Repairs may include but not limited to canal lining, gate replacement, structure replacement, earthwork (grading, dredging, etc.) weed treatment (aquatic or terrestrial), all-weather road maintenance, trash/debris removal, etc.

EXHIBIT E

EXHIBIT E

The Rescheduling Fee for each rescheduling request here under shall be equal to the last Friant carry over charge assessed for a water year prior to the date to the request.

47087

RECORDED IN OFFICIAL RECORDS OF FRESNO COUNTY, CALIFORNIA
AT 41 MIN. PAST 3 P.M.
JUN 24 1974
H. L. MASINI, County Recorder
FEE $

BOOK 6316 PAGE 31

AGREEMENT BETWEEN FRESNO IRRIGATION DISTRICT AND CITY OF FRESNO FOR EXCHANGE OF RECYCLED WATER

This agreement entered into this 20th day of June 1974, by and between FRESNO IRRIGATION DISTRICT, a public corporation (herein called "District"), and the CITY OF FRESNO, a municipal corporation (herein called "City");

WITNESSETH:

WHEREAS, Fresno Irrigation District is the owner of water rights on the Kings River and a water distribution system for the distribution of irrigation waters for agricultural use within the District and has entered into contracts with the United States for an additional supply of water from the Friant-Kern Canal and for storage in Pine Flat Reservoir on the Kings River for the purpose of supplementing the water available for such use within the District; and

WHEREAS, the City of Fresno is located entirely within the exterior boundaries of the District and is the owner of a water distribution system used by City for delivering water to persons and lands both within and outside its City limits for municipal, industrial and domestic uses and is also the owner of a liquid waste treatment plant located within the District southwest of the city limits which is used for the treatment, percolation, purification, recycling and other disposition of liquid effluent from the City and intends to enlarge and improve said facilities and to produce by such treatment, percolation, purification and recycling, water which is of a quality suitable for agricultural use; and

WHEREAS, the entire area represented by the District and by the City is a water deficient area and the District is in need of additional waters for agricultural use and the City is in need of additional water for municipal, industrial and domestic uses; and

To be recorded without fee on behalf of Fresno Irrigation District

WHEREAS, the amount of water available to the District for agricultural use may be increased by the use of water recycled by the City as above described and the amount of water available to the City for use in its water distribution system for municipal, industrial and domestic uses may be increased by the exchange of such recycled water for the use by District of additional Kings River and/or Friant-Kern Canal water in that portion of the District northeast of the City; and

WHEREAS, City is desirous of maintaining a water level under its liquid waste treatment plant that will provide for maximum efficiency in the operation of its said plant; and

WHEREAS, a greater beneficial use and more economical utilization of all of the waters available to both the District and to the City can be obtained by the use of such waters as herein provided and both parties believe it is in the best interests of all the landowners and inhabitants within the District and within the City to enter into such an agreement;

NOW, THEREFORE, it is mutually agreed as follows:

1. Approval by United States and State Water Quality Board. Immediately upon the approval of this contract by the parties hereto, it shall be presented to the United States, and also to the California Regional Water Quality Control Board, or its successor agency, for their approval and shall not become effective for any purpose until such approval has been obtained.

This contract shall be at all times subject to all of the terms and conditions of the City Bureau Contract, the District Bureau Contracts and the District Kings River Intra-Association Agreements and to the extent that any agreement contained herein is contrary to or inconsistent with any term or condition of those contracts or agreements, this contract shall be unenforceable. In the event the performance of any agreement contained herein shall become unenforceable or shall be in violation of any Federal,

State or local statute or ordinance or of any decision of any court of competent jurisdiction, the entire contract may be terminated by either party upon written notice mailed to the other party.

2. Definitions. For purposes of this agreement the following words and phrases shall be defined as follows:

(a) "Agricultural use" means the use of water primarily in the production of agricultural crops, including the irrigation of lands and underground water replenishment.

(b) "Recycled water" means water which has been treated and percolated into the underground water supply under the City's liquid waste treatment plant in the southwest portion of the District which is thereafter pumped from said underground water supply.

(c) "City Bureau Contract" means that certain contract between the United States and the City of Fresno providing for water service dated January 12, 1961.

(d) "District Bureau Contracts" means those certain contracts between the United States and Fresno Irrigation District more particularly described as follows:

Contract between the United States of America and Fresno Irrigation District Providing for the Payment of the District's Share of the Cost of Pine Flat Dam and Reservoir Allocated to Irrigation, dated December 23, 1963.

Contract for Operation and Maintenance of Irrigation Storage Space of Pine Flat Reservoir dated December 23, 1963.

Kings River Allocation Contract, dated December 23, 1963.

Conveyance and Covenants in Compromise and Settlement of Fresno Slough Claims, dated April 23, 1965.

Contract between the United States and Fresno Irrigation District Providing for Water Service, dated July 20, 1964.

(e) "District Kings River Intra-Association Agreements" means those certain contracts relating to Kings River and storage in Pine Flat Reservoir more particularly described as follows:

Water Right Indenture, dated May 3, 1927.

Administrative Agreement and Monthly Diversion Schedule dated May 3, 1927.

Agreement Supplementing and Amending Water Right Indenture Dated May 3, 1927, and Supplementing and Amending Administrative Agreement Dated May 3, 1927, Relating to Kings River Water Association, and Amended Monthly Diversion Schedule, dated June 1, 1949.

Agreement Admitting Kings River Water District As a Member of Kings River Water Association and Agreement Re: Centerville Bottoms Schedule, dated September 10, 1963.

Agreement Supplementing and Amending Water Right Indenture Dated May 3, 1927, and Administrative Agreement Dated May 3, 1927, Each as Amended and Supplemented June 1, 1949, Relating to Kings River Water Association, dated September 10, 1963.

3. Agreement to Deliver and Accept Recycled Water. During the term of this agreement City agrees to deliver and District agrees to accept from City recycled water pumped by City from the area under its liquid waste treatment plant in amounts and under the terms and conditions hereinafter provided. When so delivered to District said water shall become the property of the District to be used for agricultural purposes and for underground water replenishment in the southwest portion of the District as the District shall see fit.

4. Water Quality. The City shall not deliver to District or discharge into District's canals any such recycled water which is not of a quality suitable for all agricultural use or which shall be deleterious to plant or animal life and all water so delivered shall meet all the quality standards of the California Regional Water Quality Control Board, or its successor agency, for agriculture and irrigation use and any other federal, state or local agency having jurisdiction or control over water quality standards. City agrees at its expense to make such periodical tests to determine the quality of the water discharged into District's canals at the point where said water is so discharged as may be required by any such board or agency or as may be required by the District's manager and to submit the results

of such tests in writing to the District forthwith after such tests are made. City further agrees that any complaint that said recycled water does not meet the above standards, including but not limited to complaints from any such board or agency, the County of Fresno, any mosquito abatement district or any user of such recycled water, must be corrected and resolved to the satisfaction of District before any further discharge of water into said canals shall be made without the express consent of the District.

5. Exhibit A. A map showing the exterior boundaries of the District, the District's canal system, the city limits of the City of Fresno, the location of City's liquid waste treatment plant site, the exact locations at which City may discharge water into the District's canal system, the type and capacity of the discharge facilities by which each such discharge may be made, the location of observation wells as provided in Paragraph 9, and those portions of the District designated by the parties as the "easterly" and "westerly" portions of the District for purposes of this agreement shall be prepared by the District's engineering department and approved in writing upon said map by the authorized representatives of the District and the City. When so approved said maps shall be incorporated herein by reference as Exhibit A and shall become a part hereof. One duplicate so approved shall be kept in the office of the City and one in the office of the District. Said map may be amended in writing upon said map and reapproved in writing as above set forth.

6. Place and Time of Delivery. City will deliver all such water to the District during the District's irrigation season which may at the election of the District be extended to accommodate the recycled water received under this agreement. Said water delivered by the City to the District shall be discharged by the City into the District's Dry Creek Canal No. 77 and/or Houghton-

Canal No. 78 at the locations approved by the District and shown on the map marked Exhibit A and at no other location or locations.

7. Amount to be Delivered. The City shall deliver to the District under this agreement, subject to District's acceptance as provided herein, recycled water pumped by the City, which shall be delivered at a minimum rate of delivery of 100,000 acre feet in each ten-year period of this contract, provided, however, such delivery will not exceed the amount of 30,000 acre feet in any one year except that such maximum may be increased upon agreement between the District's manager and the Director of Public Works of the City. At least 10 days prior to the first day of each calendar month during the term of this agreement City will submit to District in writing a schedule of the daily amount of such water proposed to be delivered to District at each discharge point during that month and the rate of flow indicated in cubic feet per second at which said water will be delivered. Upon receiving said schedule District's manager will approve the amount of such water the District is willing to accept at each said discharge point during each day of that month and thereafter City shall deliver to District the daily amount of such water so approved. Said daily deliveries shall be at a continuous and constant rate of flow during the entire 24 hour period of each said day. In no event shall the discharge into Dry Creek Canal No. 77 in any one month be in excess of one-half of the total amount delivered to District in that month or the discharge into the Houghton Canal No. 78 in any one month be more than two-thirds of the total amount delivered to the District in that month and in no event shall the rate of discharge of water into Dry Creek Canal No. 77 exceed 60 c.f.s. or the rate of discharge into Houghton Canal No. 78 exceed 120 c.f.s. No such discharges shall be made into District's canals until said discharges have been approved

gives immediate notice thereof to the District. In such event City shall use all reasonable effort to immediately restore the delivery of water to the level approved by District's manager as provided in paragraph 7. District's manager may refuse to agree to any such change in schedule or to accept water under such changed schedule if he reasonably determines that such change may result in damage to a District canal or to other property of the District or any other person or will interfere with the operation, alteration, repair or maintenance of the canal into which said discharge is to be made or will interfere with some other operation or function of the District.

9. Ground Water Level. City shall not pump said recycled water from the underground water reservoir in such a manner or to the extent that it will adversely affect the elevation of the water table in the area surrounding its liquid waste treatment plant as determined by the District. Such effect shall not be deemed to be adverse if the ground water level is not lowered below the gradients established by the District as existing on August 1 of the previous year. City agrees to monitor ground water levels in the area from which said recycled water is pumped on a monthly basis by means of observation wells located within an area surrounding its liquid waste treatment plant. The number and location of said wells shall be agreed upon by the City and the District, and when so agreed upon shall be shown on Exhibit A as provided in paragraph 5. Each month at the time City submits its schedule of proposed discharges, City shall supply District with the results of said observations and shall also supply District with a statement of the amounts discharged into District's canals during the previous month. Said schedule and said information shall be given to District upon a standard form approved by District's manager.

10. Construction and Maintenance of Facilities. All

discharge facilities to be used by City in discharging said water into said canals and suitable measuring devices required to measure the amount of water discharged into District's canals shall be constructed by City at its expense according to plans and specifications approved by District and shall thereafter be maintained in good operating and working condition by and at the expense of City. Said discharge facilities shall have a discharge capacity not greater than that shown on said map marked Exhibit A and shall be equipped with positive shut-off controls by which any and all discharges of water into District's canal system may be shut off immediately and at any time. City shall at all times protect said canals and their banks from any damage, injury or erosion at the locations of said facilities into said canals and any such damage or injury at such locations shall be repaired at the expense of City. If City fails to do so District shall be entitled to make said repairs and the expense thereof shall forthwith be reimbursed by City.

11. Use of Water Available to District. In consideration of the agreements of the City herein contained, District agrees that insofar as feasible and practical, it will make available from its Kings River water or from the water received by it under its Bureau Contracts an additional amount of water equivalent to 46% of the water received by it from the City under this agreement for agricultural use and for ground water replenishment in the easterly portion of the District as indicated on Exhibit A. The term "additional amount of water" as above used shall mean water in addition to the amount of water which would have been made available for use in that area if said recycled water had not been received by the District and used in the westerly portion of the District as indicated on Exhibit A. If the District shall determine that the use of said water in said area is not feasible or practicable it may, after discussion with the City, use such

water elsewhere. If in the future it is deemed desirable to do so, City, with the approval of District, may cause the dividing line between the easterly portion of the District and the westerly portion of the District to be moved to the west and the percentage of water to be made available in said easterly portion of the District to be increased in proportion to the increase in the area of land within said easterly portion.

12. District's Representative. Wherever it is provided in this agreement that District's manager shall do and act or exercise his discretion in respect to any particular matter said act and said exercise of discretion may be performed by any other representative of the District to whom such authority shall be delegated either by the District's Board of Directors or by said manager. In exercising his said discretion, the District's manager or his authorized representative shall weigh and balance the equities of the parties in respect to the interests of each and the necessities of District's operations in relation to those of the City. However, in any such case, his decision shall be final.

13. Ownership of District's Water Rights, Canals and Storage. Nothing contained in this agreement shall in any way affect District's ownership of its canal system or of its water right or its right to storage in Pine Flat Reservoir or give City any right or interest therein.

14. Expense of Performance. The performance of all terms and conditions of this agreement to be performed by City shall be at the expense of City and the performance of all terms of this agreement to be performed by District shall be at the expense of District.

15. Indemnity. City agrees to indemnify District and save District harmless of, from and against any loss, cost, expense, liability or attorney's fees incurred by District as the result of

any claim made by any third party because of the City's pumping from the underground water supply as above described or in any way arising out of the execution or performance of this agreement unless such loss, cost, expense or liability is caused by independent negligence on the part of the District in performing the terms and conditions of this agreement on its part to be performed.

16. Successors and Assigns. This agreement shall be binding upon the successors and assigns of the parties hereto provided that City's right to discharge water into District's canal system is not transferable or assignable and shall not pass to any successor in interest without the consent of District. This agreement is not made for the benefit of any person, firm, corporation or public entity not a party hereto and no person, firm, corporation or public entity except a party hereto or its successor or assign shall have any right to enforce said agreement under California Civil Code §1559 or otherwise.

17. Amendments. Except as otherwise provided herein this agreement may not be amended except by the written agreement of the parties hereto.

18. Term, Termination. The term of this contract shall be twenty years from its date, except that it may be cancelled upon mutual agreement between the parties hereto. The contract shall continue in effect after the end of said term except that it may be terminated thereafter by either party upon one year's written notice of such termination. Notwithstanding the foregoing, this contract may be terminated at any time, upon sixty days' written notice by either party, given on and because of substantial breach by the other party, which breach is not repaired or corrected before the end of said sixty-day period.

IN WITNESS WHEREOF, the parties hereto have executed this

agreement the day and year first above written.

FRESNO IRRIGATION DISTRICT

By Winston Strong
President

By Ardys T. Gorder
Secretary

ATTEST:

CITY OF FRESNO

Gladys Douglass
City Clerk Deputy

By F. W. Hanley
Chief Administrative Officer

State of California)
County of Fresno) ss.

On this 20th day of June in the year one thousand nine hundred and seventy-four, before me, Paul H. Willison a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared ..... known to me to be the President and Winston Strong known to me to be the Secretary of the Fresno Irrigation District the corporation that executed the within instrument, and known to me to be the person S who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at my office in said County, the day and year in this Certificate first above written.

Paul H. Willison
Notary Public in and for said County and State

OFFICIAL SEAL
PAUL H. WILLISON
NOTARY PUBLIC, CALIFORNIA
PRINCIPAL OFFICE IN
FRESNO COUNTY
My Commission Expires November 19, 1977

CORPORATION ACKNOWLEDGMENT
Kilner Stationery Co.
1916 Echo

FORM K108

APPROVED AS TO FORM
SPENCER THOMAS, JR., City Attorney

By Assistant Macomber
Senior Deputy

Mail to: City of Fresno Waste Water Treatment Plant
5607 W Jensen Avenue
Fresno, Ca. 93706
Attn: Mr. Joel Dekker

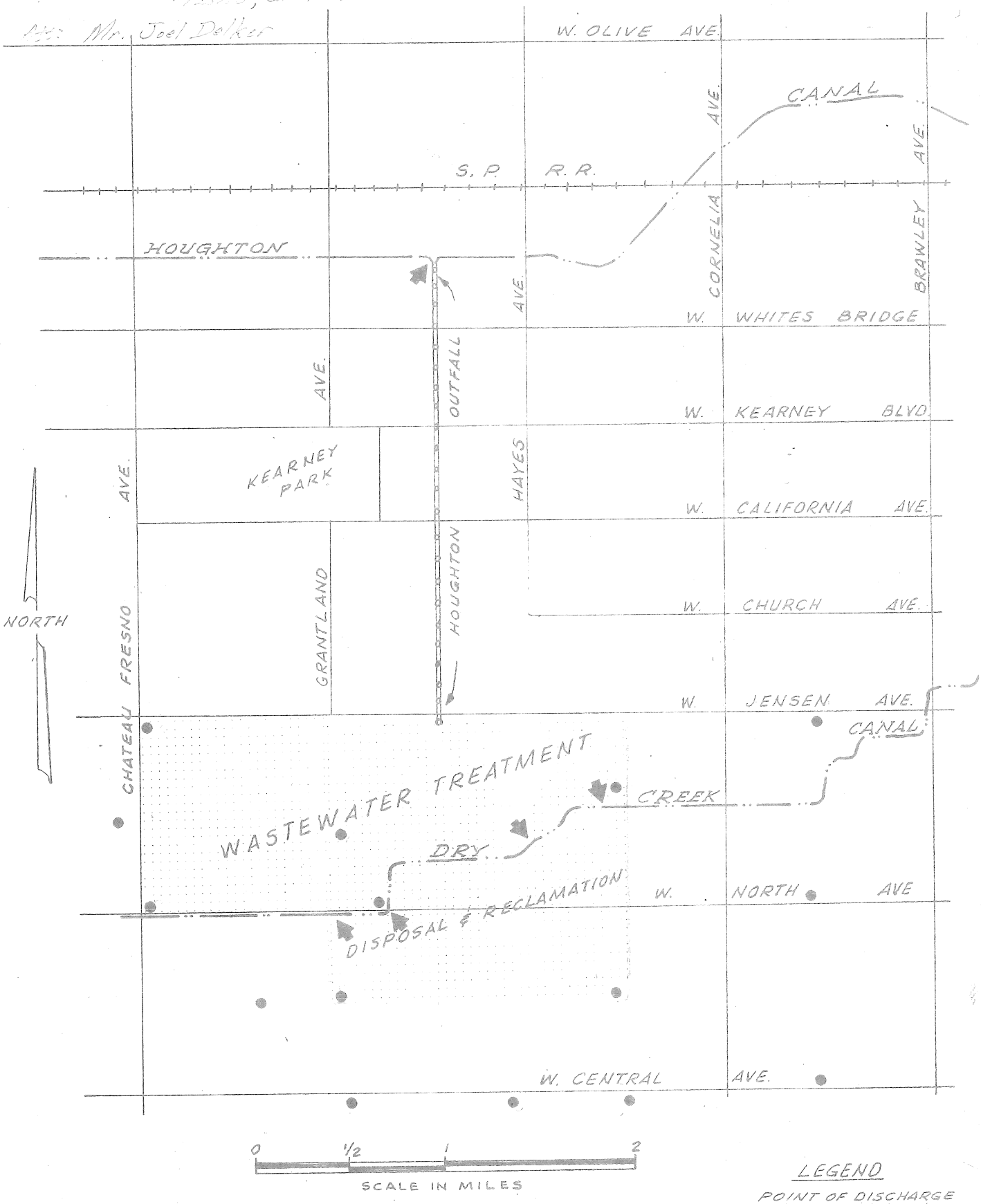


EXHIBIT A-1

J

Water Shortage Contingency Plan

City of FRESNO
Department of Public Utilities

2020 Water Shortage Contingency Plan

Final

JULY 2021 | CITY OF FRESNO



Photo Credit: Downtown Fresno Partnership

WSC

City of FRESNO
Department of Public Utilities

CITY OF FRESNO

Final
2020 Water Shortage Contingency Plan

JULY 2021



Prepared by Water Systems Consulting, Inc.

WSC

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ACRONYMS & ABBREVIATIONS

AMI	advanced metering infrastructure
City	City of Fresno
CWC	California Water Code
DPU	Department of Public Utilities
DRA	Drought Risk Assessment
DWR	Department of Water Resources
FID	Fresno Irrigation District
FMC	Fresno Municipal Code
SWTF	Surface Water Treatment Facility
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WSCP	Water Shortage Contingency Plan
WSIP	Water Storage Investment Program

1.1 Introduction

The Water Shortage Contingency Plan (WSCP) is a detailed plan on how the City of Fresno (City) intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time. The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for responsible management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

The WSCP describes the following:

1. **Water Supply Reliability Analysis:** summarizes the City's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition
2. **Annual Water Supply and Demand Assessment Procedures:** describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions
3. **Six Standard Shortage Stages:** establishes water shortage levels to clearly identify and prepare for shortages
4. **Shortage Response Actions:** describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand as well as minimize social and economic impacts to the community
5. **Communication Protocols:** describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements
6. **Compliance and Enforcement:** defines compliance and enforcement actions available to administer demand reductions
7. **Legal Authority:** lists the legal documents that grant the City the authority to declare a water shortage and implement and enforce response actions
8. **Financial Consequences of WSCP Implementation:** describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens
9. **Monitoring and Reporting:** summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation, with results used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced
10. **WSCP Refinement Procedures:** describes the factors that may trigger updates to the WSCP and outlines how to complete an update
11. **Special Water Features Distinctions:** identifies exemptions for ponds, lakes, fountains, pools, and spas, etc.
12. **Plan Adoption, Submittal, and Availability:** describes the process for the WSCP adoption, submittal, and availability after each revision

This WSCP was prepared in conjunction with the City's 2020 Urban Water Management Plan (UWMP) and is a standalone document that can be modified as needed. This document is compliant with the California Water Code (CWC) Section 10632 and incorporated guidance from the State of California Department of Water Resources (DWR) UWMP Guidebook.

Water purveyor planning for possible water supply shortages has become an increasingly important subject considering the drought conditions over the last several years. The City adopted its first WSCP in 1994 in response to the 1991 Assembly Bill 11X, which mandated all water purveyors with more than 3,000 connections develop a WSCP. The WSCP was revised as part of the 2005 UWMP and adopted by the City in 2008. The WSCP was further refined in 2016 during preparation of the 2015 UWMP and is being updated in 2021 as a standalone document, developed in parallel with the 2020 UWMP. The 2020 WSCP is still based on the original 1994 plan. The revisions are intended to meet new CWC requirements and streamline the plan's usefulness and enable the City to manage the necessary conservation measures to be enacted if a water shortage condition exists. The 2020 WSCP will be reviewed and adopted in conjunction with the 2020 UWMP.

The plan is intended to provide guidance, rather than absolute direction, for City action in response to water shortages and provide the City with options to responsibly manage water shortages.

1.2 Water Supply Reliability Analysis

This section is consistent with CWC Section 10632(a)(1) and describes the key findings of the water supply reliability analysis conducted pursuant to CWC Section 10635, which is presented in **Chapter 7** of the City's 2020 UWMP. As part of the 2020 UWMP, water suppliers must perform long-term (2025-2045) water service reliability assessment to evaluate reliability under normal, single dry year, and five-year consecutive dry year periods and a short-term (2021-2025) Drought Risk Assessment (DRA) to evaluate reliability under a five-year consecutive dry year period. Water supply reliability reflects the City's ability to meet the water needs of its customers with water supplies under varying conditions. The analysis considers plausible hydrological and regulatory variability, infrastructure capacity, climate conditions, and other factors that affect the City's water supply and demand.

The City's current water supply portfolio includes groundwater from the Kings Subbasin, surface water from the Central Valley Project Friant Division through a contract with the United States Bureau of Reclamation (USBR), and surface water from the Kings River through a contract with Fresno Irrigation District (FID), as well as recycled water produced at the Fresno-Clovis Regional Water Reclamation Facility and North Fresno Water Reclamation Facility. The City manages the surface water supplies and groundwater conjunctively such that surface water supplies are used more heavily for direct use and recharge during wet periods and groundwater is used more heavily during dry periods. Over the long term, the City aims to maximize recharge to store water for future use and help groundwater levels recover. Key issues that may create a shortage conditions include reduced surface water availability due to dry hydrologic conditions, reduction in groundwater due to contamination issues, or emergency conditions that reduce the City's water supply.

The water supply reliability analysis concluded that the City's supply portfolio is highly reliable and allows the City flexibility to use a majority of surface water when available in normal years and switch to a majority of groundwater in dry years, when surface water supplies are reduced.

The City is projected to meet potable demands with its existing supplies in all year types through conjunctive use of its groundwater and the City is projected to recharge water in most years to help store water for dry years.

1.3 Annual Water Supply and Demand Assessment

As established by CWC Section 10632.1, urban water suppliers must conduct an Annual Water Supply and Demand Assessment (Annual Assessment) and submit an Annual Water Shortage Assessment Report to DWR, with the first deadline July 1, 2022[1]. The Annual Assessment is an evaluation of the short-term outlook for supplies and demands for the current year and one projected single dry year conditions to determine whether the potential for a supply shortage exists and whether there is a need to trigger a WSCP shortage stage, appropriate response actions, compliance and enforcement actions, and communication protocols.

1.3.1 Key Data Inputs

Key data inputs and their sources for the Annual Assessments are summarized in **Table 1,** and described below**.**

Table 1. Key Data Inputs for the Annual Assessment

KEY DATA INPUT	DESCRIPTION	SOURCE
Customer demands	Estimates current year unconstrained demand plus a modest growth factor	Customer billing data, 2020 UWMP projections, input from City staff
Recharge demands	Estimates current year recharge demand	Surface water allocations, historical recharge, groundwater levels
State mandates	Reflects State orders and mandatory compliance with water use efficiency standards	Executive orders from the governor, orders and policies from the State Water Resources Control Board, input from City staff, or other sources
Surface water allocation	Reflects the City's available surface water supplies for treatment, recharge, and potential exchanges and transfers	Initial allocations from USBR and FID, typically available in April
Groundwater conditions	Reflects status of groundwater conditions	Production data, static water levels, and input from City staff
Infrastructure capacity	Reflects production and distribution capacity due to a variety of factors, including human-caused or natural catastrophic events	Production data, well production capacity, wells impacted by contamination, surface water treatment facilities' capacity, distribution system constraints, input from City staff

[1] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

1.3.1.1 Customer Demands

Upcoming year customer demands will be estimated based on the previous year's demand, with increases to address: (1) near-term projected growth of customers; (2) unconstrained water use if the previous year included any water use restrictions; and (3) potential water losses not accounted for in the previous year's demand.

1.3.1.2 Recharge Demands

Upcoming year recharge demands will be estimated by (1) availability of surface water not used at the surface water treatment facilities (SWTFs) and (2) projected availability of recharge basins.

1.3.1.3 State Mandates

The City has historically been required by the State to reduce demand regardless of supply reliability at the given time. As described previously, compliance with State mandates for water use efficiency can be declared during drought or in preparation for future droughts, such as in response to the governor's drought declarations in the 2012–2016 drought with subsequent Executive Order B-37-16 and related legislation for Making Conservation a California Way of Life. The City may consider State mandates and mandatory compliance with water use efficiency standards in determining water shortage levels.

1.3.1.4 Surface Water

The City has contracts for surface water with USBR and FID. The available surface water is dependent on hydrology, and in dry years less surface water is available to the City. Final allocations from both USBR and FID are known in April of each year, following the rainy season. In April, the City works with FID to develop a delivery schedule of surface water supplies and submits it USBR. The surface water allocation and delivery schedule will determine the City's operation of its SWTFs for the year, recharge operations, and if it will engage in any exchanges or transfers of supplies. In dry years, when less surface water is available, the City will also plan for increased groundwater use to meet its demands.

1.3.1.5 Groundwater Conditions

Groundwater level and production trends will be compiled and considered by the City staff, or with a hydrogeologist, based on the following actions:

- Plot static groundwater levels on hydrographs to determine trends.
- Plot historic and projected production data to determine trends.
- Compare historic and projected groundwater levels against production data for average and dry years.

1.3.1.6 Infrastructure Capacity

Infrastructure capabilities and overall production will be analyzed to determine if a possible power outage or deficiency may occur or continue in the coming year due to a variety of factors, potentially including human-caused or natural catastrophic events. This analysis may include well replacement, evaluation of wells for possible contamination, SWTFs capacities, and other considerations.

1.3.2 Evaluation Criteria

Staff will use the key data inputs to develop and compare supply and demand projections to determine if water shortage actions may be necessary. A preliminary Annual Assessment template is included in **Attachment 1**. Note that supply projections will incorporate infrastructure constraints and an operational buffer factor of 10% will be added to the demand estimate to account for supply and demand projection uncertainties. The estimated amount of supply available versus the estimated demand will be compared with the water shortage condition triggers presented in **Table 2**. Various trigger conditions, which summarize specific evaluation criteria for each shortage level and can be used to determine a water shortage level, are described in the following sections. Triggers are based on current conditions, and the City will evaluate these triggers and modify them as needed.

A shortage emergency may be declared when it is demonstrated that conditions threaten the ability to provide water for public health, safety, and welfare of the community. Furthermore, compliance with State mandates for water use efficiency can be declared during drought or in preparation for future droughts, such as in response to the governor's drought declarations in the 2012–2016 drought with subsequent Executive Order B-37-16 and related legislation for "Making Conservation a California Way of Life".

Short-term and long-term supply shortages may be caused by constrained production capacity or natural or human-caused catastrophic emergencies, such as: power outages, winter storms, wildfires, earthquakes, structural failures, contamination, and bomb threats. These types of emergencies may limit the City's immediate ability to provide adequate water service to meet the requirements for human consumption, sanitation, and fire protection. Impacts of such emergencies vary in duration. Thus, consumption reduction measures and prohibitions may differ for short-term and long-term conditions or shortages.

1.3.3 Annual Assessment Procedures

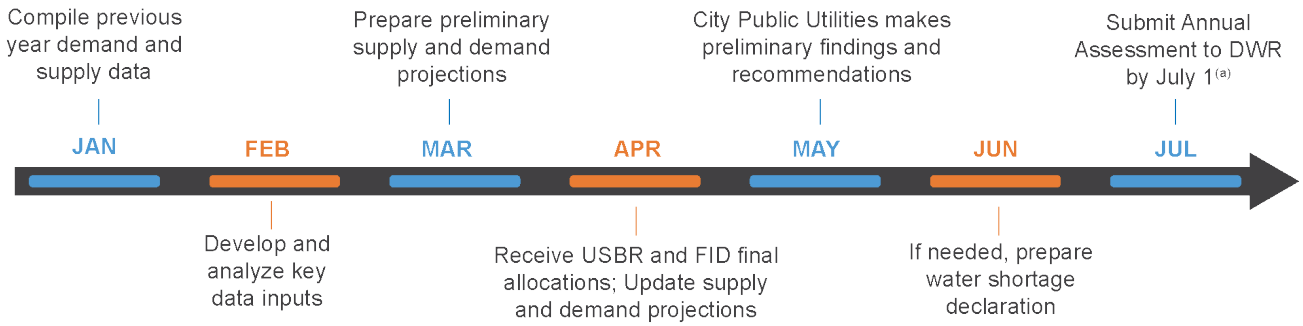
City staff will perform the Annual Assessment following initial allocations from USBR and initial projections for Kings River entitlements by FID, which is typically at the end of rainy season in April. The Annual Assessments are due to DWR by July 1 of each year[2] with the first Annual Assessment Report due to DWR by July 1, 2022. A preliminary annual assessment timeline is shown in **Figure 1.** The City may update the assessment after submission if key data inputs substantially change or other new information becomes available.

[2] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

Steps to conduct the Annual Assessment are as follows:

1. Staff gathers the key inputs, compiles historical data, and analyzes potential supply and demand gaps.
2. Demand trends, water supply conditions, and production capacity are analyzed.
3. A hydrogeologist may be consulted to provide additional groundwater condition information.
4. City Public Utilities staff will review findings and, if necessary, determine a recommended level of conservation required at the implementation or termination of each stage that will then be brought to the City Manager or Mayor for approval.
5. The City Manager, or designee, will declare and implement the level of conservation required at the implementation or termination of each level, and the declaration shall remain in effect until the City Manager, or designee, so otherwise declares. If a conservation level declaration is made, the declaration shall be published at least once in a newspaper of general circulation.
6. The City will develop and/or implement appropriate communication protocols and applicable response actions.

Figure 1. Annual Assessment Approximate Timeline



[a] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

1.4 Standard Water Shortage Levels

This section is consistent with CWC Section 10632(a)(2) and describes the City's water shortage levels. New to the 2020 UWMP, water suppliers must now consider six standard water shortage levels. Shortage levels indicate the gap between supply and demand compared to normal-year conditions. DWR standardized six shortage levels to provide a consistent regional and statewide approach to measure water supply shortage conditions. The six shortage levels correspond to 10%, 20%, 30%, 40%, 50%, and greater than 50% shortage in supplies compared to demands under normal conditions. However, a water supplier may use its own shortage levels if a crosswalk is included, relating its existing shortage levels to the six standard levels.

The City has elected to keep the previously established four water shortage stages from the 2016 WSCP and add a fifth stage to classify supply shortage greater than 50%. A crosswalk between the City's stages and DWR's standard levels is shown in **Figure 2**.

Figure 2. Water Shortage Stages Crosswalk

City of Fresno Shortage Stage	Percent Shortage Range	Standard WSCP Level	Percent Shortage Level
1	10%	1	10%
2	10 - 25%	2	20%
3	25 - 35%	3	30%
4	35 - 50%	4	40%
5	>50%	5	50%
		6	>50%

Although the water shortage stages are classified by the same percentages as the 2015 UWMP, the City has reevaluated the supply conditions and criteria to enter that stage to better reflect its supply portfolio in comparison to demand. **Table 2** lists the water shortage stages and the conditions that would trigger each stage. Any stage listed within the WSCP may be enacted by the City Manager, or designee, as deemed appropriate based on the water shortage condition.

Table 2. Water Shortage Contingency Plan Levels (DWR 8-1)

SHORTAGE LEVEL	PERCENT SHORTAGE[a]	WATER SHORTAGE CONDITION
0		No water shortage condition. Corresponds with year-round water use measures listed in Section 1.5.1 and demand reduction measures listed for "All" stages in Table 3.
1	0-10%	Stage 1 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **100%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 2 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10-25%	Stage 2 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **90%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 3 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
3	25-35%	Stage 3 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **75%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 4 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
4	35-50%	Stage 4 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **65%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 5 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
5	>50%	Stage 5 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **50%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment.

[a] Shortage levels indicate the gap between supply and demand compared to normal-year conditions. The Annual Assessment incorporates a 10% buffer on top of projected demands for conservative planning.

[b] Water year types were defined 2006 San Joaquin River Restoration Settlement Agreement for USBR allocations and characterized in Section 6.2 of the City's 2020 UWMP.

1.5 Shortage Response Actions

The Fresno Municipal Code (FMC) contains sections on water conservation that are to take place under normal water supply conditions. Regulations in place under normal water supply conditions encourage smart water use and help the City manage its water supply. Some of those regulations include year-round outdoor water schedules; turf type restrictions; turf irrigation methods; and prohibition of willful or negligent water wasting, flood irrigating, washing hardscape with potable water, and frequent draining of pools. Additional details of these regulations can be found in FMC Section 6-520(a) (**Attachment 2**). These restrictions are mandated year-round by the City and must be observed. In addition to the normal restrictions on water usage, the City developed shortage response actions to implement during a water shortage on the City level and consumer level in order to reduce demands that are described in **Section 1.5.2** and detailed in **Table 3**.

In the event of a potential water shortage, the City will evaluate the cause of the shortage to help inform which response actions should be implemented. Depending on the nature of the water shortage, the City can elect to implement one or several response actions to mitigate the shortage and reduce gaps between supply and demand. The City has identified actions that fall within the demand reduction, supply augmentation, operational changes, and additional mandatory restrictions, as stated by DWR. It should be noted that all prohibitions listed for Stage 1 will apply to Stage 2 and, likewise, all restrictions that apply to Stage 2 will apply to Stage 3 and so on, until Stage 5 is reached. Also, due to the City's diverse supply portfolio, Stage 1 imposes only voluntary consumer reductions, while Stages 2–5 all include mandatory reduction actions. If necessary, the City may adopt additional actions not listed here in extreme circumstances.

1.5.1 Year-Round Measures

FMC Section 6-520(a) lists actions that are prohibited at all times, whether or not there is a shortage condition and include:

- Use of potable water to irrigate or water outdoor landscaping in a manner that causes runoff.
- Keep, maintain, operate, or use any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage.
- Willfully or negligently waste water as defined in FMC Section 6-501.
- Sprinkle or irrigate any yard, ground, premise, or vegetation except as set forth in the City's Outdoor Water Use Schedule.
- Sprinkle or irrigate any yard, ground, premise, or vegetation, unless watering device used is controlled by a shutoff device or a person is in immediate attendance of the hose or watering device.
- Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground, or other hard-surfaced areas, except where necessary for public health or safety.
- Use potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.
- Irrigation of ornamental turf on public street medians with potable water, except where the turf serves a community or neighborhood function, there is incidental irrigation by an irrigation system designed to irrigate trees, or the turf is irrigated with recycled water.

- Irrigating outdoor landscapes with potable water during and within 48 hours after measurable rain.
- Serve drinking water other than upon request in eating or drinking establishments, including but not limited to, restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served or purchased.
- Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
- Automatically changing towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily.
- Drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer.
- Prohibit filling new or refurbished swimming pools without obtaining a pool fill permit from the City.
- Refill (top off) established swimming pools except during times when outdoor water use is allowed at the property address pursuant to the Outdoor Water Use Schedule

The City may update these year-round restrictions in the future as needed. For the latest permanent restrictions refer to FMC Section 6-520(a) (**Attachment 2**) and the latest WSCP Resolution (**Attachment 3**).

1.5.2 Demand Reduction

The City has identified a variety of demand reduction actions to offset supply shortages. Demand reduction measures are strategies intended to decrease water demand to close the gap between supply and demand. Demand reduction actions available to the City that may be considered during water shortage conditions are summarized in **Table 3**. Although it is difficult to estimate the volume of savings for each action, the City expects to meet required reductions through a combination of response actions in conjunction with outreach and communication efforts to the extent necessary to mitigate any impacts from a water shortage.

Table 3. Demand Reduction Actions by City (DWR 8-2)

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?[a]	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT[b]
All	Expand Public Information Campaign	Not Applicable	Community outreach includes classroom presentations, outreach educational information, and water tours. Increase communication as drought stages increase.	Not Applicable
All	Improve Customer Billing	Not Applicable	Water bills show customer usage vs. average usage for the customer category. Increase customer notifications of high water use based on advanced metering infrastructure data as drought stages increase.	Not Applicable
All	Offer Water Use Surveys	Not Applicable	Use water leak surveys with all community members.	Not Applicable
All	Provide Rebates for Landscape Irrigation Efficiency	Not Applicable	The City offers rebates for micro-irrigation conversions, soil moisture sensors, smart irrigation controller, and rain sensors to improve efficiencies.	Not Applicable
All	Provide Rebates for Turf Replacement	Not Applicable	The City provides rebates for community members who wish to replace their turf with a drought-resistant garden.	Not Applicable
All	Provide Rebates on Plumbing Fixtures and Devices	Not Applicable	The City offers rebates on a variety of high-efficiency plumbing fixtures, such as washers, toilets, and urinals.	Not Applicable
All	Decrease Line Flushing	Not Applicable	The City uses NO-DES for regular pipe flushing to eliminate discharging water.	Not Applicable
All	Reduce System Water Loss	Not Applicable	The City has a comprehensive system water loss reduction program in place. Increase efforts to correct water system losses as drought stages increase.	Not Applicable
1	Decrease Line Flushing	0 to 100% of shortage gap	For dead-end flushing where the NO-DES truck cannot be used, reduce normal flushing time.	Not Applicable
1	Increase Water Waste Patrols	0 to 100% of shortage gap	Increase monitoring of AMI reporting and communication with customers; Conduct patrols based on public input.	Not Applicable
1	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Voluntary limits: Summer: three days/week Winter: one day/week	No
2	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: three days/week Winter: one day/week	Yes
3	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: two days/week Winter: one day/week	Yes
4	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: one day/week Winter: one day/week	Yes
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, and building washdowns where non-potable or recycled water is sufficient.	Yes

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?[a]	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT[b]
4	Other — Prohibit vehicle washing except at facilities using recycled or recirculating water	0 to 100% of shortage gap	Prohibit washing cars, boats, trailers, aircraft, or other vehicles, except at commercial or fleet vehicle-washing facilities using water recycling equipment.	Yes
4	Pools and Spas - Require covers for pools and spas	0 to 100% of shortage gap	Require covers for swimming pools when not in use.	No
4	Other	0 to 100% of shortage gap	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City manager.	Not Applicable
4	Other	0 to 100% of shortage gap	Prohibit use of outdoor misters.	No
5	Landscape — Prohibit all landscape irrigation	0 to 100% of shortage gap	Prohibit outdoor irrigation year-round.	Yes
5	Moratorium or Net Zero Demand Increase on New Connections	0 to 100% of shortage gap	The City will temporarily limit or ban new water service connections within the service area.	Not Applicable

[a] Reduction in the shortage gap is estimated and can vary significantly.
[b] Refer to Section 1.7 for Penalties for Water Wastage.

1.5.3 Supply Augmentation

Given the consistent supply of groundwater through pumping, the City has no immediate plan to augment supply. However, the City could purchase additional USBR or FID surface water, if available. Also, the Cities of Fresno and Clovis have an agreement for interconnection of their potable water systems to provide service during emergencies and other times of hardship in either community. Although these options are discretionary and quantifying their ability to reduce the shortage gap can vary significantly, they are readily available if needed, as indicated in **Table 4**.

Table 4. Supply Augmentation & Other Actions (DWR 8-3R)

SHORTAGE LEVEL	SUPPLY AUGMENTATION METHODS AND OTHER ACTIONS BY WATER SUPPLIER	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE
1 to 5	Transfers	As Needed	Purchase or exchange available USBR or FID surface water
1 to 5	Other Purchases	As Needed	Interconnection with City of Clovis for use in emergencies

1.5.4 Operational Changes

Operational changes to address a short-term water shortage may be implemented based on the severity of the reduction goal. The City can maximize its supply by implementing operational strategies and demand reduction measures. As part of the Annual Assessment process, the City will consider their operational procedures at the time of a shortage to identify changes that can be implemented to address water shortage on a short-term basis, including but not limited to:

- Utilization of a SWTF to treat pumped groundwater to offset lack of surface water supply
- Expansion of public information campaign to educate and inform customers of the water shortage emergency and required water savings
- Decrease line flushing to only on a compliant basis strictly using the currently operational NO DES truck
- Use water patrols and increase frequency of meter reading by recruiting staff from other departments if necessary
- Offer water use surveys
- Implementing or modifying drought rate structure or surcharge or water emergency tiered pricing, pursuant to the requirements of Proposition 218 and in accordance with California Law
- Prohibit any new permits for hydrant-construction or temporary construction meters.
- Monitoring construction meters and fire hydrant meters for efficient water use in the event that a meter identified wastes water.

- Moratorium on issuing any new building permit unless the: (a) Project is found by the City Manager, or designee, to be necessary for public health, safety. (b) Project will use recycled water for construction. (c) Project will not result in a net increase in non-recycled water use. (d) Project has adequate Conservation Offsets
- Suspending the consideration of annexation to its service area unless the annexation increases the water supply available more than the anticipated demands of the property to be annexed
- Reducing overhead in the short-term and mid-term by deferring non-critical Capital Improvement Plan projects and major maintenance expenditures, and in the long-term by adjusting operational and staffing levels and retail water rate structures to incorporate the reality of lower retail water sales than previously anticipated.
- Decrease in the level or, if need be, even a total interruption in the expenditures for the agency's facility replacement program. Non-critical replacement projects will have little or no impact on the agency or its customers and would only extend the master planned replacement schedule.

1.5.5 Emergency Response Plan

In addition to responding to drought conditions, the City's WSCP can be used to respond to emergency or catastrophic conditions that impact the availability of the City's water supplies, and/or the ability to deliver water within the City's service area. Potential events are listed below:

- Loss of surface water supply
- Loss of groundwater supply
- Area-wide electrical power failure
- Natural disaster — earthquake or flood

In the event of a supply interruption, there are several measures that could be taken that would mitigate the overall negative impacts of a water shortage. The following discussion indicates possible events and actions to maintain water service to the service area.

The City has an agreement with the City of Clovis that discusses an intertie system between the two cities that could provide service during emergencies and other times of hardship in either community. The agreement covers interconnections, including apportionment of capital costs, at two locations: Leonard Avenue at the Gould Canal alignment and Behymer Avenue at Willow Avenue. The Leonard interconnection was constructed and remains in place for emergency uses through manual operation. The agreement also provided for temporary deliveries from Fresno to northern Clovis through the Behymer connection through 2015. However, the Behymer interconnection has yet to be constructed.

The City also cooperates with the County of Fresno's Office of Emergency Services, and the WSCP is included in the County's Disaster Plan. The goal during any emergency scenario is to maintain water supply such that the health and safety of the community is protected.

In the event of contamination of either the surface or ground water supplies, the non-impacted water supply could be used more heavily or the intertie with the City of Clovis could be activated. Additionally, overall demand reduction and the use of other wells or treated surface water would help meet demands.

If a regional power outage were to occur, the City could use backup power generators to operate wells. This measure, in conjunction with demand reduction, could supply sufficient water for health and safety purposes. The City has more than 35 wells with backup power sources. The

City has budgeted for the installation of a backup generator for the Northeast Wastewater Reclamation Facility. The Southeast SWTF and T-3 SWTF are also equipped with backup power generators.

If a natural disaster occurs, in addition to the actions discussed above, the City will isolate any areas of the system that were compromised for emergency repairs and, potentially, use of the intertie with the City of Clovis. Implementing the WSCP could also occur to reduce demands.

For more information on actions during an emergency, refer to the City of Fresno's Risk and Resilience Assessment Report finalized in September 2020 (AARC Consultants, LLC, 2020) and the City of Fresno Emergency Response Plan finalized in March 2020 (AARC Consultants, LLC, 2020).

1.5.6 Seismic Risk Assessment and Mitigation Plan

Refer to Fresno County Multi-Jurisdictional Hazard Mitigation Plan implemented in May 2018, Annex E: City of Fresno attached in **Attachment 4**, for appropriate Seismic Risk Assessment and Mitigation Plan procedures.

1.5.7 Shortage Response Action Effectiveness

The City of Fresno has assessed its overall water reduction by evaluating the water usage trends that were discussed in SBX7-7 in conjunction with the American Water Works Association water loss calculator. See Chapters 5 and 4 of the 2020 UWMP, respectively, for additional information.

The overall decrease of water use per capita and compliance with the 2020 per capita water use target indicate that the reduction measures have been effective in the community. All of the City's customers are metered and the City will use these devices to monitor actual reductions in water use during enacted shortage levels compared to normal year conditions. This data allows the City to determine the effectiveness of the implemented shortage response actions. If reduction goals are not being met, the City Manager, or designee, can make the necessary decisions for corrective action to be taken.

1.6 Communication Protocols

The City's Department of Public Utilities (DPU) currently has a contract with JP Marketing to manage communication and outreach to the customers. The firm's services include strategic planning, creative concepts, public relations, marketing, promotion, research, advertising, media design, copywriting, event creation, and online services. The City also has a public information officer and communications team whose purpose is to communicate water shortage procedures or general utility information effectively and efficiently to the customers.

During normal supply conditions, the Water Division implements informational campaigns to customers that emphasize user-level changes in water use and overall mindfulness of water waste while promoting voluntary conservation. Over the past few years, DPU has increased use of social media to communicate with customers quickly and organically. The City uses Facebook, Twitter, and Instagram to promote water saving tips, notify of shortage conditions, and spotlight DPU employees to foster a sense of community centered around the water supply. The City strives to be proactive in communicating work strategy and conservation efforts with customers.

This WSCP includes a staged plan to communicate the declaration of a shortage stage, inform restrictions, and provide updates during a water shortage emergency. A summary of actions the City could potentially take during a specific shortage stage is outlined in **Table 5**.

Table 5. Communication Protocol During Water Shortage Conditions

SHORTAGE STAGE	ACTION
1	Information posted on the City's website
1	Social media posts (Facebook, Twitter, Instagram, and Nextdoor)
2	Information included in utility bill inserts on a regular basis
2	Promotion of rebates and water conservation services
2	Letters, postcards, and flyers mailed to customers impacted by water use regulations
2	Targeted outreach and technical assistance to highest water users in each use class
2	Engage City councilmembers with resources to share with constituents
3	Increased paid advertising — print, online, radio, TV, streaming, social media, etc.
3	Messaging printed directly on utility bills
3	Press releases to local media (online and print newspapers, TV, radio, etc.)
3	Assembly and promotion of the speaker's bureau for water shortage presentations for neighborhood groups, gardening clubs, homeowners' associations, churches, senior centers, neighborhood associations, business associations, community groups, property management companies, etc.
4	Increased coordination with the local landscaping industry, including water shortage information in their newsletters, publications, and facilities; local wholesale and retail nurseries; and irrigation supply stores
4	Signage posted at nurseries and irrigation supply stores
4	Outreach materials and drought notices mailed to the hospitality industry, including restaurants and lodging

Note: If a water shortage progresses through multiple stages all measures in the previous stage(s) are implemented in addition to current stage actions.

1.7 Compliance and Enforcement

The City has penalties for violation of the water use restrictions in **Table 3**. The City tracks customer usage through advanced metering infrastructure (AMI) in order to enforce water wastage during shortage conditions as detailed in **Section 1.10**. The fines are noted in **Table 6**. Penalties for water waste are based on FMC, Section 6-520(e).

Table 6. Penalties for Water Wastage

INCIDENT MONTH[(a)]	PENALTY AND FINE
1	$0 – Issued a Notice of Water Waste
2	$25
3	$50
4-12	$100
6	If a customer has more than six incident months of water wastage within a one-year period, the City may implement any or all of the following measures: • Require the customer to get a landscape evaluation, lawn water audit, and water budget, as appropriate, in order to learn efficient water use. This work shall be completed at the customer's expense by landscape irrigation auditors certified by the Irrigation Association. • Installation by the City of flow restrictors or termination of water service. • Require a customer to repair any defects in their watering system within 14 days of notice by the City.

Note:
[a] Number of incident months are based on a calendar year.

1.8 Legal Authorities

CWC Section 375 provides the City with the statutory authority to adopt and enforce water conservation restrictions, and CWC Sections 350 et seq. authorize the City to declare a water shortage emergency and impose water conservation measures when it is determined that the City may not be able to satisfy ordinary demands without depleting supplies to an insufficient level.

If necessary, the City will declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1. Once having declared a water shortage, the City is provided with broad powers to implement and enforce regulations and restrictions for managing a water shortage. For example, CWC section 375(a) provides the following:

> *"Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity."*

Water Code Section 375(a). CWC Section 375(b) grants the City with the authority to set prices to encourage water conservation.

Under California law, including CWC Chapter 3.3 and Chapter 3.5 of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the City is authorized to implement the water shortage actions outlined in this WSCP. Prior to enacting a shortage level, the resolution providing the Council with authority to enact each level of the WSCP will be adopted. Resolutions to enact the WSCP can be adopted at any meeting of the City Council. The resolution providing the City Manager, or designee, with authority to enact each stage of the WSCP is included in **Attachment 6**.

The City shall also coordinate with any city or county within which it provides water supply services, as listed below, for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558).

1.9 Financial Consequences of WSCP

This section is in accordance with CWC Section 10632(a)(8) and describes the financial consequences of implementing the WSCP and potential mitigation strategies. The City anticipates reduced revenue while implementing the WSCP because of decreased water use by its customers and additional costs associated with implementing water use restrictions and associated reduction actions. The incurred cost may vary depending on the shortage stage and duration of the water shortage emergency. The cost of compliance may be tracked when a shortage is declared. The City may track the staff time and resources used to implement the WSCP, including reduced revenue, implementation and enforcement of shortage response actions, and communication and outreach efforts. Impacts of implementing the WSCP include:

- Impact of quantity of water sales on revenue
- Increased staff, salaries, and overtime required for implementing and enforcing restrictions
- Increased costs of new supplies, transfers, or other exchanges

In 2015, the mandatory conservation goal for the City was 28%, however the corresponding revenue reductions were less than 28% due to the City having a two-component water rate structure that includes the fixed “water meter service charge” for all service connections and a volumetric-based “water quantity charge.” Therefore, the reduction in revenues was affected by a lesser percentage than the overall total reduction in water use. In general, revenue impacts specified in the WSCP would be offset with a combination of the following:

- An increase in water commodity and service charges
- A reduction in annual operating expenses due to decreased demands
- Reserves currently earmarked for long range capital
- General tax fund revenues currently earmarked for future capital improvements

Methods to mitigate revenue/expenditure impacts are discussed in detail below.

1.9.1 Drought Rate Structures and Surcharges

At present, the City does not have in place a drought rate structure. The City plans to hire a rate consultant to review existing water rates and, if appropriate, develop new future water rates. As an additional task to this effort, the consultant will review, develop, and recommend a drought rate structure for the City’s consideration. With such a rate structure in place, should a water shortage take place, the City will be able to institute an alternate water rate structure that may

apply and change depending on the stage of drought that the community is experiencing. At this time, there are no details as to how the rate structure will be developed, but conceptually each of the five stages specified in the WSCP would have a water rate increase associated with it.

The use of this type of structure during a drought will minimize expenditure impacts that are incurred during a drought. The effects of the decrease in revenue due to the drought, with a corresponding increase in expenditure, will allow for the City to function without going into debt.

1.9.2 Use of Financial Reserves

The City of Fresno Water System maintains two reserve funding sources that can be used to meet a portion of the utility's revenue requirements during emergency or drought conditions. They are as follows:

- **Water Operating Reserves** – This is cash set aside in the Water Enterprise Fund that provides a "rainy day savings account" for unexpected cash flow shortages and large, unexpected expenses or losses. Normally, these reserves are not intended to be used to make up income shortfalls. However, in an emergency situation, they can be transferred to the Water Rate Stabilization Fund (see below) for transfer back to the Water Enterprise Fund to meet revenue requirements, including debt coverage ratios.
- **Water Rate Stabilization Fund** – Indentures from previous bond issuances required the establishment of the Water Rate Stabilization Fund. These funds can be drawn on to meet a portion of the utility's revenue requirements through unexpected low-revenue periods and may be applied to debt coverage ratio calculations to help avoid technical default of bond covenants and loan agreements.

In addition, the City maintains funding in the Emergency Reserve Fund for the purpose of meeting unforeseen emergencies (see Section 1212 of the City's Charter for more information). This funding may be used by an affirmative vote of at least five members of the City Council upon presentation of a statement declaring the reason for use of the funding. This funding would be used only if the Water System reserves were insufficient to meet revenue requirements.

1.9.3 Other Measures

If the funding mentioned above is not sufficient to compensate for loss of revenue during a water shortage, the City may temporarily suspend components of its operations and maintenance activities.

1.10 Monitoring and Reporting

As described in **Section 1.3**, the City will track its supplies and project demands annually as part of the Annual Water Supply and Demand Assessment, and, if conditions described in **Table 2** are projected, the City will enact its WSCP. Monitoring demands is essential to ensure the WSCP response actions are adequately meeting reductions and decreasing the supply/demand gap. This will help to analyze the effectiveness of the WSCP or identify the need to activate additional response actions.

The City currently has AMI technology to monitor customer water usage and uses its AMI system to automatically enforce demand reduction measures and restrictions. The AMI system is currently set up to monitor and enforce outdoor watering restrictions. The program monitors customer meter flows against an "excessive use" flowrate, which will vary based on the WSCP stage. The system flags customer meters exceeding the excessive use flowrate during a

day/time outside of permitted outdoor watering hours as excessive use and an incident of water waste. If a customer has one or more incidents of water waste during a month, the customer shall be issued a Notice of Water Waste and, if applicable, be charged fines and penalties. The City may expand this monitoring program in the future to monitor other uses beyond outdoor watering restrictions.

The City can also use the detailed water usage data to monitor customers' response and demand reduction due to restrictions for each stage in the WSCP. The many restrictions and prohibitions assigned to each stage in **Table 3** are inherently flexible so the City can implement certain the restrictions, monitor customer usage, and implement additional restrictions if the demand reductions are not sufficient to close the supply and demand gap. The City also intends to provide reporting to the State based on forthcoming regulations for monthly reporting of water production and other water uses, along with associated enforcement metrics.

1.11 WSCP Refinement Procedures

The City intends to use this WSCP as an adaptive management plan to respond to foreseeable and unforeseeable water shortages. The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. To maintain a useful and efficient standard of practice in water shortage conditions, the requirements, criteria, and response actions need to be continually evaluated and improved on to make sure the WSCP provides the tools to maintain reliable supplies and reduce the impacts of supply shortages.

This 2020 WSCP accounts for the latest analysis of the City's robust supply portfolio in relation to demand and adjusted percentage reduction stages to reflect a more appropriate supply shortage that should trigger stages. This is a process that should be reevaluated annually and updated as necessary. Potential changes to the WSCP that would warrant an update include any changes to shortage level triggers, changes to the shortage level structure, and changes to the response actions. Any prospective changes to the WSCP would need to be presented at a public hearing; staff would obtain any comments and adopt the updated WSCP. The steps to formally amend the WSCP are discussed in **Section 1.13**.

Potential refinements will be documented and integrated into the next WSCP update. If new response actions are identified by staff or the public, these could be advertised as voluntary actions until they are formally adopted as mandatory.

1.12 Special Water Feature Distinction

CWC Section 10623 (b) requires that suppliers analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code. As listed in **Table 3 and Section 1.5.1**, there are separate requirements for decorative water features — including decorative fountains, lakes, or ponds — and for pools and spas. The City has separate response actions, enforcement actions, and monitoring programs for both decorative water features and pools and spas. Non-pool or non-spa water features may use or be able to use recycled water, whereas pools and spas must use potable water for health and safety considerations. Limitations to pools and spas may require different considerations compared to non-pool or non-spa water features.

1.13 Plan Adoption, Submittal and Availability

This WSCP update was prepared in tandem with the 2020 UWMP. The City held a public hearing and adopted the 2020 WSCP on July 15, 2021. A copy of the published Notice of Public Hearing is included in **Attachment 5** and a copy of the adopting resolution is included in **Attachment 6**. Before the public hearing, notices were published notifying the public of the date and time of the hearing.

Once the 2020 WSCP has been adopted, a copy will be submitted to DWR, the State Library, and the County of Fresno. Also, a hard copy will be made available for public reference at the City of Fresno Department of Public Utilities office at City Hall (located at 2600 Fresno Street) and the Water Division office (located at 1910 E. University Avenue). Additionally, an electronic copy will be uploaded to the City of Fresno website[1] and made available for public reference.

Based on DWR's review of the WSCP, the City will make any amendments in its adopted WSCP, as required and directed by DWR. If the City revises its WSCP after the UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

[1] www.fresno.gov/Government/DepartmentDirectory/PublicUtilities/Watermanagement/importantdocuments.htm

References

AARC Consultants, LLC. (2020). *City of Fresno Department of Public Utilites Risk and Resilience Assessment for the America's Water Infrastructure Act 2018.* Fresno, California.

AARC Consultants, LLC. (2020). *City of Fresno Water Divsion All Hazards Emergency Response Plan.*

Attachment 1
Preliminary Annual Assessment Template

DWR ASSESSMENT TABLE TEMPLATE - EXAMPLE VALUES FOR 2021 SHOWN

City of Fresno
DWR Annual Water Supply and Demand Assessm
Supply and Demand Estimates

Current Year: <YEAR>
Updated: <DATE>

	Current Year	Following Year	
Demand Use Type	**2021**	**2022**	**Notes**
Single Family	60,666	61,272	1% annual increase from 2020
Multi-Family	19,030	19,221	1% annual increase from 2020
Commercial	17,141	17,312	1% annual increase from 2020
Industrial	5,786	5,844	1% annual increase from 2020
Landscape	9,583	8,680	1% annual increase from 2020; Reduced by increased recycled water use
Other	343	347	1% annual increase from 2020
Losses	9,664	9,760	1% annual increase from 2020
Recycled Water	1,912	2,911	Estimates per 2020 UWMP Table 7-4
M&I Demand Subtotal	**124,125**	**125,347**	
Operational Buffer (10%)	12,410	12,530	To account for supply and demand uncertainties
M&I Demand Total	**136,535**	**137,877**	
Groundwater Recharge	-	-	No recharge assumed due to low surface water supply availability
Total Demand	**136,535**	**137,877**	

Supply	**2021**	**2022**	
Groundwater, Sustainable Yield	73,062	73,644	Sustainable groundwater yield per 2020 UWMP Table 6-1
Groundwater, Allocated from Storage	-	-	Groundwater in storage built up over time from recharge and reduced pumping; Not used since supply is greater than demand
USBR Contract Allocation	17,612	19,025	Current Year: USBR Allocation = 20% plus 5,612 AF of carryover Following Year: Average of "Critical" year per 2020 UWMP Table 6-2
FID Contract Allocation	51,580	61,000	Current Year: FID Kings River Allocation = 26% Following Year: Average of "Critical" year per 2020 UWMP Table 6-3
Recycled Water, RWRF	1,802	2,801	Estimates per 2020 UWMP Table 6-6
Recycled Water, NFWRF	110	110	Estimates per 2020 UWMP Table 6-6
Total Supplies	**144,166**	**156,580**	

Supply vs. Demand	**2021**	**2022**
Supply minus Demand (AF)	**7,631**	**18,703**
Supply divided by Demand (%)	**106%**	**114%**

WATER SHORTAGE STAGE TEMPLATE - EXAMPLE VALUES FOR 2021 SHOWN

City of Fresno
DWR Annual Water Supply and Demand Assessment
Water Shortage Stage Comparison

Current Year: <YEAR>
Updated: <DATE>

2021 Water Supplies (AFY)

Supplies	Maximum Available Supplies	Projected Available Supplies
GW, Sustainable Yield	73,062	73,062
GW, from Storage	*Not Used*	
Surface Water	176,055	69,192
Recycled Water	1,912	1,912
Total	**251,029**	**144,166**

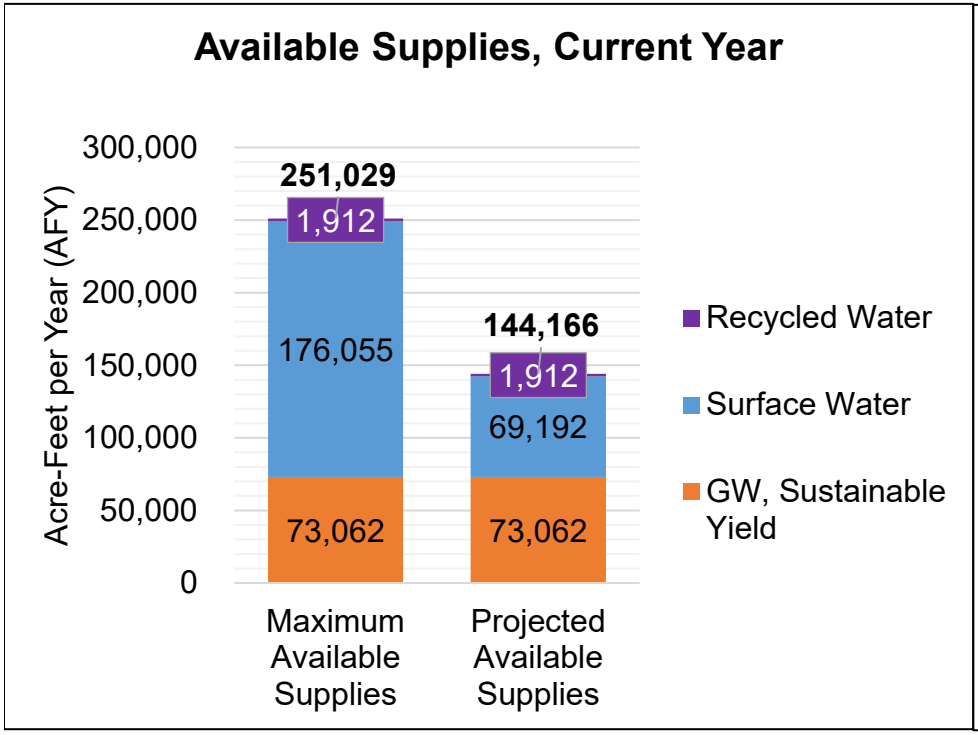
2021 Water Demands (AFY)

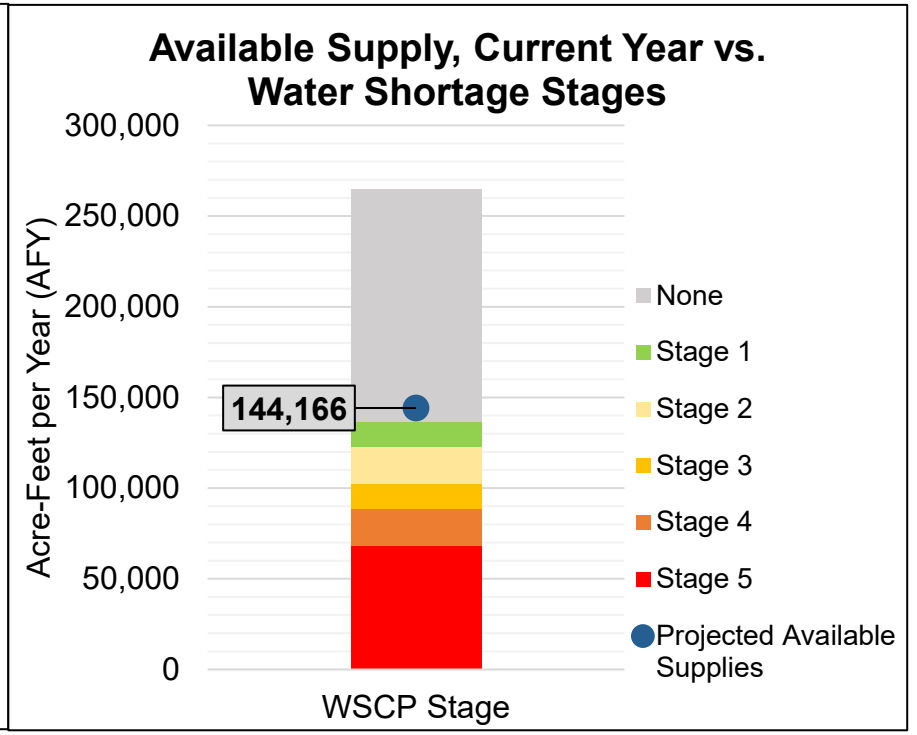
Demand Type	Estimated Demands
M&I	124,125
Buffer	12,410
Retail Subtotal	**136,535**
Recharge	0
Total	**136,535**

Water Shortage Stages

WSCP Stage	Reduction Upper End	Reduction Lower End	(AFY) Upper End	(AFY) Lower End
None				136,500
Stage 1	0%	10%	136,500	122,900
Stage 2	10%	25%	122,900	102,400
Stage 3	25%	35%	102,400	88,700
Stage 4	35%	50%	88,700	68,300
Stage 5		> 50%	68,300	

Note: Refer to seperate Supply and Demand projections table for assumptions.





Attachment 2
City of Fresno Municipal Code Chapter 6-520

SEC. 6-520. - WATER CONSERVATION.

(a) In the use of potable water supplied by the city, no customer shall do or permit any of the following:

(1) Use potable water to irrigate or water outdoor landscaping in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures,

(2) Keep, maintain, operate, or use any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage,

(3) Willfully or negligently waste water,

(4) Flood any part of the premises of another,

(5) Sprinkle the premises of another so as to prevent the normal use thereof or unreasonably wet objects thereon which should not be subjected to a spray of water except as naturally caused by the elements or by action of the owner of the object,

(6) Sprinkle or irrigate any yard, ground, premise, or vegetation except as set forth in the City's Outdoor Water Use Schedule,

(i) Annual Exemptions. The following properties may submit an application for a one-year exemption to the Outdoor Water Use Schedule in effect at the time of the application:

a. Properties with multiple addresses, and

b. Properties with turfed or landscaped areas of two acres or larger, and

c. Properties without street addresses.

The owners of such properties shall submit a proposed modified Outdoor Water Use Schedule in writing to the Director or designee for approval or modification. The Director may approve a modified Outdoor Water Use Schedule for with more frequent watering or different watering days than allowed by the Outdoor Water Use Schedule in effect at the time the application for an exemption is submitted for consideration. If the Director determines the proposed exemption will adversely impact system water pressures in the service area, the proposed exemption will be denied. All Annual Exemptions approved by the Director shall automatically expire on December 31 of each year, and the property owners must re-apply for an exemption to the Outdoor Water Use Schedule.

(ii) Short-term Exemptions. The following properties may submit an application for an exemption from the Outdoor Water Use Schedule for a specific time period not to exceed one month.

a. Properties with new lawns not yet established.

b. Properties seeking to use water for a bona fide use, such as solar panel cleaning or other use necessary for health or preservation of property.

The owners of such properties shall submit a proposed modified Outdoor Water Use Schedule in writing to the Director or designee for approval or modification no less than 48 hours before the proposed non-compliant water usage. The Director may approve a modified Outdoor Water Use Schedule that may provide for more frequent outdoor water use or different outdoor water use days than allowed by the Outdoor Water Use Schedule in effect at the time the application for an exemption is submitted for consideration. If the Director determines the proposed exemption will adversely impact system water pressures in the service area, the proposed exemption will be denied. All Short-term Exemptions approved by the Director shall automatically expire on the date set forth on the Short-Term Exemption permit.

(7) Sprinkle or irrigate any yard, ground, premise, or vegetation unless the watering device used is controlled by an shut-off device, or a person is in immediate attendance of the hose or watering device,

(8) Wash any privately owned motor vehicle, trailer, or boat except from a bucket or in a commercial car wash, provided a hose equipped with a shut-off nozzle may be used for a quick rinse without causing water to flow onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures,

(9) Wash or rinse with a hose or watering device any sidewalk, driveway, parking area, tennis court, patio, or any other exterior paved area, except for public health and safety reasons at public gathering places, or

(10) Use potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.

(11) Irrigate ornamental turf on public street medians with potable water, except where:

(i) The turf serves a community or neighborhood function, including but not limited to, recreational uses and civic or community events;

(ii) The turf is irrigated incidentally by an irrigation system primarily intended to irrigate trees;

(iii) The turf is irrigated with recycled water.

This prohibition does not include trees and shrubs on public medians, which may be irrigated.

(12) Irrigate outdoor landscapes with potable water during and within 48 hours after measurable rainfall.

(13) Serve drinking water other than upon request in eating or drinking establishments, including but not limited to, restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served or purchased.

(14) Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.

(15) Automatically change towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

(16) Drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer. Residents with private swimming pools shall file a written application for a permit with the City of Fresno Water Division at least 48 hours prior to draining the pool. Any customer whose swimming pool is drained by order of the Department of Health for failure to maintain it properly will also be issued a notice of violation of the City of Fresno Municipal Code. The draining of pools for reasons of health and safety hazards as determined by the City of Fresno Water Division and/or the Department of Health is permitted. The application shall include the results of a pool water test conducted by an independent testing organization which shows a cyanuric acid level above 100 parts per million, total dissolved solids over 2,500 parts per million, or calcium over 450 parts per million, or stating the nature and duration of repairs to be made and the date on which the pool will be drained.

(17) Fill newly constructed or refurbished swimming pools without a pool fill permit from the City of Fresno Water Division.

(18) Refill (top off) established swimming pools except during times when outdoor water use is allowed at the property address pursuant to the Outdoor Water Use Schedule.

(b) Notwithstanding the foregoing, drip irrigation of community and residential fruit and vegetable gardens and fruit tr permitted any day of the week; for this subsection, "drip irrigation system" means a non-spray, low-pressure, and lc volume irrigation system in good working order utilizing emission devices with a flow rate of less than four gallons p hour, designed to slowly apply small volumes of water at or near the root zone of plants, when used primarily for ir of fruit and vegetable gardens and fruit trees; should any city water customer be cited for excessive water use, the customer may contact the Water Division and request an exemption from the Outdoor Water Use Schedule for a hc community garden that is irrigated with a drip irrigation system. Upon being contacted, the Water Division will sche visit to the subject property to inspect the garden and the drip irrigation system used to irrigate the garden. The Wa Division shall grant an exemption for home or community garden with the following conditions:

(1) The property must limit water use to an amount equal to, or less than, the average monthly water use for the single-family residential customer class. The monthly average water use for the single-family residential customer class is printed on monthly utility bills issued by the City.

(2) The drip irrigation system must be in good working order with no leaks, line breaks, or other deficiencies that will contribute to water waste. Exemptions shall be withheld until corrective action is taken to address system deficiencies.

(3) The drip irrigation system must be used primarily for the home or community garden, and not for other landscape on the property- Exemptions shall be withheld until the drip irrigation system for the home or community garden can be isolated from other landscape on the property.

(4) No flood irrigation will be allowed with the drip irrigation system, and water must remain on the subject property with no runoff to sidewalks, driveways, pavements, or adjacent properties.

(5) The home and community garden exemption is provided exclusively for drip irrigation systems only, and will not be allowed for other types of irrigation systems.

(6) This exemption shall only apply to properties ¼ acre or smaller. For properties greater than ¼ acre, the property owner may apply to the Director or designee for an exemption.

(c) Lawn sprinkling systems shall be properly designed, installed, maintained, and operated to prevent waste of water.

(d) Repealed.

(e) The provisions of this section are conditions of service.

(1) Each incident of Excessive Use as defined in section 6-501, or use of water inconsistent with the provisions of this section, is an incident of water waste.

(2) If a customer has one or more incidents of water waste during a month, as observed by City staff or as recorded by the City's water meter reading system, the customer shall be issued a Notice of Water Waste and, if applicable, charged a fine as set forth in the Master Fee Schedule. Such fines shall be added to the customer's monthly utility bill and shall be due and payable with that utility bill and subject to the FMC 6-106, Late Payment of Municipal Service Bills.

(3) Incident counts for water waste shall be monitored, recorded, documented and enforced on a monthly basis during the calendar year for individual customers, and the incident counts shall be reset January 1 of each year.

(4) If a customer performs or permits incidents of water waste more than six consecutive months, the water service to the customer may be terminated unless in the opinion of the Director such termination would result in an unreasonable risk to the health and safety of persons. If water service is terminated for

successive incident of water waste, the water service may only be restored upon execution of an agreement with the customer to adhere to the conditions of service described in this section.

(5) If a customer objects to a fine imposed for an incident of water waste pursuant to this section, the following appeal process may be used.

Step 1.

(a) Within thirty days of issuance of the utility bill including the fine, the customer may contact the Water Conservation Program to appeal an incident of water waste resulting in a fine with the staff person who initiated the enforcement measure. The staff person shall gather the facts about the incident.

(b) The customer may provide staff with evidence there was no incident of water waste, or of a bona fide reason for the incident of water waste, including evidence of a water leak, or another reasonable justification for the water use, within ten business days of the customer's first communication with the Water Conservation Program regarding the alleged incident of water waste.

(c) Within ten business days of the initiation of an appeal, staff shall provide the customer with documentation demonstrating the incident of water waste, if applicable.

(d) The staff will provide the facts and evidence related to the appeal to the Water Conservation Program Supervisor, who will determine whether to rescind the enforcement measure. The Water Conservation Program Supervisor will provide a written decision to the customer within fifteen business days of the customer's appeal, or receiving any applicable evidence from the customer, whichever comes later.

Step 2. If the customer is not satisfied with the decision of the Water Conservation Program Supervisor, they may appeal to the Director or designee within ten business days of the date of the Water Conservation Program Supervisor's decision. The Director or designee shall review the appeal and any evidence the customer previously submitted, and provide a written decision within thirty days of receiving the appeal.

Step 3. If the customer is not satisfied with the decision of the Director of Public Utilities, the customer may appeal to the City's Administrative Hearing Officer in the manner provided in Chapter 1, Article 4 of this code. Such decision shall be final.

(Orig. Ord. 4481; Am. Ord. 6486, 1964; Am. Ord. 73-120, § 6, eff. 8-16-73; Am. Ord. 77-99, § 1, eff. 9-23-77; Am. Ord. 78-74, §§ 1, 2, eff. 5-26-78; Am. Ord. 80-115, § 149, eff. 8-8-80; Am. Ord. 89-48, §§ 1, 2, eff. 4-18-89; Am. Ord. 89-77, § 1, eff. 6-7-89; Am. Ord. 89-102, § 1, eff. 9-22-89; Am. Ord. 90-72, § 1, eff. 8-24-90; Am. Ord. 90-97, § 1, eff. 10-12-90; Am. Ord. 91-104, § 1, eff. 10-18-91; Am. Ord. 91-112, § 1, eff. 11-22-91; Am. Ord. 93-14, § 1, eff. 2-23-93; Am. Ord. 93-20, § 2, eff. 4-30-93; Am. Ord. 2015-13, § 1, eff. 5-21-15; Am. Ord. 2015-29, § 1, eff. 8-27-15; Am. Ord. 2017-56, § 3, eff. 11-19-17; Am. Ord. 2018-45, § 1, eff. 8-10-18; Am. Ord. 2019-011, § 3, eff. 5-31-19).

Editor's note— The provisions in subsection 6-520(e) regarding the enforcement program for incidents of water waste are effective January 1, 2018.

Attachment 3
Water Shortage Resolution

RESOLUTION NO. 2019-073

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO AMEND THE WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the Urban Water Management Planning Act requires the City of Fresno (City) to describe its water conservation measures within its Water Shortage Contingency Plan (WSCP);

WHEREAS, the City adopted its current WSCP on June 23, 2016, as part of the City's 2015 Urban Water Management Plan (UWMP);

WHEREAS, the City Council adopted amendments to the WSCP on October 12, 2017;

WHEREAS, in response to water conservation mandates from the State of California and to provide flexibility to its customers, the City has prepared further amendments to the WSCP to update water conservation requirements and watering restrictions in different water conservation stages in the City of Fresno.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Fresno as follows:

1. The City hereby adopts the amended Water Shortage Contingency Plan, as attached in Tables 1-3 of Exhibit A herein.

2. Resolution 2018-253 shall be repealed on the effective date of this Resolution.

* * * * * * * * * * * * * * *

Date Adopted: 4/11/2019
Date Approved: 4/16/2019
Effective Date: 4/16/2019

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, YVONNE SPENCE, MMC CRM, City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 11th day of April, 2019.

AYES : Arias, Bredefeld, Chavez, Esparza, Soria, Caprioglio
NOES : None
ABSENT : None
ABSTAIN : None

Mayor Approval: April 16th, 2019
Mayor Approval/No Return: N/A, 2019
Mayor Veto: N/A, 2019
Council Override Vote: N/A, 2019

YVONNE SPENCE, MMC CRM
City Clerk

By: Yvonne Spence
Deputy

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

By: Amanda Freeman 04/18/19
Amanda B Freeman Date
Senior Deputy City Attorney

Attachment:
Exhibit A – Revised Water Shortage Contingency Plan, Tables 1-3

EXHIBIT A

Revised Water Shortage Contingency Plan

Table 1: Stages of Water Shortage Contingency Plan (WSCP)

Stage	Percent Supply Reduction	Water Supply Condition
1	10%	Stage 1 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the second of two consecutive years, the volume of surface water available to the City through USBR and FID is projected to be less than the long-term average and the reduction in supply, averaged over the consecutive years, is equal to 10% or greater, or • Groundwater contamination conditions exists (DDW required the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 10% loss in water production capacity, or • Localized groundwater cones of depression develop exceeding historic low water levels and, to avoid possible litigation with responsible parties of point source contaminant plumes, the City must shut down existing wells that result in a 10% loss in groundwater production capacity, or • A combination of the above mentioned circumstances or a disaster reduced the City's overall water supply or production capabilities by 10% or more. • After having been in a Stage 2 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10 - 25%	Stage 2 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the third of three consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the three consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 25% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 25% of the long-term average, or • One-year change in average groundwater level in 30 key City wells exceeds 3 feet or two-year change in average groundwater level in 30 key City wells exceeds 6 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 25% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities

Stage	Percent Supply Reduction	Water Supply Condition
		by 25% or more. • After having been in a Stage 3 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point consistent with the above conditions for this stage.
3	25 to 35%	Stage 3 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the fourth of four consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the four consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 35% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 35% of the long-term average, or • One-year change in average groundwater level in 30 key City wells exceeds 5 feet or two-year change in average groundwater level in 30 key City wells exceeds 10 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 35% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 35% or more. • After having been in a Stage 4 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.

Stage	Percent Supply Reduction	Water Supply Condition
4	35 - 50%	Stage 4 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the fifth of five consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the five consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 50% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 50% of the long-term average, or • One-year change in average groundwater level in 30 key wells exceeds 7.5 feet or two-year change in average groundwater level in 30 key City wells exceeds 12 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 50% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 50% or more.

Table 2: Restrictions and Prohibitions on End Uses

(#)	Stage	Restrictions and Prohibitions	Additional Explanation or Reference	Penalty, Charge or Other Enforcement
a	1-4	Landscape – Limit landscape irrigation to specific times (Outdoor Water Use Schedule)	See Outdoor Water Use Schedule, Table 2a.	Yes See Table 3
b	1-3	Other	Prohibit car washing except with a bucket only (a hose equipped with a shut off nozzle may be used for a quick rinse)	Yes See Table 3
c	1-4	Other – Prohibit use of potable water for washing hard surfaces	Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas except where necessary for public health or safety	Yes See Table 3
d	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit irrigating outdoor landscapes with potable water during and within 48 hours after measurable rainfall	Yes See Table 3
e	1-4	Landscape – Prohibit certain types of landscape irrigation	Sprinkle or irrigate any yard, ground, premise, or vegetation unless the watering device used is controlled by an automatic shut-off device, or a person is in immediate attendance of the hose or watering device	Yes See Table 3
f	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit using potable water to irrigate or water outdoor landscaping in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures	Yes See Table 3
g	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit irrigation of ornamental turf on public street medians with potable water, except where the turf serves a community or neighborhood function, it's irrigated incidentally by an irrigation systems designed to irrigate trees, or the turf is irrigated with recycled water	Yes See Table 3

h	4	Other	Prohibit car washing	Yes See Table 3
i	1-4	Other – Restaurants may only serve water upon request	No restaurant, hotel, café, cafeteria, or other public place where food is sold is served or offered for sale, shall serve drinking water to any customer unless expressly requested	Yes See Table 3
j	1-4	Landscape – Prohibit certain types of landscape irrigation	Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development	Yes See Table 3
k	1-4	Water Features – Restrict water use for decorative water features, such as fountains	Prohibit use of potable water to clean, fill or maintain decorative fountains, lakes, or ponds unless such water is reclaimed	Yes See Table 3
l	4	Other – Prohibit use of potable water for construction and dust control	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, building wash down where non-potable or recycled water is sufficient	Yes See Table 3
m	1-4	Other – Prohibit automatic linen service in hotels and motels	Prohibit automatically changing towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily	Yes See Table 3
n	4	Other	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City Manager	No
o	4	Other – Customers must repair leaks, breaks, and malfunctions in a timely manner	Prohibit allowing potable water to escape from breaks within the customer's plumbing system for more than twenty-four (24) hours after the customer is notified or discovers the break	Yes See Table 3

p	4	Other – Prohibit vehicle washing except at facilities using recycled or recirculating water	Prohibit washings cars, boats, trailers, aircraft, or other vehicles except to wash such vehicles at commercial or fleet vehicle washing facilities using water recycling equipment	Yes See Table 3
q	1-4	Swimming Pools – Prohibit draining swimming pools more than once every three years	Prohibit draining swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer	Yes See Table 3
r	1-4	Swimming Pools – Limit filling new or refurbished pools by requiring a pool fill permit	Prohibit filling new or refurbished swimming pools without obtaining a pool fill permit from the City	Yes See Table 3
s	1-4	Swimming Pools – limit filling (topping off) established pools to times and days permitted by the Outdoor Water Use Schedule	Prohibit filling (topping off) swimming pools during times when outdoor irrigation is allowed according to the Outdoor Water Use Schedule	Yes See Table 3
t	4	Pools and Spas – Require covers for pools and spas	Require covers for swimming pools when not in use	No
u	4	Other	Prohibit Use of Outdoor Misters	No

Table 2a: Outdoor Water Use Schedule

Stage	Summer (April 1 – October 31)	Summer Outdoor Water Use days	Winter (November 1 – March 31)	Winter Outdoor Water Use days	Outdoor Water Use Times
1	3 days/week recommended	Even addresses: Wednesday, Friday, Sunday Odd addresses: Tuesday, Thursday, Saturday	1 day/week recommended	Even addresses: Sunday Odd addresses: Saturday	Outdoor Water Use allowed 12:00 AM – 9:59 AM & 6:00 PM – 11:59 PM Outdoor Water Use is prohibited all days 10:00 AM – 6:00 PM
2	3 days/week	Even addresses: Wednesday, Friday, Sunday Odd addresses: Tuesday, Thursday, Saturday	1 day/week	Even addresses: Sunday Odd addresses: Saturday	
3	2 days/week	Even: Wednesday and Sunday Odd: Tuesday and Saturday	1 day/week	Even addresses: Sunday Odd addresses: Saturday	
4	1 day/week	Even addresses: Sunday Odd addresses: Saturday	No outdoor water use		

Table 3: Penalties for Incidents of Water Waste

Incident Month	Incident Fine	Enforcement Schedule
1	$0	The first month an incident of water waste is recorded during the calendar year, the City shall issue a Notice of Water Waste to the customer for the incident observed by City staff or as recorded directly by the City's water meter reading system.
2	$25	The second month an incident of water waste is recorded is recorded for a customer during the calendar year, the City shall assess a fine of $25 to the customer, and the fine shall be applied to the customer's monthly utility bill.
3	$50	The third month an incident of water waste is recorded for a customer during the calendar year, the City shall assess a fine of $50 to the customer, and the fine shall be applied to the customer's monthly utility bill.
4	$100	The fourth month an incident of water waste is recorded for a customer during the calendar year, the City shall assess a fine of $100 to the customer, and the fine shall be applied to the customer's monthly utility bill.
5 -12	$100	For the fifth month an incident of water waste is recorded during the calendar year, and every month thereafter for the remainder of the calendar year during which an incident of water waste is recorded, the City shall assess a fine of $100 to the customer, and the fine shall be applied to the customer's monthly utility bill.
After 6	N/A	If a customer has more than six consecutive months of documented water waste incidents, the water service to the customer may be restricted or terminated unless in the opinion of the Director such restriction or termination would result in an unreasonable risk to the health and safety of persons. If water service is terminated for excessive violations of the water waste provisions as defined herein, the water service may only be restored upon execution of an agreement with the customer to adhere to the conditions of service described in this section.

April 12, 2019

Council Adoption: 4/11/19
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR LEE BRAND

FROM: YVONNE SPENCE, MMC
City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of 4/11/19, Council adopted the attached Resolution No. 2019-073, entitled **Amending the City of Fresno Water Shortage Contingency Plan.** Item No. 3-B (3), File ID19-1472, by the following vote:

Ayes	:	Arias, Bredefeld, Caprioglio, Chavez, Esparza, Soria
Noes	:	None
Absent	:	None
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before April 22, 2019. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval

****

Thank you.

APPROVED/NO RETURN: _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____
Lee Brand, Mayor

Date: 4-16-19

COUNCIL OVERRIDE ACTION:

Date: _____

Ayes :
Noes :
Absent :
Abstain :

CITY OF FRESNO
CITY CLERK'S OFFICE
2019 APR 17 P 1:57

RECEIVED

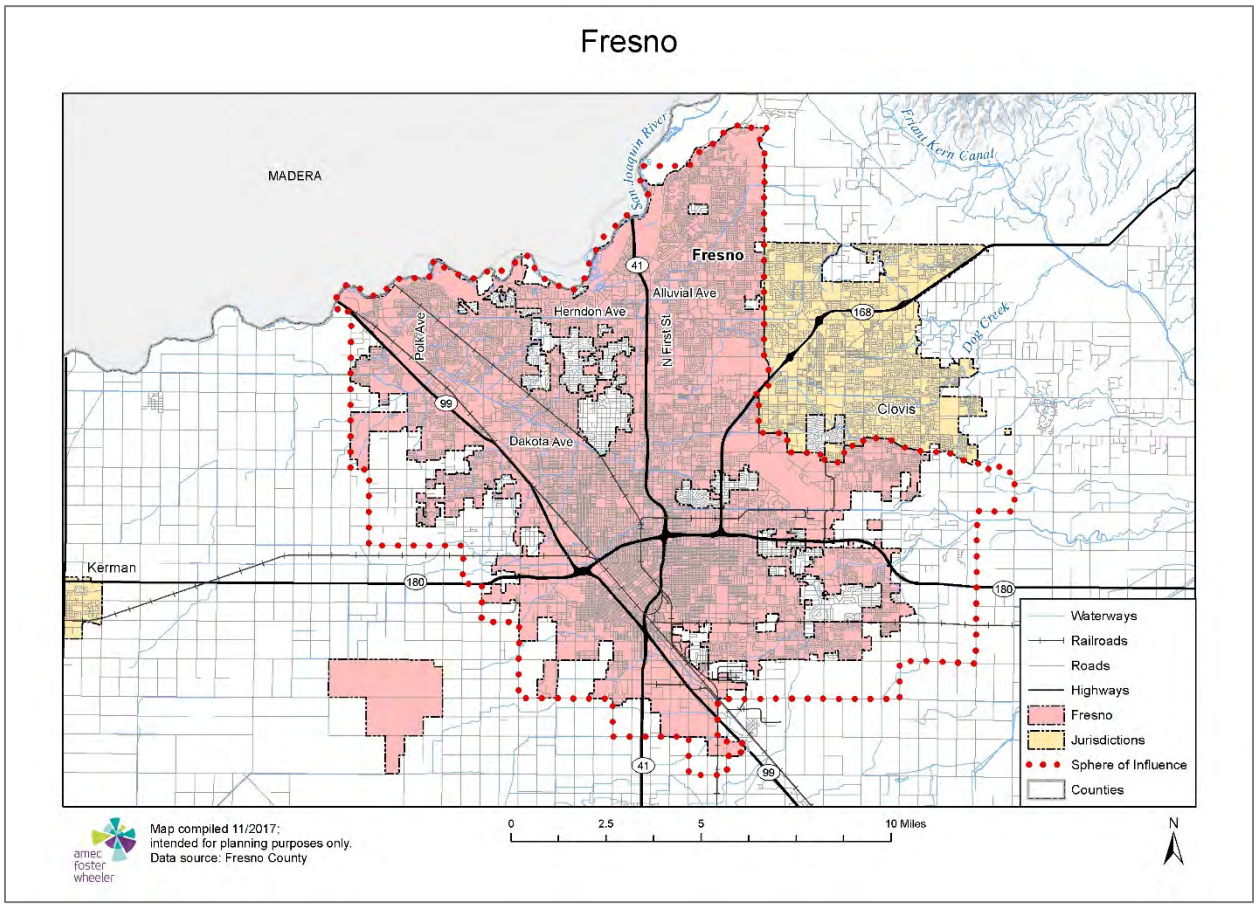
Attachment 4
Fresno County Multi-Jurisdictional Hazard Mitigation Plan, Annex E: City of Fresno

Reference the complete Fresno County Multi-Jurisdictional Hazard Mitigation Plan online:
https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/12/FresnoCountyHMPFinal.pdf

E.1 Community Profile

Figure E.1 displays a map and the location within Fresno County of the City of Fresno and its Sphere of Influence.

Figure E.1: The City of Fresno



E.1.1 Geography and Climate

The City of Fresno and its Sphere of Influence encompass a 100,400-acre area in central Fresno County. Over the past decade, the City has expanded into the northern, northwestern, and eastern reaches of its Sphere of Influence. Except for the deep channel of the San Joaquin River at the northern boundary of the City, Fresno's topography is generally level and slopes gently to the southwest. The upper San Joaquin River lies at the City's northerly boundary and has carved a deep channel, confining the river between steep bluffs that range from 20 to approximately 100 feet in height.

Fresno has a Mediterranean climate, averaging over 262 sunny days per year and little or no measurable precipitation from June through September. Annual rainfall typically totals 12-14 inches in episodic events lasting up to a few days at most. Fresno's prevailing winds are typically light and from the northwest.

Storms with strong weather disturbances (lightning and very agitated winds) may occur from autumn months through the spring, with the strength of the storm dependent upon temperature gradients between moving weather fronts.

Winter mornings in December and January approach freezing but only rarely reach as low as, or below, 32ºF; winter daytime high temperatures almost always approach or exceed 40ºF. Snowfall is an extremely rare and transient phenomenon; the last recorded snowfall in Fresno was ½ inch on December 20, 1998. The Tule fog, a thick ground fog that settles in the San Joaquin Valley from late fall through early spring, is the leading cause of weather-related accidents in California. In addition to causing visibility issues, "black ice" from precipitated fog may temporarily affect some roadways and bridges during the winter.

Summer daytime peak temperatures are high in Fresno. Some heat waves last over a week with daytime highs well over 100ºF and issuance of health advisories. Summer evenings provide for some cooling of 10-15ºF with the early morning daybreak hours cooling by 20-30ºF, depending on humidity (low humidity allows for more radiant cooling).

Geography and climate combine to create a general accumulation of air pollutants in the San Joaquin Valley (and in the City of Fresno) that occasionally result in unhealthy air quality conditions. Air quality problems are exacerbated by dust storms, human activities (e.g., vehicle emissions and fireplace and wood stove use), atmospheric photochemical processes, and forest fires from local and regional fires. The City has chronically failed to attain some of the national and state ambient air quality standards, but due to the efforts of the California Air Resources Board and the regional San Joaquin Valley Unified Air Pollution Control District, progress toward attainment of ozone (oxidant) and particulate matter standards is being made. Carbon monoxide standards were deemed to have been attained in the 1990s.

E.1.2 History

Development of what today is the City of Fresno began in 1871, when the Central Pacific Railroad chose the Fresno Station for its San Joaquin Valley rail line. The City soon became the County seat and the shipping and distribution hub for the region's agricultural industry. An economic boom across California in the 1880s helped transform Fresno from a village to a city, and helped drive its incorporation in 1885. Today, the City of Fresno is the center of trade, commerce, finance, and transportation for the San Joaquin Valley.

E.1.3 Economy

The most comprehensive economic data available for the City of Fresno comes from the U.S. Census Bureau by way of the American Community Survey (ACS). Select estimates of economic characteristics for the City of Fresno are shown in Table E.1.

Table E.1: City of Fresno's Economic Characteristics, 2015

Characteristic	City of Fresno
Families below Poverty Level	24.4%
All People below Poverty Level	29.8%
Median Family Income	$45,806
Median Household Income	$41,531
Per Capita Income	$19,465
Population in Labor Force	231,332
Population Employed*	198,113
Unemployment	14.3%

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/
*Excludes armed forces

Tables E.2 and E.3 show how the City of Fresno's labor force breaks down by occupation and industry based on 5-year estimates from the 2015 American Community Survey.

Table E.2: City of Fresno's Employment by Occupation, 2015

Occupation	# Employed	% Employed
Management, Business, Science and Arts Occupations	57,374	29.0
Management, Business, and Financial Occupations	*(20,767)*	*(10.5)*
Computer, Engineering, and Science Occupations	*(6,018)*	*(3.0)*
Education, Legal, Community Service, Arts, and Media Occupations	*(20,262)*	*(10.2)*
Healthcare Practitioner and Technical Occupations	*(10,327)*	*(5.2)*
Sales and Office Occupations	49,752	25.1
Service Occupations	41,528	21.0
Production, Transportation, and Material Moving Occupations	26,738	13.5
Natural Resources, Construction, and Maintenance Occupations	22,721	11.5
Total	**198,113**	**100.00**

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/

Table E.3: City of Fresno's Employment by Industry, 2015

Industry	# Employed	% Employed
Educational Services, and Health Care, and Social Assistance	48,557	24.5
Retail Trade	23,337	11.8
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	20,643	10.4
Professional, Scientific, and Management, and Administrative and Waste Management Services	16,742	8.5
Manufacturing	14,869	7.5

Industry	# Employed	% Employed
Public Administration	12,030	6.1
Finance and Insurance, and Real Estate and Rental and Leasing	10,875	5.5
Other Services, Except Public Administration	10,710	5.4
Construction	10,586	5.3
Agriculture, Forestry, Fishing and Hunting, and Mining	10,446	5.3
Transportation and Warehousing, and Utilities	9,476	4.8
Wholesale Trade	7,158	3.6
Information	2,684	1.4
Total	**198,113**	**100.00**

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/

With the depressed real estate and construction market and economic recession toward the end of the 2000-2010 decade, unemployment rates increased to a peak of 18.0 percent in 2010. Since then, the unemployment rate has steadily decreased. The most recent annual data from the State of California Employment Development Department indicates that in 2016 there were 238,400 people in the City of Fresno labor force. Of these, 214,000 were employed; 24,400 were not. The unemployment rate was 10.2 percent.

E.1.4 Population

According to the California Department of Finance, Fresno's population was estimated to be 520,778 in 2016. Select demographic and social characteristics for the City from the U.S. Census Bureau's 2015 American Community Survey 5-year estimates are shown in Table E.4.

Table E.4: City of Fresno's Demographic and Social Characteristics, 2015*

Characteristic	City of Fresno
Gender/Age	
Male	49.2%
Female	50.8%
Median age	30.0
Under 5 years	8.9%
Under 18 years	29.5%
65 years and over	9.9%
Race/Ethnicity**	
White	52.2%
Asian	13.0%
Black or African American	7.9%
American Indian/Alaska Native	1.1%
Hispanic or Latino (of any race)	48.5%
Education	
High school graduate or higher	75.2%
Disability Status	
Population 5 years and over	11.75%

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/
*Based on a 2015 estimated population of 510,451
**Of the 95.4% reporting one race

For information about how some of these demographics affect social vulnerability and how they compare to other Fresno County jurisdictions, California, and the United States, see "Social Vulnerability" in Section 4.3.1 Fresno County Vulnerability and Assets at Risk of the main plan. A more in-depth look at the population of the City of Fresno, including the City's special needs populations, is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement).

E.2 Hazard Identification and Summary

The City of Fresno's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Fresno (see Table E.5). In the context of the plan's planning area, there are no hazards unique to Fresno.

Table E.5: City of Fresno—Hazard Summaries

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance
Agricultural Hazards	Limited	Highly Likely	Critical	Low
Avalanche	N/A	N/A	N/A	N/A
Dam Failure	Significant	Unlikely	Limited	Medium
Drought	Significant	Likely	Critical	High
Earthquake	Extensive	Occasional	Critical	Medium
Flood/Levee Failure	Significant	Occasional	Critical	High
Hazardous Materials Incident	Significant	Likely	Critical	High
Human Health Hazards:				
Epidemic/Pandemic	Extensive	Occasional	Critical	Medium
West Nile Virus	Limited	Highly Likely	Negligible	Low
Landslide	Limited	Unlikely	Negligible	Low
Severe Weather				
Extreme Cold/Freeze	Significant	Occasional	Negligible	Low
Extreme Heat	Extensive	Highly Likely	Limited	Medium
Fog	Extensive	Likely	Limited	Medium
Heavy Rain/Thunderstorm/ Hail/Lightning	Extensive	Highly Likely	Limited	Low
Tornado	Extensive	Occasional	Negligible	Low
Windstorm	Extensive	Likely	Limited	Medium
Winter Storm	Extensive	Highly Likely	Negligible	Low
Soil Hazards:				
Erosion	No Data	Likely	No Data	Low
Expansive Soils	No Data	Occasional	No Data	Low
Land Subsidence	Limited	Occasional	No Data	Low
Volcano	Extensive	Unlikely	Negligible	Low
Wildfire	Extensive	Highly Likely	Critical	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths

Probability of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.	Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid **Significance** Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact

E.3 Vulnerability Assessment

The intent of this section is to assess the City of Fresno's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide, which was distributed to each participating municipality or special district to complete during the original outreach process in 2009. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and identify related vulnerabilities unique to each jurisdiction. In addition, the City of Fresno's HMPC team members were asked to validate the matrix that was originally scored in 2009 based on the experience and perspective of each planning team member relative to the City of Fresno.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan (See Table 4.1). However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See Table E.5). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Note: The hazard "Significance" reflects overall ranking for each hazard, and is based on the City of Fresno's HMPC member input from the Data Collection Guide and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table E.5 reflect the hazards that could potentially affect the City. Those of Medium or High significance for the City of Fresno are identified below. The discussion of vulnerability for each of the following hazards is located in Section E.3.2 Estimating Potential

Losses. Based on this analysis, the priority hazards (High Significance) for mitigation include drought, flood/levee failure, and hazardous materials incidents.

- dam failure
- drought
- earthquake
- epidemic/pandemic
- extreme heat
- flood/levee failure
- fog
- hazardous materials incidents
- wildfire
- windstorm

Other Hazards

Hazards assigned a Significance rating of Low and which do not differ significantly from the County ranking (e.g., Low vs. High) are not addressed further in this plan, and are not assessed individually for specific vulnerabilities in this section. In the City of Fresno, those hazards ranked Low are as follows:

- agricultural hazards*
- human health hazards: West Nile Virus
- landslide
- severe weather: heavy rain/thunderstorm/hail/lightning, tornado
- soil hazards
- volcano
- extreme cold
- winter storm

Note on Agricultural Hazards*: Agricultural hazards are ranked Low in the City of Fresno than for the County overall (ranked High) because very little land in the City is used for agricultural purposes.

Additionally, the City's Committee members decided to rate several hazards as Not Applicable (N/A) to the planning area due to a lack of exposure, vulnerability, and no probability of occurrence. **Avalanche** is considered Not Applicable (N/A) to the City of Fresno.

E.3.1 Assets at Risk

This section considers Fresno's assets at risk, including values at risk; critical facilities and infrastructure; historic, cultural, and natural resources; economic assets; and growth and development trends.

Values at Risk

The following data on property exposure is derived from the Fresno County 2017 Parcel and Assessor data. This data should only be used as a guideline to overall values in the City as the

information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is likely low and does not reflect current market value of properties. It is also important to note that in the event of a disaster it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. Table E.6 shows the 2017 values at risk broken down by property type for the City of Fresno.

Table E.6: 2017 Property Exposure for the City of Fresno by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Agricultural	76	53	$2,887,304	$2,887,304	$5,774,608
Commercial	6,110	24,004	$5,471,778,084	$5,471,778,084	$10,943,556,168
Exempt	1,012	3,881	$0	$0	$0
Industrial	2,575	5,630	$1,420,216,900	$2,130,325,350	$3,550,542,250
Multi-Residential	5,793	52,504	$2,416,885,833	$1,208,442,917	$3,625,328,750
Open Space	1	1	$150,882	$150,882	$301,764
Residential	113,468	117,771	$15,122,142,902	$7,561,071,451	$22,683,214,353
Unknown	2	2	$530,082	$530,082	$1,060,164
Total	**129,037**	**203,846**	**$24,434,591,987**	**$16,375,186,070**	**$40,809,778,057**

Source: Fresno County 2017 Parcel and Assessor data

Since the 2009 Plan, the City of Fresno has experienced notable increases in agricultural, commercial, and residential properties and property values at risk. Compared to improved values from the Fresno County Assessor's Office's 2007 Certified Roll Values, agricultural improved value has increased by 254.2 percent, commercial improved value has increased by 299.8 percent and total residential improved value has increased by 265.8 percent. Part of this dramatic increase in exposure of commercial and residential properties can be attributed to annexations of previously unincorporated County land that have occurred within the last decade.

Critical Facilities and Infrastructure

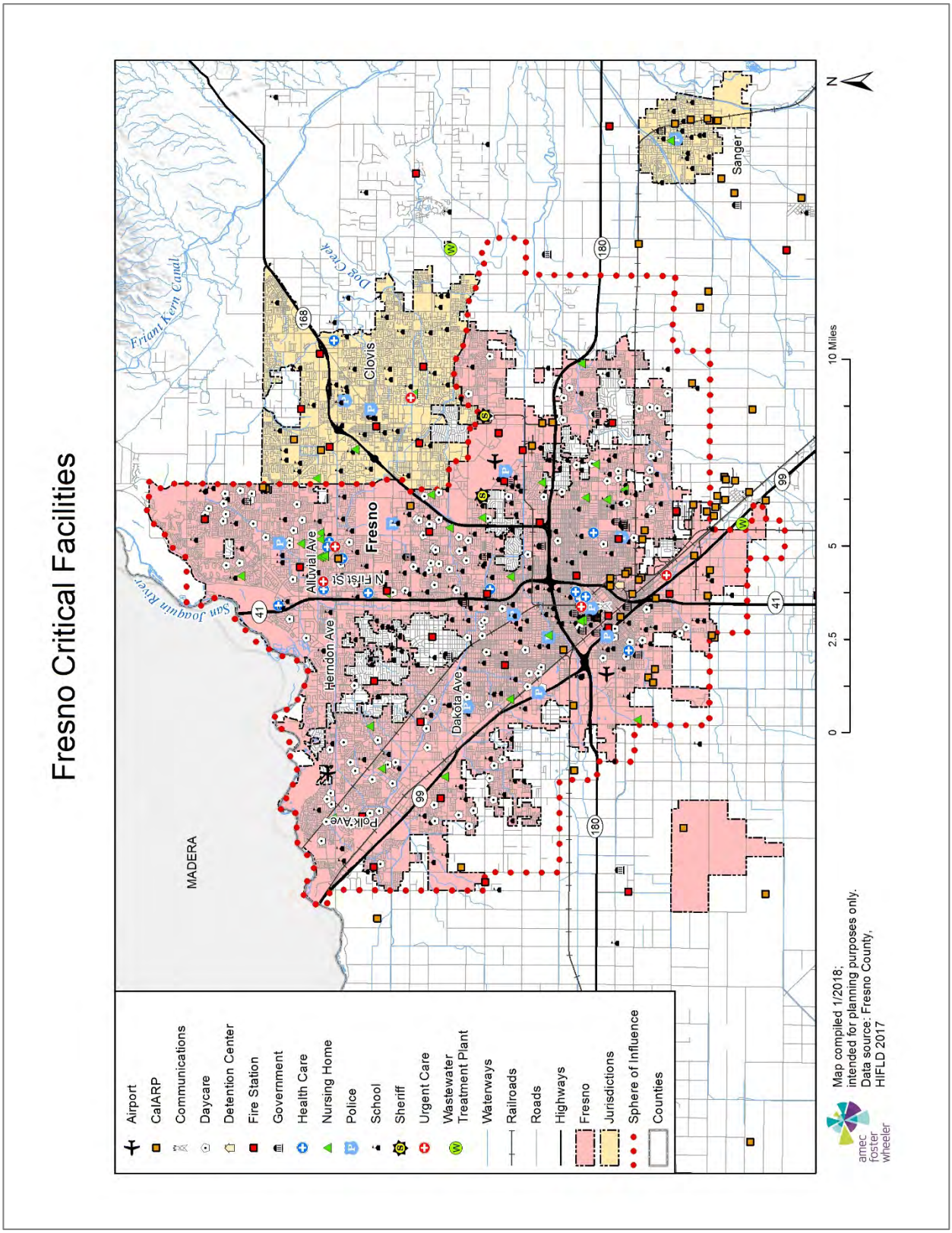
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Fresno from Fresno County GIS is provided in Table E.7 and mapped in Figure E.2.

Table E.7: City of Fresno's Critical Facilities

Critical Facility Type	Number
Airport	3
Behavioral Health	4
CalARP	28
Colleges & Universities	14
Communications	1
County Government	4
Courthouse	1
Daycare	155
Department of Agriculture	2
Department of Public Health	4
Department of Public Works	1
Department of Social Services	9
Detention Center	4
District Attorney	2
Fire Station	21
General Services	3
Health Care	12
Nursing Home	27
Police	10
School	183
Sheriff	3
Supplemental College	4
Urgent Care	4
Total	**499**

Source: Fresno County, HIFLD 2017

Figure E.2: City of Fresno's Critical Facilities



The list of specific critical facilities and community assets is maintained by the City of Fresno Police Department. The Fresno Urban Area Critical Infrastructure List is considered confidential and may be accessed through the Fresno Police Department Homeland Security Division.

Historic, Cultural, and Natural Resources

Historic and Cultural Sites

The Cultural Resource Facility located on the California State University, Bakersfield campus maintains a database, maps, and descriptive surveys of prehistoric sites in the Fresno area. Details of the locations are kept confidential due to the risk of theft or vandalism of artifacts. The general location of these sites is along the San Joaquin River and its bluffs, where permanent Native American settlements were established near a permanent water supply and seasonal salmon fishery.

The City of Fresno maintains a local official register of historic resources (available from the historic preservation officer in the City's Planning and Development Department). There are approximately 284 properties on the register. Twenty-one of the properties were demolished or destroyed by fire after being placed on the list, and three other properties have been relocated to sites outside the City of Fresno. The local register includes 31 properties that are on the National Register of Historic Places (see Table E.8).

Table E.8: City of Fresno's Properties on the National Register of Historic Places

Property Name	Address	Date Listed
Azteca Theater	836-840 F Street	4/21/2017
Bank of Italy	1015 Fulton Mall	10/29/1982
Brix, H. H., Mansion	2844 Fresno Street	9/15/1983
Einstein House	1600 M Street	1/31/1978
Forestiere Underground Gardens	5021 W. Shaw Avenue	10/28/1977
Fresno Bee Building	1555 Van Ness Avenue	11/1/1982
Fresno Brewing Company Office and Warehouse	100 M Street	1/5/1984
Fresno County Hall of Records	2281 Tulare Street	12/22/2011
Fresno Memorial Auditorium	2425 Fresno Street	5/10/1994
Fresno Republican Printery Building	2130 Kern Street	1/2/1979
Fresno Sanitary Landfill	West and Jensen Avenues	8/7/2001
Holy Trinity Armenian Apostolic Church	2226 Ventura Street	7/31/1986
Hotel Californian	851 Van Ness Avenue	4/21/2004
Kearney, M. Theo, Park and Mansion	7160 Kearney Boulevard	3/13/1975
Kindler, Paul, House	1520 E. Olive Avenue	10/29/1982
Maulbridge Apartments	2344 Tulare Street	5/6/1982
Meux House	1007 R Street	1/13/1975
Old Administration Building, Fresno City College	1101 University Avenue	5/1/1974
Old Fresno Water Tower	2444 Fresno Street	10/14/1971
Pantages, Alexander, Theater	1400 Fulton Street	2/23/1978
Physicians Building	2607 Fresno Street	11/20/1978

Property Name	Address	Date Listed
Rehorn House	1050 S Street	1/8/1982
Romain, Frank, House	2055 San Joaquin Street	1/11/1982
San Joaquin Light & Power Corporation Building	1401 Fulton Street	1/3/2006
Santa Fe Hotel	935 Santa Fe Avenue	3/14/1991
Santa Fe Passenger Depot	2650 Tulare Street	11/7/1976
Southern Pacific Passenger Depot	1033 H Street	3/21/1978
Tower Theatre	1201 N. Wishon Avenue	9/24/1992
Twining Laboratories	2527 Fresno Street	3/26/1991
Warehouse Row	722, 744, and 764 P Street	3/24/1978
YWCA Building	1660 M Street	9/21/1978

Source: National Register of Historic Places, www.nps.gov/nr/

Other historic resources in the City of Fresno include the following historic districts:

- The Porter Tract Historic District (45 homes)
- The Chandler Field/Fresno Municipal Airport Historic District (four historic structures)
- The Wilson Island Historic District (78 homes)
- The Huntington Boulevard Historic Districts (81 homes)

As comprehensive as the City's register may be, it does not include all properties in the City with potential historic or cultural significance. The list is continually being expanded as sites are discovered through routine analysis of proposed development areas and through proposed new listings of historic districts. The pool of potentially historic properties also changes through time, since federal law provides for a 50-year retrospective review, which now encompasses the post-World War II building boom era. Ten properties that were recommended for the City's register but were denied inclusion by the Fresno City Council are still recognized for their historic/cultural significance (heritage properties), which is taken into account when any actions are undertaken on them pursuant to provisions of the California Environmental Quality Act. (Three of these properties have been since been demolished.)

While a detailed assessment of seismic and flood risks for the listed properties in Fresno is currently beyond the available staff resources of the City's Historic Preservation Office, it can be generally assumed that most of the structures have not been seismically reinforced and that their masonry is vulnerable to strong ground shaking.

While many of the structures are in Fresno's old downtown and were built when this area was largely within the 100-year floodplain of the Fresno Stream Group, efforts by the Fresno Metropolitan Flood Control District in conjunction with the U.S. Army Corps of Engineers and the City of Fresno have provided for flood detention structures and ponding basins that have greatly reduced the size and extent of the floodplain in the downtown, helping to preserve these historic resources.

Natural Resource Areas

San Joaquin River Corridor

While the City maintains many community and neighborhood parks, its natural resources are primarily along the San Joaquin River. Owing to the year-round presence of water, the river bottom and bluffs host the richest aquatic and riparian forest biota in the City. It is in this area where migratory waterfowl and federally and state-listed endangered wildlife are most likely be encountered. These species include the valley elderberry longhorn beetle, the giant garter snake, and the American bald eagle (recently recommended for delisting from the National Endangered Species list).

Over past decades, land in the river corridor has been purchased and aggregated by state agencies (Department of Fish and Game, San Joaquin River Conservancy), by nonprofit groups (San Joaquin River Parkway Trust, Fresno Sportsmen's Club), and by the City and County (the City's Woodward Park and Milburn Unit, the County's Lost Lake Park). The ultimate goal of the San Joaquin River Conservancy Plan is to fashion a regional parkway with continuity of wildlife corridors and to manage it for joint recreational, habitat conservation, and floodplain protection uses.

Due to its location, this natural resource area is flood-prone. In some areas, this risk has been increased due to removal of massive amounts of sand and gravel (from mining), which lowered the ground surface over past decades. While the native riparian plants and animals have largely evolved with coping mechanisms for periodic severe flooding, any developed recreation facilities would be at risk. The face of the bluff is also very vulnerable to wildfire because of its vegetative overgrowth and nearly vertical slopes. Fire prevention efforts are difficult here because the soils are too unstable for vegetative removal projects or for irrigation that would keep the plants well-watered.

Vernal Pool Areas

In the northerly parts of the City, outside the river corridor, certain clay soils have the capacity to form impermeable hardpans and layers that do not allow rapid percolation of rainwater. During the rainy season, shallow vernal pools form that are populated by a host of specialized plants and animals. Many species associated with vernal pools are federally and state-listed species (e.g., the California tiger salamander, various types of fairy shrimp crustaceans, orcutt grass, button celery species, meadowfoam, and owl clover). Vernal pools are also heavily utilized by nonlisted species, such as migratory waterfowl, rodents, furbearing predators, and raptors that prey on other animals.

Wildfire is not considered a major risk to these natural communities, because they evolved with dry season fires as a common occurrence (the plants have very resistant seeds and the crustaceans and amphibians go into protected parts of their life cycles such as deep dormancy). Human encroachment through agriculture and land development is the greatest risk to vernal pool areas. If the clay layers are disrupted by "deep ripping" plowing, water cannot accumulate on the surface and the pools will not form. If the land is subjected to year-round irrigation, specially adapted

vernal pool species will be out-competed by other species. Conversion of land to urban development with structures, paving, lawns, pets, and people will destroy vernal pool natural communities.

Economic Assets

The City of Fresno's economic sector includes both private and public entities that have been compiled into clusters in order to identify key economic assets. These ten clusters, known as the Regional Job Initiative (RJI) clusters, are Advanced Manufacturing, Clean Energy, Construction, Food Processing, Healthcare, Info Processing (Call Centers, Logistics, and Distribution), Software Development, Tourism, and Water Technology. Among these clusters are major employers like Saint Agnes, Pelco, Gottschalks, and Ruiz Foods that both boost Fresno's economic growth and provide employment opportunities.

If a disaster struck the City, it could have a severe impact on Fresno's economic assets. Sectors of greatest concern include all the RJI clusters, but in particular Food Processing, which includes the agricultural industry, and Healthcare.

Growth and Development Trends

The City of Fresno is growing at a rapid pace. Its expansion from incorporation in 1885 to the present day (August 2017) is illustrated in Figure E.3. Even more growth is anticipated in the years to come, based on current trends.

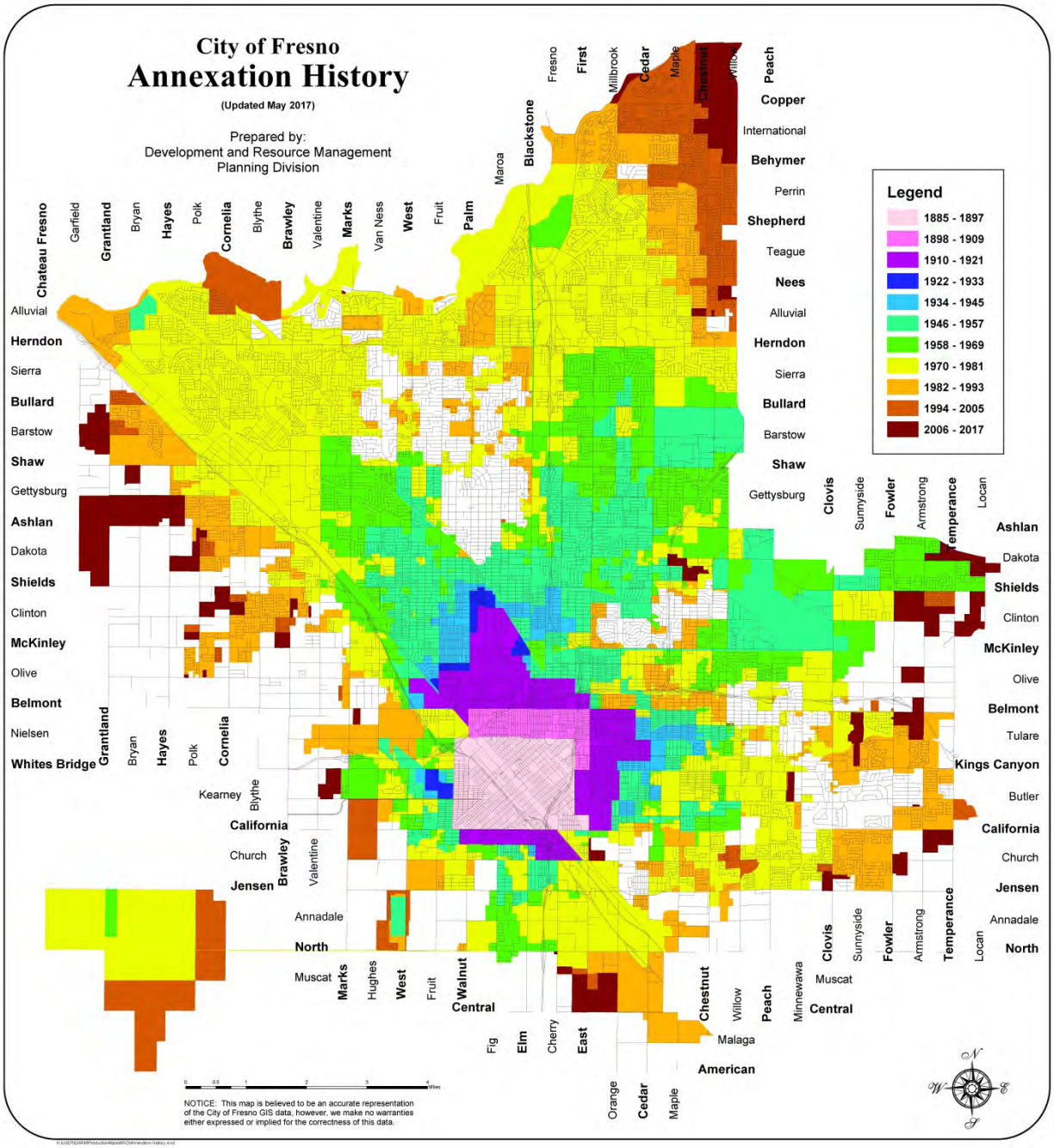
Table E.9 illustrates how the City has grown in terms of population and number of housing units between 2011 and 2017 alone.

Table E.9: City of Fresno's Change in Population and Housing Units, 2011-2017

2011 Population	2017 Population Estimate	Estimated Percent Change 2011-2017	2011 # of Housing Units	2017 Estimated # of Housing Units	Estimated Percent Change 2011-2017
498,664	525,832	+5,49	172,171	178,819	+3.86

Source: California Department of Finance, www.dof.ca.gov/Forecasting

Figure E.3: City of Fresno's Annexation History



Source: City of Fresno Development Department. This map is believed to be an accurate representation of the City of Fresno GIS data, however, we make no warranties either expressed or implied for the correctness of this data.

By December 31, 2035 (the "Horizon" year of the most recent Fresno General Plan), it is estimated that 771,000 people will reside in the Fresno Metropolitan Area (which would include County islands and areas inside the City's Sphere of Influence but not yet annexed). This figure of 771,000 would be 64 percent of the projected 2035 Fresno County population of 1,201,416 (State of California Department of Finance population projections).

As of August of 2017, the City of Fresno comprised 115.3 square miles of annexed (incorporated) land within its 161.8-square mile Sphere of Influence. Development had reached the natural and political northerly boundary of the City, the San Joaquin River, and began expanding to the west and southeast through conversion of rural residential and agricultural land. Within the Sphere of Influence, there continued to be "County islands" and partially urbanized fringe areas. An urban unification annexation program may reduce the numbers and sizes of these enclaves in the coming decade.

The Fresno General Plan made a concerted effort to revitalize the City's downtown by balancing new growth areas to geographically recenter the downtown. With construction of a major sewer trunk along the Grantland Avenue alignment and proposed construction of new wastewater and water treatment plants in the southeastern area, the City's future growth is expected to concentrate primarily to the west and southeast.

The Fresno Metropolitan Flood Control District (FMFCD) has commenced major flood control facility construction on Fancher Creek in the eastern portion of the City's Sphere of Influence. Since the Fresno General Plan was completed in December 2014, the FMFCD will compile technical studies and update its master service plan in conjunction with the City's land use plan for this new growth area.

The Fresno General Plan also directed that new development be more compact and that single-family residential densities be higher than the City's traditional 4± dwelling units/acre pattern for subdivisions. The recently adopted Fulton Corridor Specific Plan and Downtown Neighborhoods Community Plan and other plan amendments and projects in process (and proposed in the future) feature smaller lots, multi-story housing, multi-family units, and reduced setbacks.

Unless the cost of manufactured housing units would provide a substantial savings over site-built homes, it is not expected that the proportion of manufactured housing in the City of Fresno will greatly increase. It is possible that there will be some increase as producers of these units create models with appropriate roof pitches and other features to meet the City's design review standards.

More information about the City of Fresno's growth and current housing stock is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement). More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Fresno County Vulnerability and Assets at Risk of the main plan.

E.3.2 Estimating Potential Losses

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Table E.6 above shows Fresno's exposure to hazards in terms of number and value of structures. Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern day building codes. No further information on vulnerable structures is available. Impacts of past events and vulnerability to specific hazards are further discussed below (see Section 4.1 Hazard Identification for more detailed information about these hazards and their impacts on Fresno County).

Agricultural Hazards

Agricultural hazards are ranked with a Low significance in the City of Fresno; lower than for the County overall (ranked High) because very little land in the City is used for agricultural purposes. Agricultural losses due to hazard events have greater economic impact on the small communities and rural areas of the County than on the City of Fresno. However, ornamental and garden plants in the City, and pets and incidental livestock kept within City limits, may become involved in any countywide responses to crop pests or infectious agents, because these urban plants and animals provide reservoirs for the diseases and crop pests that threaten the County's agriculture.

Dam Failure

The National Inventory of Dams lists five dams located in the City of Fresno, including the Redbank Creek Detention basin, Fancher Creek Detention, Friant Millerton Road Embankment A, Redbank, and Friant Dike 3.

Drought

Annual rainfall in the City of Fresno is typically 12-14 inches. This makes the region vulnerable to episodic drought and to chronic drawdown of aquifer levels (the U.S. Environmental Protection Agency has designated the groundwater below Fresno as a sole source aquifer). Water in this aquifer has historically flowed through permeable strata from north and northeast toward the south and west, but the aquifer has been so affected by drawdown that a "cone of depression" has been created, reversing the historic flow directions (the "groundwater gradient") in portions of west and south Fresno.

In the last 10 years the City of Fresno has made strides to reduce dependence on groundwater by setting a course to implement water plans, which include the Urban Water Management Plan, Recycled Water Waster Plan, and the recently adopted Water Capital Program. A surface water treatment plant is currently under construction in Southeast Fresno and should be completed by 2018. When operational, the plant will maximize use of Fresno's surface water allocations during

normal years and allow the City to reduce overuse of groundwater. Recycled water use will also grow in Fresno with the new recycled water mains now being constructed. The City has plans to use 25,000 acre-feet per year of recycled water for irrigating open spaces, parks, street medians and golf courses.

Earthquake

The seismic hazard in the City of Fresno is low relative to California coastal and mountain communities and is lower than in the Sierra and western areas of Fresno County. There are no known earthquake faults underlying Fresno, and the City has never been the epicenter of a known seismic event. However, Fresno is considered to have a moderate risk of earthquake damage due to the presence of major fault systems to the west, south, and east and due to Fresno's large population and number of buildings, critical facilities, and infrastructure and other development that could be vulnerable to more severe ground shaking.

Historically, Fresno has sustained very little damage from major earthquakes occurring on California's major faults: the Owens Valley earthquake of 1872 toppled an unreinforced masonry (brick) church steeple. More recent major earthquakes in the past four decades (with epicenters near Coalinga and the Bay Area) have resulted in perceptible tall building swaying in Fresno, minor injuries (attributable to shelved items falling), and slight damage (e.g., minor cracked plaster, etc.). To date, no soil liquefaction has been observed in Fresno from any seismic event.

The most serious impacts of an earthquake in Fresno would probably arise from damage to large dams in the Sierra Nevada on the upper reaches of the San Joaquin River very close to active Long Valley Caldera-related faults. Should either of the two most easterly (and largest) dams in this area be severely damaged or breached, the resulting sequential dam failures could cause floodwaters to overtop Friant Dam northeast of the City. While the dam failure inundation map for Friant shows that most of the flooded area would be expected in the northwest part of town (where the confining river bluffs are not as high), there are some residences and important infrastructure in the river channel itself that would be inundated and gravely damaged (or destroyed), including highway bridges and the inlet of the Friant-Kern Canal, which supplies Bureau of Reclamation surface water to the Fresno area and to other communities in the southern San Joaquin Valley.

Epidemic/Pandemic

Fresno's population includes many residents who have limited access to health care, with causes related to low household income levels, lack of insurance coverage, a limited number of primary health care facilities and acute care beds, a low ratio of public health and medical professionals to population, and language barriers. Highly communicable diseases tend to affect a large percentage of the City, perhaps due to large household size and the mobility of the population. If a highly communicable disease outbreak occurred that caused serious or life-threatening illness for most infected persons, health care and other public service systems would experience disruption or breakdown and would require outside intervention with resources from other communities, the state, or the federal government.

Extreme Cold/Freeze

Freeze events occur occasionally in Fresno, but impacts are greater to the agriculture industry in the County than to the City. In January 2007, overnight minimum temperatures fell below freezing between January 6 and 10. The event led to a presidential disaster declaration due to the estimated $710 million in agricultural damage in the Central and South Valley. The 2007 event occurred in another eight-year interval after the devastating citrus freezes of 1998 and 1990. The event caused frozen pipes in Fresno but little other property damage. The City also has a plan for freezing temperature events and opens warming centers. These centers are primarily geared toward the homeless population.

Extreme Heat

Fresno uses a local version of the California State Plan for Extreme Heat. This plan was used during the extreme heat event during the summer of 2006 and worked well. The City operates cooling centers, which are primarily geared toward the homeless. Public notification for extreme heat events is conducted through the Public Affairs office in coordination with Fresno County.

Expansive Soils

These types of soils occur in northern Fresno in the far northeastern portions of its Sphere of Influence (in the "Copper River" area). Expansive clay soils can cause cavitation over time and require special construction standards for foundations.

Flood

As noted in the preceding section, there is some flood risk to the City from San Joaquin River major dam failure inundation, but the more common flood risk, repetitively experienced in Fresno, is that of shallow "sheet" flooding from major precipitation events. Except for the San Joaquin River, streams in the Fresno-Clovis Metropolitan Area originate in the Sierra foothills to the east and extend into the valley floor west of State Route 99 by way of dual-use irrigation and storm runoff channels and disperse into numerous smaller irrigation canals. Overflow from these canals and urban stormwater from intense precipitation events is sent back to the San Joaquin River or to farmland southwest of Fresno via spillway channels.

In the City of Fresno, these canals and channels are under control of the Fresno Irrigation District, an independent public agency, but their use during storm events is shared by another independent district, the Fresno Metropolitan Flood Control District (FMFCD). The FMFCD was created to develop flood control facilities to prevent further repetitive losses created by the Fresno Stream Group and to provide an urban drainage network. This District is responsible for administering a Storm Drainage and Flood Control Master Plan. The City's municipal code supports these efforts by including a Drainage Fee Ordinance to ensure that grading and development comply with the FMFCD's Master Plan and standards and provide proportionate shares of storm drain and ponding basin infrastructure.

The City of Fresno's Floodplain Ordinance further coordinates and supports FMFCD efforts. This ordinance and the Fresno General Plan Safety Element policies require conformance to FEMA floodplain management policies and to those of California's Central Valley Flood Prevention Board (which regulates the designated floodway along the San Joaquin River channel). Still, in areas not completely developed to urban standards, areas where the urban drainage network is not yet completed, and in some County "island" areas (land within the City that the County has authority over), stormwater drainage facilities may not prevent localized shallow flooding during intense runoff events.

According to FEMA's 2016 Flood Insurance Study (FIS), the following major canals and ditches run through the City:

- **Central Canal** flows southwest through the southeastern part of the City of Fresno.
- **Dry Creek Canal** begins at the confluence of Mill Ditch and Herndon Canal, just downstream of North Millbrook Avenue, and flows southwest through the southwestern portion of the City.
- **Fancher Creek Canal** flows southwest along the eastern corporate limits of the City of Fresno and joins Central Canal at the southeast corner of the City.
- **Herndon Canal** begins at the confluence of Mill Ditch and Dry Creek Canal. It flows west through the center of the City of Fresno, then flows northwest through the northwestern part of the City.
- **Mill Ditch** flows west along East McKinley Avenue to its confluence with Herndon and Dry Creek Canals.

The FIS details the City of Fresno's flood history as follows:

In February 1884, flood flows from streams of the Fresno-Clovis group inundated the business section of the City of Fresno. Frequent flooding was a problem in the City throughout the 1880. Suburban areas of the City were flooded in spring 1920; the downtown area was inundated in 1923; flooding occurred in the Fig Garden area in 1936; and parts of the City, especially in the northeast section, were flooded in March 1938. Since the 1938 flood, which had an estimated discharge of 2,700 cubic feet per second (cfs) on Dry Creek at the Big Dry Creek Dam site, high flows occurred on that stream in December 1955 (3,800 cfs), January 1969 (5,700 cfs), and February 1969 (4,500 cfs). During December 1955, approximately 500 acres of agricultural and suburban land were flooded by overflow from irrigation canals, and damage, mostly to public facilities, totaled approximately $50,000. The largest and most damaging flood period was January and February 1969, when the combined discharges of Dry, Dog, Redbank, Fancher, and Mud Creeks flooded an estimated 14,500 acres and caused almost $4.7 million in damage. Most of the flooding was in the eastern and northeastern parts of the City. It occurred because many of the streams in the Fresno-Clovis group discharged floodwater into various irrigation canals, causing them to overflow.

Values at Risk

Following the methodology described in Section 4.3.2 Vulnerability of Fresno County to Specific Hazards, a flood map for the City of Fresno was created (see Figure E.4). Tables E.10 and E.11 summarize the values at risk in the City's 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Figure E.4: City of Fresno's 100- and 500-Year Floodplains

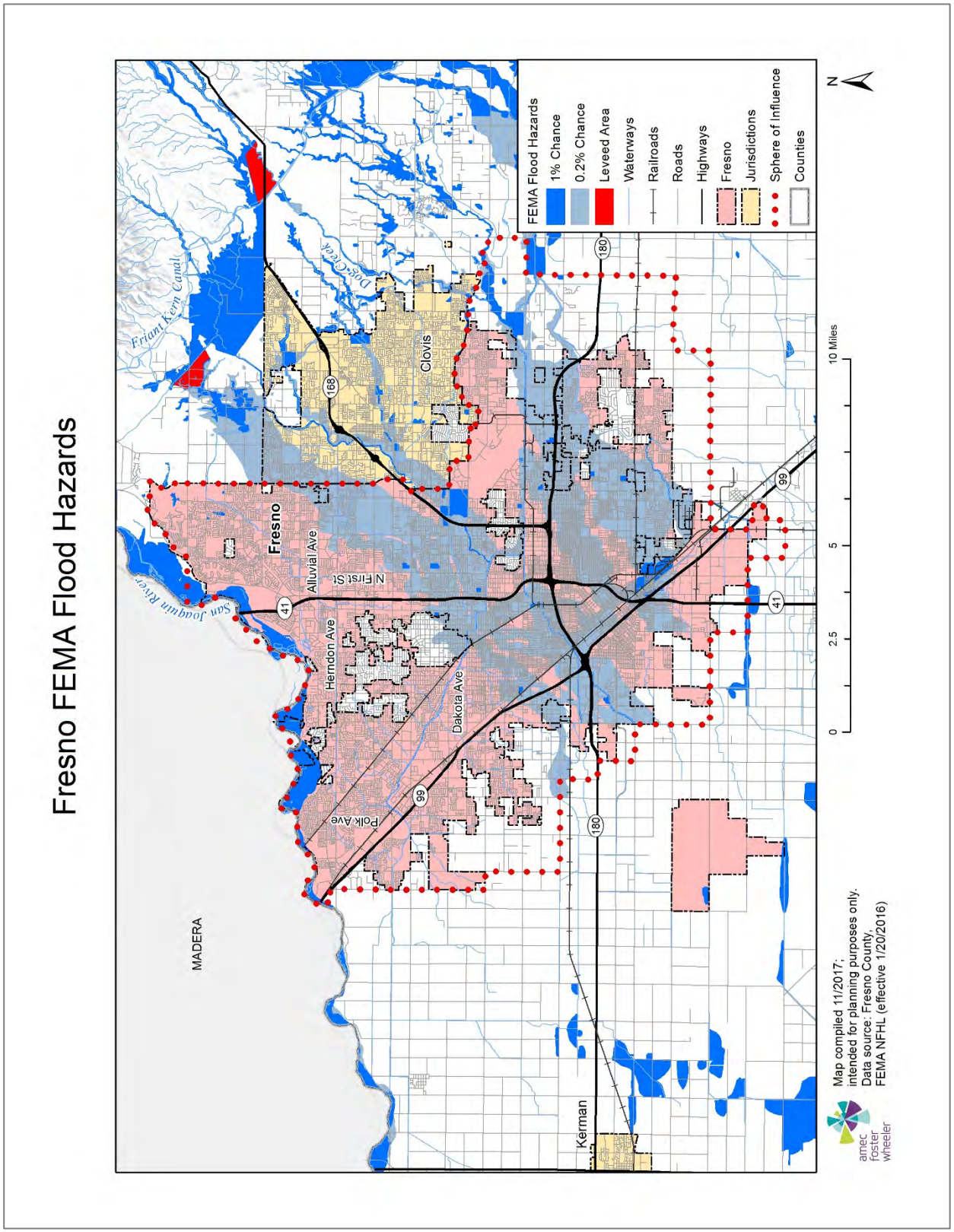


Table E.10: City of Fresno's FEMA 1% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	1	0	$60,933	$60,933	$121,866	$30,467
Commercial	23	210	$6,222,246	$6,222,246	$12,444,492	$3,111,123
Exempt	29	35	$0	$0	$0	$0
Industrial	70	107	$30,681,072	$46,021,608	$76,702,680	$19,175,670
Multi-Residential	11	84	$2,529,983	$1,264,992	$3,794,975	$948,744
Residential	97	120	$23,269,875	$11,634,938	$34,904,813	$8,726,203
Total	**231**	**556**	**$62,764,109**	**$65,204,716**	**$127,968,825**	**$31,992,206**

Sources: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

Table E.11: City of Fresno's FEMA 0.2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	29	29	$746,974	$746,974	$1,493,948	$373,487
Commercial	2,814	9,030	$1,574,492,657	$1,574,492,657	$3,148,985,314	$787,246,329
Exempt	381	1,404	$0	$0	$0	$0
Industrial	745	1,435	$309,126,790	$463,690,185	$772,816,975	$193,204,244
Multi-Residential	2,299	20,013	$797,001,401	$398,500,701	$1,195,502,102	$298,875,525
Residential	31,581	32,817	$2,677,387,750	$2,677,387,750	$5,354,775,500	$1,338,693,875
Total	**37,849**	**64,728**	**$5,358,755,572**	**$5,114,818,267**	**$10,473,573,839**	**$2,618,393,460**

Sources: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

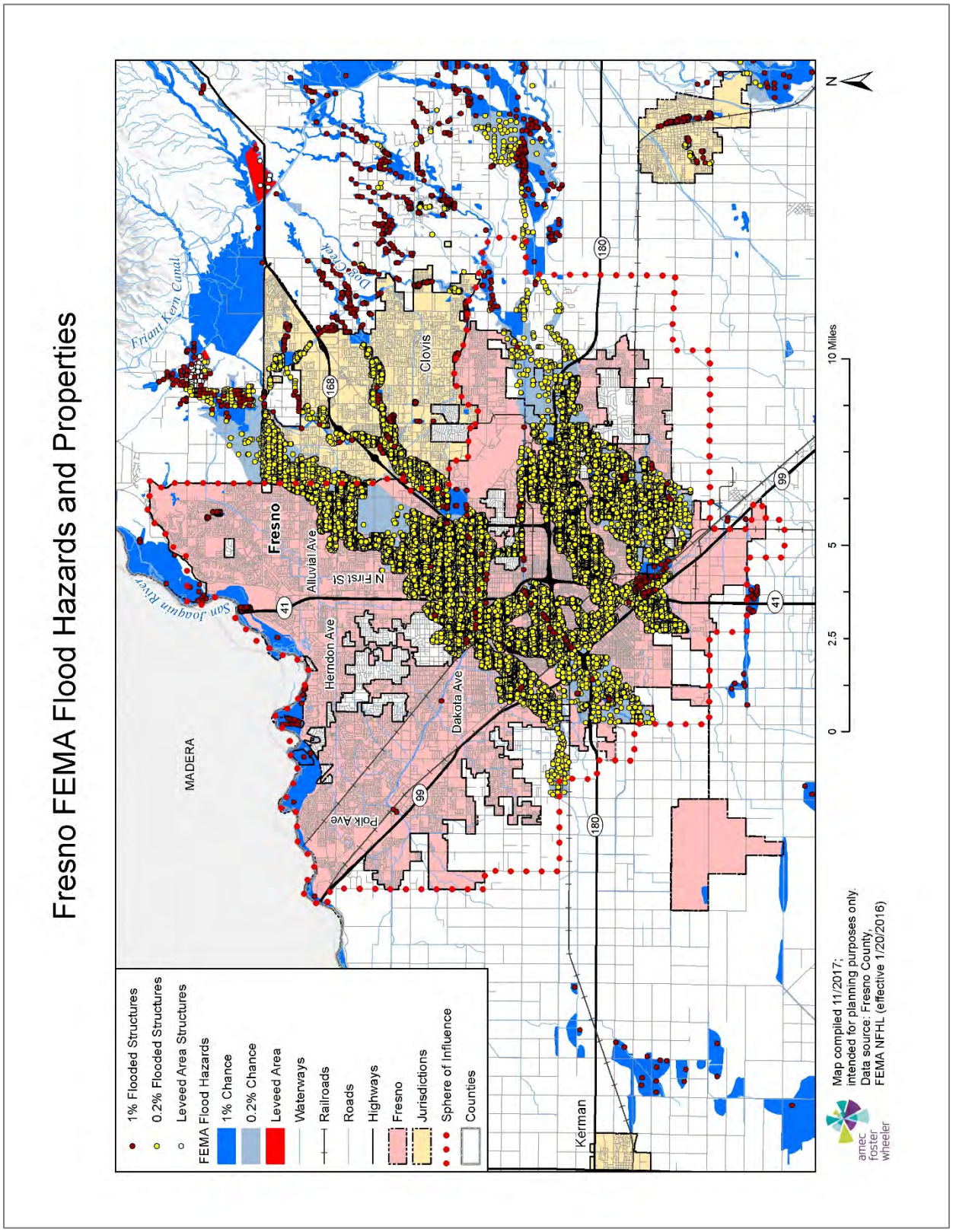
Based on this analysis, the City of Fresno has significant assets at risk to the 100-year and greater floods. There are 231 improved parcels within the 100-year floodplain for a total value of roughly $128 million, including building and content value. An additional 37,849 improved parcels valued at roughly $10.5 billion fall within the 500-year floodplain.

Applying the 25 percent damage factor as described in Section 4.3.2, there is a 1 percent chance in any given year of a 100-year flood causing roughly $32.0 million in damage in the City of Fresno and a 0.2 percent chance in any given year of a 500-year flood causing roughly $2.65 billion in damage (combined damage from both floods).

Properties at risk to flooding are shown in relation to the mapped floodplains in Figure E.5.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Figure E.5: City of Fresno's Properties at Risk in the 100- and 500-Year Floodplains



In addition to the 100-year and 500-year floodplains mapped by FEMA, the California Department of Water Resources maintains Best Available Maps (BAM) which include the floodplains in the Sacramento and San Joaquin River Basins, based on a study performed in 2002 by the U.S. Army Corps of Engineers (USACE). Though limited to the San Joaquin River as a flood source and thus not as comprehensive as the FEMA FIRM, the USACE study shows additional differentiation in flood risk by modeling the 200-year floodplain (the flood with a 0.5 percent annual chance of occurring). Table E.12 summarizes the values at risk by property type within the 200-year floodplain and loss estimates to the 200-year storm using the same methodology described above.

Table E.12: City of Fresno's FEMA 0.5% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	1	0	$60,933	$60,933	$121,866	$30,467
Commercial	3	139	$4,322,495	$4,322,495	$8,644,990	$2,161,248
Exempt	5	5	$0	$0	$0	$0
Residential	18	19	$12,103,507	$6,051,754	$18,155,261	$4,538,815
Total	**27**	**163**	**$16,486,935**	**$10,435,182**	**$26,922,117**	**$6,730,529**

Sources: Fresno County 2017 Parcel and Assessor data; CA DWR BAM; USACE

Based on this analysis, there are 27 parcels within the 200-year floodplain valued at nearly $10.5 million. Applying the 25 percent damage factor, there is a 0.5 percent annual chance of a 200-year flood causing $6.73 million in damage in the City of Fresno.

Insurance Coverage, Claims Paid, and Repetitive Losses

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. In addition to providing insurance for properties at risk of flooding, the program collects and publishes statistics on flood-related losses in participating jurisdictions.

NFIP insurance data for the City of Fresno indicates that as of March 30, 2017, there were 323 flood insurance policies in force in the City with $99,316,700 in coverage. This coverage represents a decline of nearly 200 policies over the last decade. Of the 323 policies, 277 were residential (267 for single-family homes) and 46 were nonresidential. 56 of the policies were in A zones (including A01-30, AE, AO, and AH), and the remaining 267 policies were in B, C, and X zones. Policies in B, C, and X zones have increased slightly over the past decade, while policies in the 100-year floodplain have dramatically declined.

There have been 81 historical claims for flood losses totaling $765,183; 73 were for residential properties; 37 were in A zones and 36 were in B, C, or X zones; and 54 were pre-FIRM structures (17 of the 19 post-FIRM structures with reported losses were in a B, C, or X zone). According to the FEMA Community Information System accessed 9/17/2018 there was one Repetitive Loss and no Severe Repetitive Loss properties located in the jurisdiction.

Population at Risk

Using parcel data from the County, the digital flood insurance rate map, population at risk was calculated for the 100-year and 500-year floods based on the number of residential properties at risk and the U.S. Census Bureau 2016 estimate for the average number of persons per household (3.17). The following are at risk to flooding in the City of Fresno:

- 100-year flood—342 people
- 500-year flood—107,400 people
- **Total flood**—107,742 people

Critical Facilities at Risk

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. Table E.13 lists the critical facilities in the City's 100- and 500-year floodplains.

Table E.13: Critical Facilities in the 100- and 500-Year Floodplains: City of Fresno

Critical Facility Type	100-Year Floodplain	500-Year Floodplain
Airport	-	1
Behavioral Health	-	1
CalARP	1	12
Colleges & Universities	-	5
Communications	-	1
County Government	-	2
Daycare	-	52
Department of Agriculture	-	2
Department of Public Health	-	2
Department of Social Services	-	6
District Attorney	-	1
Fire Station	-	7
General Services	-	3
Health Care	-	1
Nursing Home	-	12
Police	-	5
School	-	68
Urgent Care	-	2
Total	**1**	**183**

Source: Fresno County, HIFLD 2017

Hazardous Materials Incident

The following are the primary concerns for the City of Fresno related to hazardous materials release:

- Train derailments

- Kinder-Morgan pipeline
- Chevron petroleum pipelines
- Storage facilities

There are 28 CalARP hazardous materials facilities located in the City of Fresno. As detailed in Table E.14, there are 62 critical facilities located within a half mile of a CalARP facility.

Table E.14: Critical Facilities within ½ mile of CalARP Facility: City of Fresno

Critical Facility Type	Count
Colleges & Universities	1
Communications	1
County Government	4
Courthouse	1
Daycare	11
Department of Public Health	2
Department of Social Services	4
Detention Center	4
District Attorney	2
Fire Station	4
Health Care	3
Nursing Home	4
Police	1
School	17
Sheriff	1
Supplemental College	1
Urgent Care	1
Total	**62**

Source: Fresno County, HIFLD 2017

For more information on this hazard please refer to the main plan, Section 4.

Severe Weather: Fog

The risk and vulnerability factors for fog in the City is not unique from the County at large. Please refer to the main plan's discussion of the fog hazard in section 4.

Severe Weather: Windstorm

Fresno's prevailing winds are typically light and from the northwest. High wind conditions are occasionally created by strong weather fronts. Occasionally, there are funnel clouds of low intensity. Past structural damage has been light, infrequent, and very limited in geographic extent. Injuries have been extremely rare. Most of this damage has occurred secondary to large trees being blown over. The City's design wind load, the level of wind force that new structures are required to be engineered to withstand, is 70 mph.

Soil Hazards: Land Subsidence

Despite long-term over-drafting of groundwater that has lowered the static water table under Fresno by as much as 100 feet over the past century, ground level subsidence has not been noted in the vicinity of the City (this is probably due to the geologic strata underlying the City, which features layers of clay and hardpan interleaved with sand and gravel layers).

Wildfire

Similar to many areas of the County, Fresno has high temperatures in the summer with low rainfall creating fire hazard conditions. There is some wildfire risk in the San Joaquin River Bluff area in northern Fresno due to vegetation and steep slopes.

Following the methodology described in Section 4.3.2 Vulnerability of Fresno County to Specific Hazards, a wildfire map for the City of Fresno was created (see Figure E.6). An analysis was performed using GIS software to determine where populations, values at risk, and critical facilities are located within wildfire threat zones. Table E.15 shows the values at risk in the moderate wildfire threat zone (there are no values at risk in the high or very high threat zones). There are not any critical facilities in wildfire threat zones in the City of Fresno.

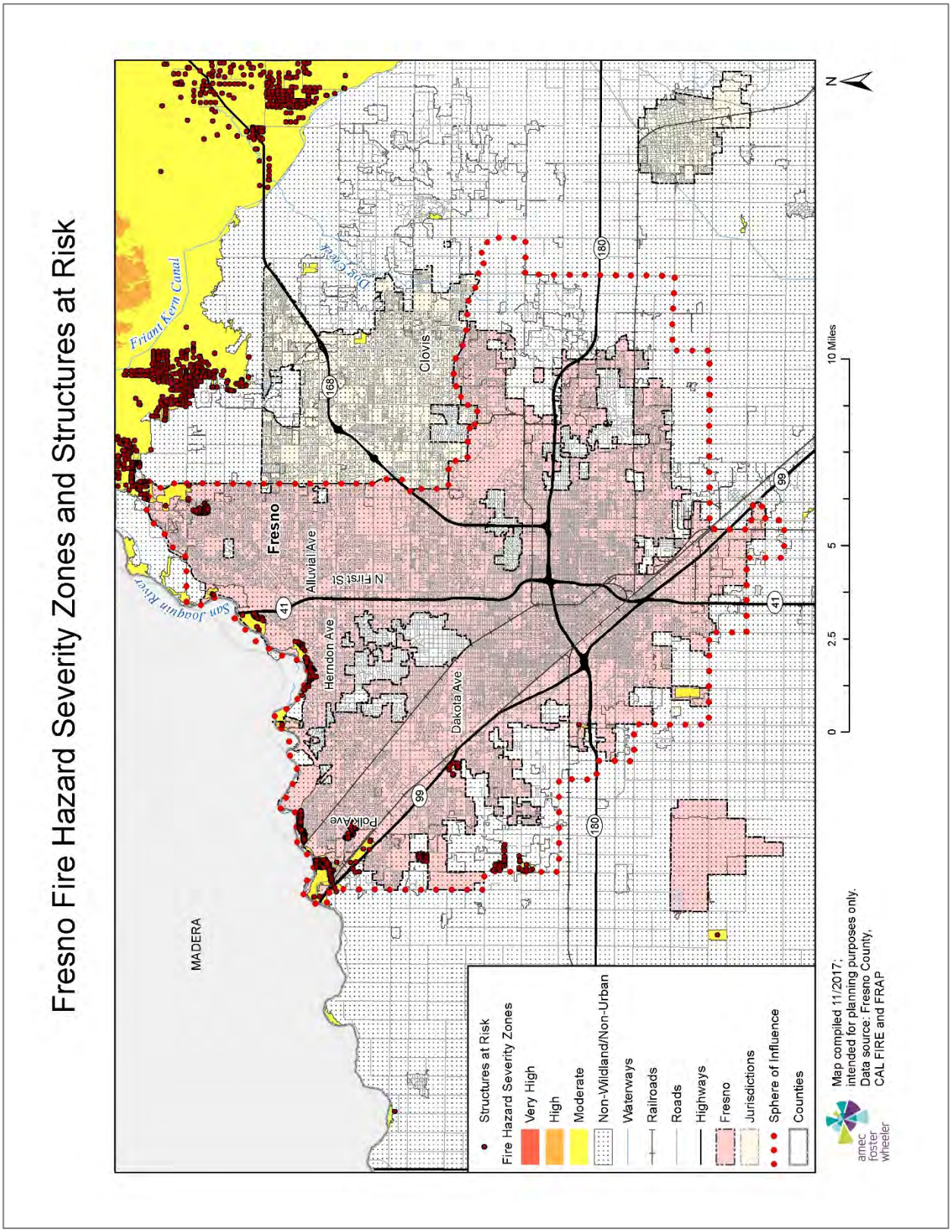
Table E.15: Values at Risk to Wildfire (Moderate Threat) in the City of Fresno

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Agricultural	1	0	$60,933	$60,933	$121,866
Commercial	13	36	$24,379,836	$24,379,836	$48,759,672
Exempt	12	13	$0	$0	$0
Industrial	4	4	$2,105,480	$3,158,220	$5,263,700
Multi-Residential	1	16	$255,200	$127,600	$382,800
Residential	772	779	$180,172,709	$90,086,355	$270,259,064
Total	**803**	**848**	**$206,974,158**	**$117,812,944**	**$324,787,102**

Sources: Fresno County 2017 Parcel and Assessor data

Based on this analysis, the City of Fresno's moderate wildfire threat affects 2,450 people and 803 improved parcels valued at roughly $324,787,102. Almost all of the parcels at risk are in the San Joaquin River corridor, where development is very restricted due to flood risk and bluff instability. Other parcels are in industrial areas along the western edge of the City, where the City's weed abatement ordinances (requiring vegetation control by April) would reduce the wildfire risk.

Figure E.6: City of Fresno's Wildfire Threat



E.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Amec Foster Wheeler consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Fresno's updated capabilities are summarized below.

E.4.1 Regulatory Mitigation Capabilities

Table E.16 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fresno.

Table E.16: City of Fresno's Regulatory Mitigation Capabilities

Regulatory Tool	Yes/No	Comments
General Plan	Yes	The Fresno General Plan has a Noise and Safety Element with policies for wildland fire hazards, seismic/geologic hazards, storm drainage and flood control, hazardous materials, airport safety, and emergency response
Zoning Ordinance	Yes	Fresno Municipal Code Chapter 15; Zoning Ordinance has requirements related to health and safety (e.g., dwelling unit density controls, building setbacks for fire protection, masonry walls along major streets)
Subdivision Ordinance	Yes	Fresno Municipal Code Chapter 15 requires multiple points of access for ingress/egress, fire protection provisions, etc.
Development Permit (formerly Site Plan Review) requirements	Yes	Required for all nonresidential development projects and multi-family projects over two units; required for duplexes in some zone districts; plot plan review required for even single-family residential construction
Growth Management Ordinance	Yes	Fresno Municipal Code Chapter 12 provides for extension of urban infrastructure and services including sewer treatment, water supply, and fire protection
Floodplain Ordinance	Yes	Fresno Municipal Code Chapter 13 (local building codes) includes the Flood Damage Prevention Ordinance
Other special purpose ordinance (stormwater, water conservation, wildfire)	Yes	- Within the Zoning Ordinance, there is a Bluff Preservation Overlay district with requirements for soil stability analysis and setbacks from the San Joaquin bluff edge

Regulatory Tool	Yes/No	Comments
		- Pretreatment Ordinance and environmental control program for wastewater system to prevent and abate any hazardous material releases
Building Code	Yes	Version: 2016 California Building Code with a few City modifications: fire sprinkler ordinance, swimming pool ordinance, and security ordinance
Fire Department ISO Rating	Yes	Rating: 3
Erosion or Sediment Control Program	Yes	The Bluff Preservation Ordinance, as well as grading plan review and stormwater pollution prevention plans, which are required for all development projects through project conditions and CEQA review
Stormwater Management Program	Yes	In conjunction with Cal-EPA, Regional Water Quality Control Board, and Fresno Metropolitan Flood Control District
Capital Improvements Plan	Yes	Public Works Department and Department of Public Utilities formulate and administer these plans
Economic Development Plan	Yes	Fresno Redevelopment Agency and Economic Development Division of the Planning and Development Department
Local Emergency Operations Plan	Yes	Ratified by City Council in 2005 and last updated in 2015
Flood Insurance Study or other engineering study for streams	Yes	FEMA Flood Insurance Study, 2005

Fresno General Plan (Adopted December 18, 2014)

The Fresno General Plan is a blueprint of how the City anticipates directing and managing growth while minimizing potential impacts for existing and future generations. It provides long-range planning strategies for the continued development, enhancement, and revitalization of the Fresno Metropolitan Area. The plan goals are the guiding principles and provide the framework for the objectives and policies that can be found in the plan elements. The following general plan goals directly or indirectly mitigate hazards identified in this plan:

- **Goal 9**—Promote a city of healthy communities and improve quality of life in established neighborhoods.
  - *Emphasize supporting established neighborhoods in Fresno with safe, well maintained, and accessible streets, public utilities, education and job training, proximity to jobs, retail services, health care, affordable housing, youth development opportunities, open space and parks, transportation options, and opportunities for home grown businesses.*
- **Goal 12**— Resolve existing public infrastructure and service deficiencies, make full use of existing infrastructure, and invest in improvements to increase competitiveness and promote economic growth.
  - *Emphasize the fair and necessary costs of maintaining sustainable water, sewer, streets, and other public infrastructure and service systems in rates, fees, financing and public investments to implement the General Plan. Adequately address accumulated deferred maintenance, aging infrastructure, risks to service continuity, desired standards of service to meet quality-of-life goals, and required infrastructure to support growth, economic competitiveness and business development.*
- **Goal 16**— Protect and improve public health and safety.

Some of the elements of the General Plan also contain objectives and policies relevant to protecting human health and safety (e.g., supporting objectives and policies in the Public Utilities and Services Element direct that amendments to construction and fire codes to reduce the level of risk to life and property from fire commensurate with the City's fire suppression capabilities and that fire and police services be provided). Because the Noise and Safety Element is the portion of the General Plan most relevant to hazard mitigation, select objectives and policies are extracted and included below.

The Noise and Safety Element

The Noise and Safety Element seeks to reduce deaths, injuries, illnesses, damage to property, and economic and social dislocation that could result from hazards. Of specific relevance to this plan, it addresses seismic and geologic conditions, flooding, hazardous materials, and emergency response.

Seismic and Geologic Hazards

NS-2. Objective: Minimize risks of property damage and personal injury posed by geologic and seismic risks.
NS-2-a. Policy: Seismic Protection. Ensure seismic protection is incorporated into new and existing construction, consistent with the Fresno Municipal Code.
NS-2-b. Policy: Soil Analysis Requirement. Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.
NS-2-c. Policy: Landfill Areas. Require proposed land uses on or near landfill areas to be designed and maintained to comply with California Code of Regulations, Title 27, Section 21190, Post Closure Land Use.
NS-2-d. Policy: Bluff Preservation Overlay Zone. Per the requirements of the Bluff Preservation Overlay Zone District and Policy POSS-7-f (Chapter 5, Parks and Open Space), the following standards shall be applicable for property located within the Bluff Preservation zone: • Require proposed development within 300 feet of the toe of the San Joaquin River bluffs to undertake an engineering soils investigation and evaluation report that demonstrates that the site is sufficiently stable to support the proposed development, or provide mitigations to provide sufficient stability; and • Establish a minimum setback of 30 feet from the San Joaquin River bluff edge for all buildings, structures, decks, pools and spas (which may be above or below grade), fencing, lighting, steps, etc. o An applicant may request to reduce the minimum setback to 20 feet from the bluff edge if it can be demonstrated, to the satisfaction of the City's Building Official and the Planning Director, that the proposed building, structure, deck, pool and/or spas (which may be above or below grade), fencing, steps, etc., will meet the objectives of the Bluff Preservation Overlay Ordinance. In no case shall the setback be reduced to less than 20 feet.

Flooding Hazards

NS-3. Objective: Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.
NS-3-a. Policy: Stormwater Drainage and Flood Control Master Plan. Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.

NS-3-b. Policy: Curb and Gutter Installation. Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.
NS-3-c. Policy: Dual Use Facilities. Support multiple uses of flood control and drainage facilities as follows: • Use, wherever practical, FMFCD facilities for groundwater management and recharge; and • Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.
NS-3-d. Policy: Landscaped Buffer. City will support the development of FMFCD ponding basins including the landscaping and irrigation for the top one third of the side sloped areas consistent with the FMFCD Basin Design Criteria.
NS-3-e. Policy: Pollutants. Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.
NS-3-f. Policy: Flooding Emergency Response Plans. Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin river bottom.
NS-3-g. Policy: Essential Facilities Siting Outside of Floodplains. Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.
NS-3-h. Policy: Runoff Controls. Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed the capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.
NS-3-i. Policy: New Development Must Mitigate Impact. Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project. *Commentary: The City recognizes the expertise and significant role of the FMFCD, and will give the highest deference to its recommendations for mitigation measures, consistent with applicable law.*
NS-3-j. Policy: National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements. Review NFIP maps periodically to determine if areas subject to flooding have been added or removed and make adjustments to the Land Use Diagram Figure LU-1.
NS-3-k. Policy: 100-Year Floodplain Policy. Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.
NS-3-l. Policy: 200-Year Floodplain Protection. Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin river bottom.
NS-3-m. Policy: Flood Risk Public Awareness. Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.
NS-3-n. Policy: Precipitation Changes. Work with FMFCD to evaluate the planned and existing stormwater conveyance system in light of possible changes to precipitation patterns in the future.

Hazardous Materials

NS-4. Objective: Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.
NS-4-a. Policy: Processing and Storage. Require safe processing and storage of hazardous materials, consistent with the California Building Code and the Uniform Fire Code, as adopted by the City.
NS-4-b. Policy: Coordination. Maintain a close liaison with the Fresno County Environmental Health Department, Cal-EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining

hazardous material business plans, inventory statements, risk management prevention plans, and contingency/emergency response action plans.
NS-4-c. Policy: Soil and Groundwater Contamination Reports. Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or groundwater contamination is identified or could be encountered during site development.
NS-4-d. Policy: Site Identification. Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.
NS-4-e. Policy: Compliance with County Program. Require that the production, use, storage, disposal, and transport of hazardous materials conform to the standards and procedures established by the County Division of Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.
NS-4-f. Policy: Hazardous Materials Facilities. Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.
NS-4-g. Policy: Hazmat Response. Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.
NS-4-h. Policy: Household Collection. Continue to support and assist with Fresno County's special household hazardous waste collection activities, to reduce the amount of this material being improperly discarded.
NS-4-i. Policy: Public Information. Continue to assist in providing information to the public on hazardous materials.

Emergency Response

NS-6. Objective: Foster an efficient and coordinated response to emergencies and natural disasters.
NS-6-a. Policy: County Multi-Jurisdiction Hazard Mitigation Plan. Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex. *Commentary: The federal Disaster Mitigation Act of 2000 requires that cities, counties, and special districts have a Local Hazard Mitigation Plan to be eligible to receive FEMA hazard mitigation funds. Cities and counties can adopt and use all or part of a regional multi-jurisdictional plan, such as the one prepared by Fresno County, in lieu of preparing all or part of a Local Hazard Mitigation Plan.*
NS-6-b. Policy: Disaster Response Coordination. Maintain coordination with other local, State, and Federal agencies to provide coordinated disaster response.
NS-6-c. Policy: Emergency Operations Plan. Update the City's Emergency Operations Plan periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.
NS-6-d. Policy: Evacuation Planning. Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies. Commentary: The evacuation plan will be flexible in order to consider many scenarios and multiple modes of transportation beyond private automobiles. It will provide special provisions for disadvantaged populations, such as those with physical disabilities or those with low or very low incomes, and for areas with fewer resources through neighborhood emergency preparedness programs.
NS-6-e. Policy: Critical Use Facilities. Ensure critical use facilities (e.g. City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and other structures that are important to protecting health and safety in the community remain operational during an emergency. • Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions. • Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.
NS-6-f. Policy: Emergency Vehicle Access. Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

NS-6-g. Policy: Emergency Preparedness Public Awareness Programs. Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

Fresno Flood Plain Ordinance

The City of Fresno's Flood Plain Ordinance was revised in the late 1990s and formally adopted by the Fresno City Council on September 20, 2005. (In late 2007, the Fresno Municipal Code was republished with its chapters somewhat reorganized. There was no change in the text of the Flood Plain Ordinance at that time, but due to the reorganization of its content, its most recent adoption effective date is January 17, 2008.) The Fresno Flood Plain Ordinance is Article 6 of Chapter 11 of the Fresno Municipal Code.

The purpose of this ordinance is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;
- Ensure that potential buyers are notified that property is in an area of flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, the ordinance includes the following methods and provisions:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- Control filling, grading, dredging, and other development which may increase flood damage
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood water or which may increase flood hazards in other areas
- Control the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters

This ordinance applies to all areas of special flood hazards within the jurisdiction of the City as identified by FEMA's Flood Insurance Study for Fresno County, California and incorporated areas dated September 30, 2005, with accompanying Flood Insurance Rate Maps, and all subsequent amendments and/or revisions. It appoints the building official to administer, implement, and enforce the ordinance by granting or denying development permits in accord with its provisions.

This ordinance includes the following standards of construction related to special flood hazard areas:

- Anchoring
- Construction materials and methods
- Elevation and floodproofing
- Residential construction
- Nonresidential construction
- Flood venting
- Standards for utilities
- Standards for subdivisions
- Standards for manufactured homes
- Standards for recreational vehicles
- Floodways
- Standards for storage of materials and equipment

In conjunction with Fresno's Drainage Fee Ordinance (Fresno Municipal Code Chapter 12, Article 19), which requires local grading and development to conform to the Fresno Metropolitan Flood Control District Master Drainage Plan and to provide proportionate shares of drainage infrastructure, the Fresno Flood Plain Ordinance and its preceding Flood Damage Prevention Ordinance have reduced flood damage losses in the City.

National Flood Insurance Program/Community Rating System

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. It has been a member of the Community Rating System (CRS) since October 1, 1992. The City's Floodplain Administrator duties are assigned to the building official. The Building and Safety Division of the Planning and Development Department works to improve the City's CRS rating, which determines the price paid for flood insurance policies issued in the jurisdiction. The rating is based on detailed biannual audits conducted by FEMA and/or a designee agency (currently, the California Department of Water Resources). The primary means of improving and maintaining a good CRS rating is through administration of the Fresno Flood Plain Ordinance. As part of its efforts to improve its community rating, the City of Fresno has hosted periodic FEMA Region IX NFIP/CRS training.

The City's current CRS rating from October 2016 is Class 8, which reflects the loss of two class levels in the most recent audit.

San Joaquin River Bluff Preservation Ordinance, 1980

After an interagency San Joaquin River Reconnaissance Plan was completed in the late 1970s, the City of Fresno adopted the San Joaquin River Bluff Specific Plan to preserve this important open space and habitat feature and to safeguard the bluff face, which is the most unstable geologic feature in the City. The San Joaquin River Bluff Specific Plan was later subsumed by the 1988 Bullard Community Plan, which carried forward protective policies for this area of Fresno.

The regulation of land use, development, and grading in this portion of Fresno is ongoing pursuant to the Bluff Preservation Ordinance. This ordinance, part of the City's zoning regulations, delineates an overlay zone district along the river bluff (the Bluff Preservation Overlay District), established allowable and prohibited land uses, and set forth conditions and requirements for using or modifying property in the district. The regulations of the district are deemed to be necessary for the preservation of the special qualities of the bluffs and for the protection of the health, safety, and general welfare of owners and users of property in the area.

The Bluff Preservation Ordinance is administered by the Fresno Development and Resource Management Department through its special permit process and grading plan checks. Anyone applying for a building permit is required to submit a site plan review with accompanying soil investigation and evaluation report (prepared by an appropriately licensed professional engineer or registered geologist). The Department's Code Enforcement Division also conducts periodic surveillance of bluff properties for grading and construction done without permits and institutes abatement actions when these conditions are discovered.

Hazardous Material Incident Safeguards

The Fresno Fire Department works with Fresno County Environmental Health to review hazardous material business plans that detail flammable, explosive, toxic, and otherwise hazardous materials used by businesses in the City. The Fire Department has its own permitting requirement for liquid and gaseous fuel tanks to ensure that they are installed and maintained safely. The City's Hazardous Materials Response Unit (housed in a City fire station) maintains the capability to quickly characterize material releases and spills, to evaluate risks to life and property, and to implement appropriate controls and evacuation measures.

Fire Prevention Policy

The City of Fresno has some of the most progressive and effective fire prevention policies and regulations in the nation relating to water supply (fire flow) required for development, ingress and egress from developed buildings and subdivisions, on-site automatic fire suppression systems (sprinkler and on-site private hydrants), building addressing to facilitate rapid emergency response, marking of unsafe buildings (those older structures with hazardous conditions or a lack of water supply), and instant aid/mutual aid with adjacent fire departments belonging to Fresno County special districts and the City of Clovis.

In addition to its extensive network of well-trained and well-equipped firefighting stations, the Fresno Fire Department has a Fire Prevention Bureau, under supervision of the City's fire marshal, to administer regulations adopted and referenced by the Fresno Municipal Code Chapter 6, Article 5 relating to fire prevention. The Fire Prevention Bureau carries out these responsibilities by conducting routine inspections of all public and commercial buildings, performing detailed development permit and construction plan checks, and investigating arson.

Another component of the City's overall fire protection program is the administration of its public nuisance ordinances to require properties to be kept clean and free of flammable debris and to annually abate weeds and overgrown vegetation before these materials can dry out in the spring to pose a wildfire hazard (Fresno Municipal Code Chapter 10, Article 6 relating to public nuisance abatement). The Planning and Development Department Code Enforcement Division and Department of Public Utilities Community Sanitation Division coordinate their efforts to enforce the nuisance abatement regulations and provide cleanup services when property owners do not take care of matters themselves.

City of Fresno Emergency Operations Plan, 2015, Updated 2015

The City of Fresno Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, excessive heat/cold, power outages, and national security emergencies in or affecting the City of Fresno. The Plan, which was updated in 2015, does the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the City of Fresno.
- Identifies the policies, responsibilities, and procedures required to protect the health and safety of City communities, public and private property, and the environment from natural or technological disasters.
- Establishes the operational concepts and procedures associated with initial response operations to emergencies, the extended response operations, and the recovery process.

The EOP is designed to establish the framework for implementation of the California Standardized Emergency Management System/National Incident Management System for the City of Fresno, which is located within the California Governor's Office of Emergency Services' Mutual Aid Region V. It is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly between the City of Fresno and the Fresno County Operational Area, including special districts and state agencies, in emergency operations. This plan will be used in conjunction with the Fresno County EOP and the State of California Emergency Plan. The plan is designed to guide the reader or user through each phase of an emergency: preparedness, response, recovery, and mitigation.

Other Plans and Policies

Other hazard mitigation-related policies and plans in place in and observed by the City of Fresno include the following:

- California Code of Regulations Title 23 administrative law for development and use of land in designated floodway areas along the San Joaquin River administered by the Central Valley Flood Protection Board, staffed by the California Department of Water Resources.
- Standards for constructing and maintaining drainage basins and ponds to prevent mosquito breeding and to provide for mosquito control district access for inspection and abatement activities (jointly promulgated by the Planning and Development Department and Public Works Department in fall of 2005).
- Dam failure inundation plans prepared and administered by the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, Fresno Metropolitan Flood Control District, Southern California Edison, and Pacific Gas and Electric Company.
- The California Environmental Quality Act, overseen by the Fresno City Attorney's Office and administered by several City departments, requires consideration of health and safety impacts as they may relate to projects, which are defined as any action that may result in a change in the physical environment and that would include public facilities, and private development, and even adoption/amendment of land use plans and ordinances. An analysis of every project is conducted by the appropriate City department (the Development and Resource Management Department does the bulk of these analyses). Inquiries regarding project sites and features are distributed to departments and outside agencies that may have knowledge of, or which may regulate, aspects of the proposed project. The information obtained from these requests for comment and from other staff research is compiled into an informational document for decision-makers and the public. The information is also used to develop a list of mitigation actions to reduce or abate potential adverse impacts of the project. For those projects which may involve federal funds or require federal approvals, a parallel National Environmental Policy Act assessment is also prepared by the City.
- The Development and Resource Management Department administers regulations in the California Building Code and in Uniform Electrical, Plumbing, and Mechanical Codes as those codes are modified through adoption by the state and City. Plan check and inspection activities of the Department ensure structural soundness and compliance with seismic and other regulations.

E.4.2 Administrative/Technical Mitigation Capabilities

Table E.17 identifies the personnel responsible for activities related to mitigation and loss prevention in Fresno.

Table E.17: City of Fresno's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	Yes	Planning and Development Department (planners), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Planning and Development Department (engineers), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Planner/engineer/scientist with an understanding of natural hazards	Yes	Planning and Development Department (planners and engineers), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Personnel skilled in GIS	Yes	Planning and Development Department, Department of Public Utilities, Public Works Department, Information Services Department
Full time building official	Yes	Planning and Development Department
Floodplain administrator	Yes	Planning and Development Department
Emergency manager	Yes	Fresno Fire Department
Grant writer	Yes	Planning and Development Department, Police Department, Public Works Department, Fire Department
Other personnel	Yes	California registered geologist (Department of Public Utilities), California registered environmental health specialist (Planning and Development Department), licensed water and wastewater treatment operators
Warning systems/services (Reverse 9-11, outdoor warning signals)	Yes	State Emergency Alert System is coordinated by emergency management team through the National Weather Service
Other	Yes	Emergency notification of San Joaquin River bottom residents in conjunction with the U.S. Bureau of Reclamation and Fresno County

E.4.3 Fiscal Mitigation Capabilities

Table E.18 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table E.18: City of Fresno's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Geographically restricted to designated portions of Fresno based on area income
Capital improvements project funding	Yes	Budgeted out of utility fees and often related to issuance of bonds; City also obtains grants, shares of state gas tax and sales taxes, ballot measure tax revenue, etc.
Authority to levy taxes for specific purposes	Yes	Subject to California Proposition 218 restrictions on new and increased assessments
Authority to levy fees and fines, and to recover costs through lien processes, for nuisance abatement	Yes	Subject to an appeal process that involves administrative law judges retained by the City
Fees for water, sewer, gas, or electric services	Yes	Water, sewer, solid waste, code enforcement (cleanup)

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Impact fees for new development	Yes	Master Fee Schedule as originally chartered under the City's Urban Growth Management Ordinance
Incur debt through general obligation bonds	Yes	Would need vote of the taxpayers to enact.
Incur debt through special tax bonds	Yes	Special Assessment Districts that issue debt and incur the debt but the City only administers
Incur debt through private activities	Yes	The City has the capability of doing them and have in the past
Withhold spending or public infrastructure investment in hazard prone areas	Yes	The Department of Public Utilities retains jurisdiction over water and sewer services and determines its appropriate service areas with risk to facilities being one of the factors leading to a decision not to extend services to River bottom properties

E.4.4 Mitigation Outreach and Partnerships

The Fresno Department of Public Utilities, in conjunction with other agencies, provides water conservation and stormwater quality protection public information programs. The Fire Department provides personal preparedness outreach for heat and freeze emergencies and shelter-in-place information for hazardous materials emergencies. Additionally, the City has developed public service announcements for smoke detector battery life, canal safety, and fireworks safety.

The City's Joint Information System disseminates information in Spanish, and the City can obtain translation services for other languages when necessary. A Joint Information Center plan is an annex to the City of Fresno Emergency Operations Plan and provides comprehensive guidance for early warning notification in all languages and specifically the Americans with Disabilities Act (ADA) community.

Preparedness Exercises afford the opportunity to include the City of Fresno ADA Committee. Members of the committee and volunteers from the ADA community role play for realistic first responder training.

E.4.5 Other Mitigation Efforts

- The City is a certified StormReady community through the National Weather Service.
- The Fire Department, Police Department, and Solid Waste Division are nationally accredited.
- The City has installed security systems for the wastewater treatment facility and for its surface water treatment plant. Generators are installed in critical groundwater pumping stations and these facilities are secured.

E.4.6 Opportunities for Enhancement

Based on the capabilities assessment, the City of Fresno has several existing mechanisms in place that already help to mitigate hazards. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect

the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City of Fresno will lead to more informed staff members who can better communicate this information to the public. In addition, the City could work to improve the CRS rating through additional floodplain management program enhancements. This could further lower the cost of flood insurance for residents.

E.5 Mitigation Strategy

E.5.1 Mitigation Goals and Objectives

The City of Fresno adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

Incorporation into Existing Planning Mechanisms

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Public Works Department may utilize the hazard information when implementing Capital Improvement projects and the Planning and Development Department may utilize the hazard information when reviewing a site plan or other type of development applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Fresno will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

Continued Compliance with the National Flood Insurance Program

In addition to the mitigation actions identified herein the City will continue to comply with the National Flood Insurance Program as specified in General Plan Policy NS-3-j: *"National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements."*

E.5.2 Completed 2009 Mitigation Actions

The City of Fresno did not complete any of the mitigation actions identified in the 2009 plan. However, implementation is in progress for several of these actions and will be continued as part of the mitigation strategy for this plan update.

E.5.3 Mitigation Actions

The planning team for the City of Fresno identified and prioritized the following mitigation actions based on the risk assessment. Background information as well as information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are also included.

In addition to implementing the mitigation actions below the City of Fresno will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in

partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see Section 5.3.3 Multi-Jurisdictional Mitigation Actions, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

1. Establish Post-Disaster Action Plan for City Continuity of Operations Plan

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: Establish a post-disaster action plan to be part of the City of Fresno Continuity of Operations Plan (COOP) that will include the following elements:

- Procedures for public information
- Post-disaster damage assessment
- Grant writing
- Code enforcement
- Redundant operations

The plan will also include annexes from local businesses and large employers to improve economic and employment recovery. The plan will also identify a mechanism for the City to help businesses without COOPs develop a COOP to be incorporated, as an annex, into the City's Emergency Operations Plan.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: $150,000

Potential Funding: Local funds, grants

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-planning. A City COOP and local business COOPs will reduce the impact of a disaster to the local economy and employment.

Schedule: Long term

Status: 2009 project, implementation in progress

2. Improve the City's Capabilities for Sheltering Animals in a Disaster

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: During a disaster, not only do people need to be rescued, but their pets do also. Hurricane Katrina showed the nation that shelters do not typically allow pets, so pets may be left behind when their owners evacuate. The care of the animals left behind falls to local animal shelters. Currently, the SPCA Animal Shelter does not have the supplies to handle a large scale animal emergency. The City has approximately 18,000 licensed dogs. If a disaster occurred, they would only be able to house a small percentage of them. Overcrowding of animals usually causes diseases and loss of animal life. Purchasing new cages would alleviate some of the overcrowding created by a disaster.

Other Alternatives: Ask other agencies for supplies, if they have them available.

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: $50,000

Potential Funding: General fund

Benefits (Avoided Losses): This will cut down on the spread of disease and animal loss during an emergency or disaster.

Schedule: Short term

Status: 2009 project, implementation in progress

3. Train and Certify City Inspectors to Conduct Post-Disaster Damage Assessment

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: City inspectors play a vital role in post-disaster building assessment and damage assessment. Pre-training and certification is vital in response and recovery to reduce loss of life, relocate populations, and ensure the rebuilding of local economies.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): High

Cost Estimate: $250,000

Potential Funding: Grants

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-training and certification of individuals responsible for performing assessment of structures and facilities impacted by disasters. Certification will also allow qualified staff to mobilize with the State of California Office of Emergency Services (Region 5) Urban Search and Rescue Task Force.

Schedule: Long term

Status: 2009 project, implementation not yet started

4. Implement a Flood Awareness Program for the Public

Hazard(s) Addressed: Flood

Issue/Background: The City needs a program to educate flood-prone property owners along the San Joaquin River and in frequent annual flooding areas about the flood threat and how best to prepare, mitigate, and insure their properties.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): Medium

Cost Estimate: $15,000/year

Potential Funding: General fund, grants

Benefits (Avoided Losses): This will prevent the loss of human life and economic and property losses.

Schedule: Long term

Status: 2009 project, implementation not yet started

5. Southwest Fresno – Recycled Water Distribution System Construction

Hazard(s) Addressed: Drought

Issue/Background: In 2009, the State of California adopted a recycled water policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and an additional 300,000 acre-feet per year by 2030. The Recycled Water Master Plan prepared by the City of Fresno, Department of Public Utilities (DPU), identifies opportunities to assist with compliance of this law by reducing groundwater pumping and replacing groundwater with recycled water for non-potable purposes (i.e. outdoor irrigation, dust control, fountains, etc.). On April 11, 2013, the Council adopted the Recycled Water Master Plan and associated environmental documents.

In 2017, the DPU commissioned a 5 MGD Tertiary Treatment Facility at the Fresno-Clovis Regional Wastewater Treatment Facility. DPU is currently constructing a Recycled Water Distribution System in Southwest Fresno to deliver recycled water to parks, cemeteries, schools, agricultural uses, etc., to offset potable water irrigation demands. This will help mitigate drought by enabling the use of recycled water for certain uses instead of tapping potable water supplies.

Other Alternatives: DPU has a Water Shortage Contingency Plan (WSCP) which was updated in the City of Fresno's 2015 Urban Water Management Plan to manage water shortages including drought conditions. The WSCP consists of four stages allowing the City to ultimately reduce its water demand to a level commensurate with the water supplies available to a maximum reduction of 50 percent.

Responsible Office: City of Fresno Department of Public Utilities

Priority (High, Medium, Low): High

Cost Estimate: $75,000,000

Potential Funding: California State Water Resources Control Board – Clean Water State Revolving Fund

Benefits (Avoided Losses): Reduced ground water pumping by using recycled water for non-potable purposes.

Schedule: Ongoing with completion in 2019

Status: New project

6. Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation

Hazard(s) Addressed: Drought

Issue/Background: The Kings subbasin underlays the City of Fresno and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Fresno has become a joint power authority of the North Kings Groundwater Sustainability Agency, other members of the Agency include the County of Fresno, City of Kerman, City of Clovis, Biola Community Services District, Garfield Water District and International Water District. As a member of the North Kings GSA, the City of Fresno is required to participate in the development and implementation, no later than January 31, 2020, of a

Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the North Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Fresno.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City Engineer and North Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with grant funding opportunities from the State.

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR by January 31, 2020, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: New project in 2018

Attachment 5
Notice of Public Hearing

Notice of Public Hearing

City of Fresno

Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or Peter.Maraccini@Fresno.gov.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street

Bldg. A, Fresno, CA 93706, or by emailing at Peter.Maraccini@Fresno.gov. All written comments must be received no later than July 14, 2021, at 11:59 P.M.

Attachment 6
Resolution Approving the WSCP

RESOLUTION NO. 2021-197

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 WATER SHORTAGE CONTINGENCY PLAN AND AUTHORIZE THE CITY MANAGER TO DECLARE THE APPROPRIATE WATER CONSERVATION STAGES AND IMPLEMENT THE ASSOCIATED SHORTAGE RESPONSE ACTIONS

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, Water Code Section 10632 requires every urban water supplier to prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its UWMP; and

WHEREAS, the WSCP details intended City actions to respond to water shortages; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared a WSCP that complies with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 WSCP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library,

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 WSCP would be held in Council Chambers at which time public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 WSCP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Water Shortage Contingency Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Water Shortage Contingency Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

3. The City Manager, or designee, is hereby authorized to declare the appropriate Water Conservation Stages outlined in the 2020 Water Shortage Contingency Plan and implement the associated shortage response actions specified for the appropriate Water Conservation Stage in the Water Shortage Contingency Plan.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-197, entitled ***RESOLUTION – **Adopting 2020 Water Shortage Contingency Plan and authorizing the City Manager to declare the appropriate water conservation stages and implement the associated shortage response actions (Subject to Mayor's veto).** Item 10:05 A.M. (4), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

RECEIVED
2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

K

Outreach Events

2015 Outreach Events		
Date	Name of Event	Description
Jan	"Creating a Water-wise Landscape: Seven Steps to Follow our Climate"	Landscape Workshop by Susan Stiltz as SPEAKER for City employees at City Hall 2600 Fresno St 93721.Distribute literature E. Social media: sent email with flier to City employees. Contact: Melany Felton. LITERATURE
Jan	Fresno Chinese New Year Parade	Outreach booth providing water saving info & rebate information
March	Spring Festival - Clovis Botanical Garden	Outreach booth providing water saving info & rebate information
April	Home Depot - Riverpark Kid's Day Spring Event	Hands on activity for kids, drought tolerant plants planting, literature for adults
April	America's Party for the Planet	Outreach booth providing water saving info & rebate information
April	Sequoia Middle School Outdoor Club	Outreach booth providing water saving info & rebate information
May	Spring Fling - Master Gardener	Provided literature for event held at Garden of the Sun
May	Madden Library Water-wise Plant Exchange event	Water wise garden speaker, materials handed out
May	Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
June	Kids Water Camp	Large one day event, hands on activites, educational for kids 3rd grade (all elementary schools invited to participate)
July	Fresno Home Remodeling & Decorating Show	Fresno Fairgrounds 3 day event. Outreach booth with visual displays & information
Sept	Carnaval Children's Festival	Mosqueda Center Outreach booth, providing water saving information & rebates
Sept	Fresno State partnership	Susan Hawksworth extended education. Began planning for Feb classes with landscape specialists
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information
Nov	Fresno Fall Improvement Show	Inspiration Park Grand opening
Nov	Inspiration Park Grand opening	Outreach booth providing water saving info & rebate information

2016 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days

March	Spring Into Your Garden	Outreach booth providing water saving info & rebate information. Visual displays
April	Water Planet Day	Outreach booth providing water saving info & rebate information. Visual displays
April	8th Annual Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Dec	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Orchard St. & Grant Ave

2017 Outreach Events		
Jan	Hmong New Year	Outreach booth providing water saving info & rebate information. Hmong translator & printed materials in Hmong
Feb	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Hildago Elementary 3550 E Thomas 93702
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
March	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Leavenworth Elementary School, 4420 E Thomas

April	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Webster Elementary School, 2600 E Tyler 93701
April	9th Annual Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
April	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
May	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Slater Elementary school 4472 N Emerson 93705
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Make A Difference Day @ Chukchansi Park	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2018 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event
March	Spring Into Your Garden Festival	Outreach booth providing water saving info & rebate information. Visual displays
April	10th Annual Water Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days

Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual Display
Sept	Central California Women's Conference	Outreach booth providing water saving info & rebate information. Visual Display
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual Display
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2019 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event
March	Spring Into Your Garden Festival	Outreach booth providing water saving info & rebate information. Visual displays
April	Outreach booth @ Manchester Mall	Outreach booth providing water saving info & rebate information. Visual displays
April	Party for the Planet @ Chaffee Zoo	Outreach booth providing water saving info & rebate information. Visual displays
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
May	11th Annual Water Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2020 Outreach Events
All Outreach Suspended

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Notification Letters

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Shay Bakman
Bakman Water Company
PO Box 7965
Fresno, CA 93747

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Bakman:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Scott Redelfs
City of Clovis Public Utilities
155 N. Sunnyside Ave
Clovis, CA 93611

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Redelfs:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Bill Stretch
Fresno Irrigation District
2907 South Maple Ave
Fresno, CA 93725

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Stretch:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Peter Sanchez
Fresno Metropolitan Flood Control District
5469 East Olive Ave
Fresno, CA 93727

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Sanchez:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Steven White
Fresno County Public Works
2220 Tulare St, 6th Floor
Fresno, CA 93721

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. White:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

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2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Jason Phillips
Friant Water Authority
4969 E. McKinley Ave, Suite 201
Fresno, CA 93727

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Phillips:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Nick Keller
Garfield Water District
PO Box 337
Clovis, CA 93613

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Keller:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Moises Ortiz
Malaga County Water District
3580 South Frank Street
Fresno, CA 93725-2511

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Ortiz:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Kassy D. Chauhan, PE
North Kings Groundwater Sustainability Agency
2907 S. Maple Avenue
Fresno, CA 93725

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mrs. Chauhan:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Jason Franklin
Pinedale County Water District
480 West Birch Ave
Pinedale, CA 93650

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Franklin:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Michael P. Jackson, PE
United States Bureau of Reclamation South-Central California Area Office
1243 N Street
Fresno, CA 93721-1813

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Jackson:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

Notice of Public Hearing

City of Fresno

Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or Peter.Maraccini@Fresno.gov.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street Bldg. A, Fresno, CA 93706, or by emailing at Peter.Maraccini@Fresno.gov. All written comments must be received no later than July 14, 2021, at 11:59 P.M.

McClatchy

Beaufort Gazette
Belleville News-Democrat
Bellingham Herald
Bradenton Herald
Centre Daily Times
Charlotte Observer
Columbus Ledger-Enquirer
Fresno Bee
The Herald - Rock Hill
Herald Sun - Durham
Idaho Statesman
Island Packet
Kansas City Star
Lexington Herald-Leader
Merced Sun-Star
Miami Herald
el Nuevo Herald - Miami
Modesto Bee
Raleigh News & Observer
The Olympian
Sacramento Bee
Fort Worth Star-Telegram
The State - Columbia
Sun Herald - Biloxi
Sun News - Myrtle Beach
The News Tribune Tacoma
The Telegraph - Macon
San Luis Obispo Tribune
Tri-City Herald
Wichita Eagle

AFFIDAVIT OF PUBLICATION

Account #	Order Number	Identification	Order PO	Amount	Cols	Depth
59161	92995	Print Legal Ad - IPL0030763		$861.84	2	5.31

Attention: City of

City of Fresno Dept. Public Utilities
2101 G Street Bldg A
Fresno, CA 93706

PUBLIC NOTICE

Notice of Public Hearing

City of Fresno
Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

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IPL0030763
Jul 1 2021

COUNTY OF DALLAS
STATE OF TEXAS

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.
The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 28, 1994, Action No. 520058-9.
The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

No. of Insertions: 1

Beginning Issue of: 07/01/2021

Ending Issue of: 07/01/2021

Isabel Capps

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: 07/01/2021

Amanda Grisham

Notary Public in and for the state of Texas, residing in Dallas County

AMANDA DAWN GRISHAM
My Notary ID # 132031326
Expires May 30, 2023

Extra charge for lost or duplicate affidavits.
Legal document please do not destroy!

McClatchy

Beaufort Gazette
Belleville News-Democrat
Bellingham Herald
Bradenton Herald
Centre Daily Times
Charlotte Observer
Columbus Ledger-Enquirer
Fresno Bee
The Herald - Rock Hill
Herald Sun - Durham
Idaho Statesman
Island Packet
Kansas City Star
Lexington Herald-Leader
Merced Sun-Star
Miami Herald
el Nuevo Herald - Miami
Modesto Bee
Raleigh News & Observer
The Olympian
Sacramento Bee
Fort Worth Star-Telegram
The State - Columbia
Sun Herald - Biloxi
Sun News - Myrtle Beach
The News Tribune Tacoma
The Telegraph - Macon
San Luis Obispo Tribune
Tri-City Herald
Wichita Eagle

AFFIDAVIT OF PUBLICATION

Account #	Order Number	Identification	Order PO	Amount	Cols	Depth
59161	95606	Print Legal Ad - IPL0031437		$861.84	2	53 L

Attention: City of

City of Fresno Dept. Public Utilities
2101 G Street Bldg A
Fresno, CA 93706

PUBLIC NOTICE

Notice of Public Hearing

City of Fresno
Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

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IPL0031437
Jul 8 2021

COUNTY OF DALLAS
STATE OF TEXAS

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No. of Insertions: 1

Beginning Issue of: 07/08/2021

Ending Issue of: 07/08/2021

Isabel Capps

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: 07/08/2021

Amanda Grisham

Notary Public in and for the state of Texas, residing in Dallas County

AMANDA DAWN GRISHAM
My Notary ID # 132031326
Expires May 30, 2023

Extra charge for lost or duplicate affidavits.
Legal document please do not destroy!

M

Adopting Resolutions

RESOLUTION NO. 2021-196

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, the City adopted its current UWMP on June 23, 2016; and

WHEREAS, the requirements of an UWMP are to generally: (1) assess current and projected water supplies, (2) evaluate water demand and customer types, (3) evaluate reliability of water supplies, (4) compare demand and supply projections for a 20-year period, and (5) detail response actions in the event of a water shortage; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared the UWMP to comply with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 UWMP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library, Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 UWMP would be held in Council Chambers at which public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 UWMP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Urban Water Management Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-196, entitled ***RESOLUTION – Adopting 2020 Urban Water Management Plan (Subject to Mayor's veto). Item 10:05 A.M. (3), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes :
Noes :
Absent :
Abstain :

RECEIVED
2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

RESOLUTION NO. 2021-197

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 WATER SHORTAGE CONTINGENCY PLAN AND AUTHORIZE THE CITY MANAGER TO DECLARE THE APPROPRIATE WATER CONSERVATION STAGES AND IMPLEMENT THE ASSOCIATED SHORTAGE RESPONSE ACTIONS

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, Water Code Section 10632 requires every urban water supplier to prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its UWMP; and

WHEREAS, the WSCP details intended City actions to respond to water shortages; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared a WSCP that complies with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 WSCP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library,

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 WSCP would be held in Council Chambers at which time public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 WSCP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Water Shortage Contingency Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Water Shortage Contingency Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

3. The City Manager, or designee, is hereby authorized to declare the appropriate Water Conservation Stages outlined in the 2020 Water Shortage Contingency Plan and implement the associated shortage response actions specified for the appropriate Water Conservation Stage in the Water Shortage Contingency Plan.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-197, entitled ***RESOLUTION – **Adopting 2020 Water Shortage Contingency Plan and authorizing the City Manager to declare the appropriate water conservation stages and implement the associated shortage response actions (Subject to Mayor's veto).** Item 10:05 A.M. (4), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

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2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

RESOLUTION NO. 2021-198

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT APPENDIX L - ADDENDUM TO THE CITY OF FRESNO'S 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, the City of Fresno (City) contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 acre-feet of Class 1 surface water; and,

WHEREAS, the CVP was developed through an agreement with the Exchange Contractors that have historic pre-1914 San Joaquin River water rights; and,

WHEREAS, the Exchange Contractors receive water from the Sacramento-San Joaquin River Delta (Delta) in exchange for the CVP Friant Division water; and,

WHEREAS, during times of severe drought when the Exchange Contractors don't receive their full allocations from the Delta, the Exchange Contractors can call on their historic pre-1914 San Joaquin River water rights to fulfill their allocations, which reduces CVP Friant Division allocations to the City; and,

WHEREAS, due to the indirect connection of the City's Class 1 surface water allocation from the CVP Friant Division to the Exchange Contractors allocation from the Delta, the City is required to demonstrate consistency with the Delta Plan established via the Sacramento-San Joaquin Delta Reform Act of 2009; and,

WHEREAS, Delta Plan Policy WR P1 requires urban water suppliers to demonstrate reduced Delta reliance in the 2015 and 2020 Urban Water Management Plans (UWMPs); and,

WHEREAS, the City's 2015 UWMP did not include information regarding Delta

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self -Reliance; and

WHEREAS, the City prepared the 2015 UWMP following the Department of Water Resources (DWR) UWMP Guidebook 2015, which made such reporting optional; and,

WHEREAS, the DWR UWMP Guidebook 2020 instructs urban water suppliers to amend 2015 UWMP with reporting on reduced Delta reliance if not already included; and,

WHEREAS, the City has prepared Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" that follows the instructions of the DWR UWMP Guidebook 2020, fulfills the requirements of the Delta Plan Policy WR P1, and complies with the requirements of the Urban Water Management Planning Act; and,

WHEREAS, the City desires to amend its 2015 UWMP to incorporate Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed;" and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft Appendix L – Addendum to the 2015 UWMP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library, Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021 and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft Appendix L – Addendum to the 2015 UWMP would be held in Council Chambers at which time public comment on the draft Addendum would be received, as required by Water Code Section 10642; and,

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the draft Appendix L Addendum to the 2015 UWMP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed."

2. The City Manager, or designee, is hereby authorized and directed to file Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-198, entitled ***RESOLUTION – Adopting Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan (Subject to Mayor's veto). Item 10:05 A.M. (5), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes :
Noes :
Absent :
Abstain :

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CITY OF FRESNO
CITY CLERK'S OFFICE
2021 JUL 19 P 4:52

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Appendix G:
Noise Supporting Information

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TABLE Existing (Year 2019)-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Clovis Avenue - south of American Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14400 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.11

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	57.6	115.4	244.3	524.2

TABLE Existing (Year 2019)-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - north of Mckinley Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2800 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.51

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	82.0	176.3

TABLE Existing (Year 2019)-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Mckinley Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1900 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.82

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	63.4	136.2

TABLE Existing (Year 2019)-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Clinton Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2300 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 61.65

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	72.0	154.6

TABLE Existing (Year 2019)-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - north of Jensen Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1700 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	58.9	126.5

TABLE Existing (Year 2019)-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Jensen Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1200 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 58.83

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	100.3

TABLE Existing (Year 2019)-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of Bethel Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 14000 SPEED (MPH): 60 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
74.1	152.9	326.1	700.9

TABLE Existing (Year 2019)-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of De Wolf Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9800 SPEED (MPH): 60 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
60.2	121.4	257.5	552.8

TABLE Existing (Year 2019)-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - west of De Wolf Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5700 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.11

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	86.4	180.3	385.6

TABLE Existing (Year 2019)-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of Temperance Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 9900 SPEED (MPH): 60 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.51

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
60.6	122.2	259.2	556.5

TABLE Existing (Year 2019)-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - west of Temperance Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10800 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.88

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
63.7	129.2	274.6	589.7

TABLE Existing (Year 2019)-12
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Locan Avenue - north of Tulare Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 170 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (Year 2019)-13
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Locan Avenue - south of Tulare Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 160 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 50.08

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (Year 2019)-14
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of McKinley Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 4200 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.27

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	107.3	230.9

TABLE Existing (Year 2019)-15
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of Ashlan Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5200 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.19

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	57.7	123.7	266.2

TABLE Existing (Year 2019)-16
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of Belmont Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5800 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

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* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.67

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	62.0	133.0	286.3

TABLE Existing (Year 2019)-17
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Tulare Avenue - east of Locan Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 250 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 52.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE Existing (Year 2019)-18
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Tulare Avenue - west of Locan Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 600 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 55.82

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	63.4

TABLE Existing (Year 2019)-19
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: North Avenue - west of Temperance Avenue
NOTES: Fresno SEDA SP - Existing (Year 2019)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2500 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	76.1	163.4

TABLE 2035 Forecast (No Project)-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Clovis Avenue - south of American Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 15400 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.41

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
59.8	120.4	255.4	548.1

TABLE 2035 Forecast (No Project)-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - north of Mckinley Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 4300 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.37

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	50.9	109.0	234.5

TABLE 2035 Forecast (No Project)-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Mckinley Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1900 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.82

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	63.4	136.2

TABLE 2035 Forecast (No Project)-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Clinton Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3500 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.48

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	0.0	95.1	204.5

TABLE 2035 Forecast (No Project)-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - north of Jensen Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1700 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 60.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	0.0	58.9	126.5

TABLE 2035 Forecast (No Project)-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Jensen Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1300 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.17

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	105.8

TABLE 2035 Forecast (No Project)-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of Bethel Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 15100 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.34

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
77.5	160.6	342.9	737.1

TABLE 2035 Forecast (No Project)-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of De Wolf Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 11600 SPEED (MPH): 60 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.19

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
66.3	135.3	287.9	618.4

TABLE 2035 Forecast (No Project)-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - west of De Wolf Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6700 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.81

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	95.5	200.5	429.3

TABLE 2035 Forecast (No Project)-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of Temperance Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 13900 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.98

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	73.8	152.2	324.5	697.6

TABLE 2035 Forecast (No Project)-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - west of Temperance Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 12700 SPEED (MPH): 60 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.59

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
69.9	143.5	305.7	656.9

TABLE 2035 Forecast (No Project)-12
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Locan Avenue - north of Tulare Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 220 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 51.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL 70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Forecast (No Project)-13
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Locan Avenue - south of Tulare Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 200 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 51.05

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Forecast (No Project)-14
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of McKinley Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 4200 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.27

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	107.3	230.9

TABLE 2035 Forecast (No Project)-15
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of Ashlan Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5200 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.19

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	57.7	123.7	266.2

TABLE 2035 Forecast (No Project)-16
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of Belmont Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5800 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.67

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	62.0	133.0	286.3

TABLE 2035 Forecast (No Project)-17
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Tulare Avenue - east of Locan Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 370 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.72

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Forecast (No Project)-18
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Tulare Avenue - west of Locan Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 870 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 57.43

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	81.1

TABLE 2035 Forecast (No Project)-19
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: North Avenue - west of Temperance Avenue
NOTES: Fresno SEDA SP - 2035 Forecast (No Project)

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2500 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	76.1	163.4

TABLE 2035 Forecast Plus Project-01
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Clovis Avenue - south of American Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18300 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 69.16

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
66.0	134.6	286.2	614.8

TABLE 2035 Forecast Plus Project-02
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - north of Mckinley Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5600 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.52

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	60.6	129.9	279.6

TABLE 2035 Forecast Plus Project-03
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Mckinley Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3700 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.72

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	98.7	212.2

TABLE 2035 Forecast Plus Project-04
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Clinton Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

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* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 4700 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 64.76

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	53.9	115.6	248.8

TABLE 2035 Forecast Plus Project-05
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - north of Jensen Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 3600 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 63.60

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	96.9	208.4

TABLE 2035 Forecast Plus Project-06
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: De Wolf Avenue - south of Jensen Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2200 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES

	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 61.46

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL

70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	69.9	150.1

TABLE 2035 Forecast Plus Project-07
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of Bethel Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 18900 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.31

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	88.9	186.0	398.0	856.0

TABLE 2035 Forecast Plus Project-08
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of De Wolf Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 16800 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 70.80

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
82.7	172.2	368.0	791.4

TABLE 2035 Forecast Plus Project-09
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - west of De Wolf Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10000 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.55

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	60.9	123.0	261.0	560.3

TABLE 2035 Forecast Plus Project-10
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - east of Temperance Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 20100 SPEED (MPH): 60 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.58

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
92.4	193.6	414.6	891.8

TABLE 2035 Forecast Plus Project-11
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Jensen Avenue - west of Temperance Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 19800 SPEED (MPH): 60 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 24 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 71.52

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	91.5	191.7	410.4	882.9

TABLE 2035 Forecast Plus Project-12
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Locan Avenue - north of Tulare Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 400 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 54.06

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Forecast Plus Project-13
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Locan Avenue - south of Tulare Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 320 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 53.09

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	0.0	0.0

TABLE 2035 Forecast Plus Project-14
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of McKinley Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 6400 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 66.10

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	66.1	142.0	305.7

TABLE 2035 Forecast Plus Project-15
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of Ashlan Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 5700 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 65.59

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	61.3	131.5	283.0

TABLE 2035 Forecast Plus Project-16
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: McCall Avenue - north of Belmont Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 10000 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 68.03

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	88.9	191.1	411.5

TABLE 2035 Forecast Plus Project-17
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Tulare Avenue - east of Locan Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 590 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 55.74

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL	70 CNEL	65 CNEL	60 CNEL	55 CNEL
	0.0	0.0	0.0	62.7

TABLE 2035 Forecast Plus Project-18
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: Tulare Avenue - west of Locan Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 1400 SPEED (MPH): 50 GRADE: .5

TRAFFIC DISTRIBUTION PERCENTAGES	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 59.50

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	51.9	111.1

TABLE 2035 Forecast Plus Project-19
FHWA ROADWAY NOISE LEVEL ANALYSIS

RUN DATE: 06/27/2022
ROADWAY SEGMENT: North Avenue - west of Temperance Avenue
NOTES: Fresno SEDA SP - 2035 Forecast Plus Project

---

* * ASSUMPTIONS * *

AVERAGE DAILY TRAFFIC: 2500 SPEED (MPH): 50 GRADE: .5

	TRAFFIC DISTRIBUTION PERCENTAGES		
	DAY	EVENING	NIGHT
AUTOS	75.51	12.57	9.34
M-TRUCKS	1.56	0.09	0.19
H-TRUCKS	0.64	0.02	0.08

ACTIVE HALF-WIDTH (FT): 6 SITE CHARACTERISTICS: SOFT

---

* * CALCULATED NOISE LEVELS * *

CNEL AT 50 FT FROM NEAR TRAVEL LANE CENTERLINE (dB) = 62.01

DISTANCE (FEET) FROM ROADWAY CENTERLINE TO CNEL			
70 CNEL	65 CNEL	60 CNEL	55 CNEL
0.0	0.0	76.1	163.4

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Appendix H:
Transportation Supporting Information

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Traffic Impact Analysis Report

Fresno Southeast Development Area (SEDA) Specific Plan TIA DRAFT

City of Fresno, California

June 30, 2022

TJKM

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EXECUTIVE SUMMARY

This report summarizes the results of the Traffic Impact Analysis (TIA) conducted for the Southeast Development Area (SEDA) located east of the city of Fresno, California. The SEDA comprises approximately 9,000 acres of land and was formally designated as a Growth Area in the 2035 Fresno General Plan. The plan consists of various mixed uses. There will be approximately 37,000 new jobs created along with 45,000 new housing units. The SEDA area is located southeast of the City of Fresno, with East North Avenue as its southern border, McCall Avenue as its eastern border, and Ashlan Avenue as its northern border.

This report provides the roadway segment level of service (LOS) related to the project. Additionally, the report also includes evaluations and recommendations concerning project site access and on-site circulation for vehicles, bicycles, and pedestrians, as well as a vehicle miles traveled (VMT) analysis.

To evaluate the impacts on the transportation infrastructure due to the addition of traffic from the proposed project, 20 study roadway segments were evaluated during the weekday morning (a.m.) peak hour and evening (p.m.) peak hour, and daily scenarios. The study segments were evaluated under *Existing Conditions, Year 2035 Baseline (No Project) Conditions,* and *Year 2035 Project Conditions*. For the purpose of this analysis, potential traffic operational effects from the proposed project are identified based on established operational thresholds described in the report.

Project Trip Generation

The proposed project is expected to generate approximately 94,477 weekday p.m. peak hour trips and 866,452 total daily trips.

Existing Conditions

Existing volumes for the SEDA area for AM/PM peak hour and daily are low due to the rural nature of the project area. Peak daily volumes are less than 15,000 while the highest AM/PM peak volumes observed hover around 1,000.

Year 2035 Baseline (No Project) Condition

Year 2035 no project scenario volumes for the project area were projected from existing volumes using the delta method and the Fresno Council of Governments Travel Demand Model (Fresno ABM). Low growth in the no project condition results in volumes very similar to existing conditions.

Year 2035 Project Conditions

Year 2035 project scenario volumes were projected with SEDA project land use coded into the Fresno ABM. Higher growth rates derived from the model resulted in almost doubling of daily volumes in some roadway segments for the daily time period.

Vehicle Miles Traveled

The proposed project will be located at the southeast boundary of Fresno. The project is expected to increase the total VMT in the area; but will not have a significant impact due to the mixed use nature of the project. The construction of additional sidewalks, other walkways, and bicycle facilities on the project site will encourage future residents and customers to use alternate modes (walking, biking, transit), further

reducing potential VMT impacts. In addition, the mixed use nature of the project with added commercial destinations mean that residents will travel shorter for their needs, shortening the VMT per capita and VMT per employee impacts. Future transit operations are anticipated for the SEDA project area, further reducing its VMT impacts.

1.0 INTRODUCTION

This report summarizes the results of the Traffic Impact Analysis (TIA) for the proposed SEDA Specific Plan development in Fresno, California.

1.1 Project Description

The project proposes to 9,000 acres of mixed use development in the southeast of the city of Fresno in its sphere of influence. In total, there will be around 45,000 housing units (split between 26,000 single family dwelling units and 19,000 multi family dwelling units), 12,000 retail employees, 8,000 office employees, and 17,000 civic institutional employees for a total of 37,000 employees.

The project is located in the southeast of the City of Fresno, with Ashlan Avenue as the northern border, McCall Avenue as eastern border, E North Avenue as southern border, and Temperance Road as the western border.

The following section discusses the TIA Purpose, study segments, and analysis scenarios.

1.2 Project Purpose

The purpose of the Traffic Impact Analysis is to evaluate the impacts on the transportation infrastructure due to the addition of the traffic from the proposed SEDA project. The report also includes evaluations and recommendations concerning project site access and on-site circulation for vehicles, bicycles, and pedestrians, queuing analysis at the study intersections, parking supply, and a VMT analysis.

1.3 Study Segments

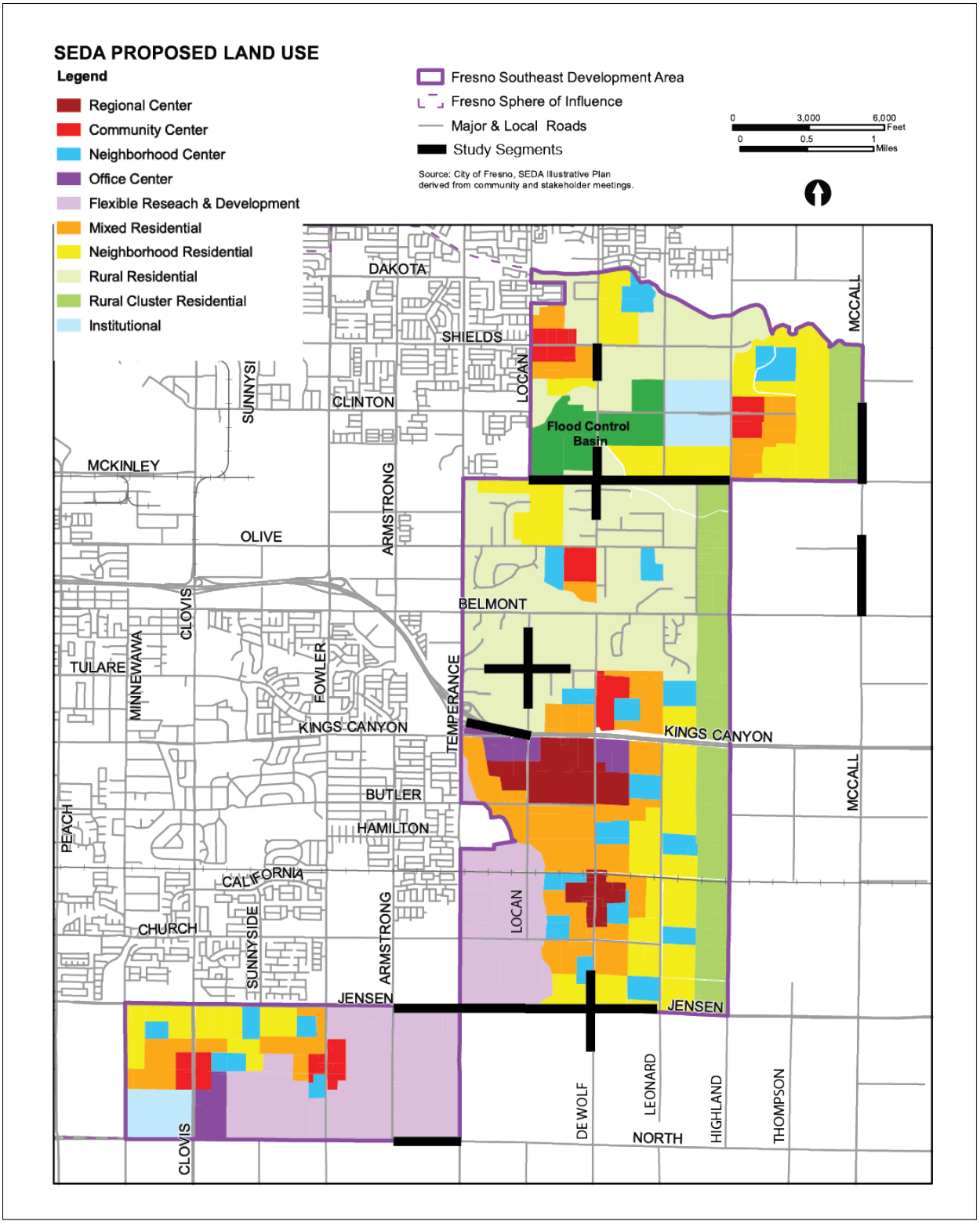
TJKM evaluated traffic conditions at twenty study segments during the a.m. and p.m. peak hours and daily conditions for a typical weekday. The study segments were based on availability of count data from both the City and County of Fresno count databases. No new counts were conducted due to the worldwide COVID-19 pandemic affecting recent traffic patterns. The peak periods were between 6:30 a.m. – 8:30 a.m. and 4:30 p.m. – 6:30 p.m. The study segments and associated traffic controls are as follows:

1. Clovis Ave south of American Ave
2. De Wolf Ave north of McKinley Ave
3. De Wolf Ave south of McKinley Ave
4. De Wolf Ave south of Clinton Ave
5. De Wolf Ave north of Jensen Ave
6. De Wolf Ave south of Jensen Ave
7. Jensen Ave east of Bethel Ave
8. Jensen Ave east of De Wolf Ave
9. Jensen Ave west of De Wolf Ave
10. Jensen Ave east of Temperance Ave
11. Jensen Ave west of Temperance Ave
12. Kings Canyon Rd east of Temperance Ave
13. Locan Ave north of Tulare Ave

14. Locan Ave south of Tulare Ave
15. McCall Ave north of McKinley Ave
16. McCall Ave north of Ashlan Ave
17. McCall Ave north of Belmont Ave
18. Tulare Ave east of Locan Ave
19. Tulare Ave west of Locan Ave
20. North St west of Temperance Ave

Figure 1 illustrates the study segments and the vicinity map of the proposed project.

Figure 1: SEDA Site Plan and Study Segments



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

1.4 Analysis Scenarios

This study addresses the following three traffic scenarios:

- **Existing Conditions** – This scenario evaluates the study segments based on existing traffic volumes, lane geometry, and traffic controls.
- **Year 2035 Baseline (No Project) Conditions** – This scenario evaluates study segments for the future with no build conditions.
- **Year 2035 Project Conditions** – This scenario is identical to the earlier one but in addition to build conditions. It presumes building of SEDA plan land uses by 2035 for impact analysis, consistent with General Plan EIR.

2.0 STUDY METHODOLOGY

Traffic impacts related to the proposed project were evaluated for both compliance with applicable regulatory documents and environmental significance as defined in the California Environmental Quality Act (CEQA). In Accordance with the *Technical Advisory* published by the Governor's Office of Planning and Research (OPR), a qualitative and quantitative VMT analysis forms the basis of the CEQA analysis for the proposed project. An LOS analysis was conducted to determine consistency with City of Fresno plans and standards.

2.1 Level of Service Analysis Methodology

Roadway segment traffic operations were conducted using the roadway segment analysis methodology utilized in Fresno's General Plan. Traffic volumes on the study roadway segments are used to determine the overall usage and congestion. Do note that roadway segment analysis is based on the traffic counts taken at a single location, which are intended to be representative of the entire segment. A roadway link connects two intersections; and a segment is a series of links. The segments used in the SEDA analysis were developed based on where existing count data have been collected in the SEDA project area.

Traffic operations on the study roadway segments were measured using a qualitative measure called level of service (LOS). LOS generally measures traffic operating conditions whereby a letter grade from A (the best) to F (the worst) are assigned. These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with driving, as well as speed, travel time, traffic interruptions, and freedom to maneuver. The next section of this report denotes the LOS standards.

2.2 Level of Service Standards

LOS grades are generally defined as follows:

- **A** represents free flow travel with excellent level of comfort and convenience and the freedom to maneuver.
- **B** represents stable operating conditions, but the presence of other road users causes a noticeable, though slight, reduction in comfort, convenience, and maneuvering freedom.
- **C** represents stable operating conditions, but the operation of individual users is substantially affected by the interaction with others in the traffic stream.
- **D** represents high density, but stable flow. Users experience severe restriction in speed and freedom to maneuver, with poor levels of comfort and convenience.
- **E** represents operating conditions at or near capacity. Speeds are reduced to a low but relatively uniform value. Freedom to maneuver is difficult with users experiencing frustration and poor comfort and convenience. Unstable operation is frequent, and minor disturbances in traffic flow can cause breakdown conditions.
- **F** represents forced or breakdown conditions. This conditions exists when volume of traffic exceeds the capacity of the roadways. Long queues form and stop and go traffic becomes the norm.

The LOS was calculated for each of the study roadway segments to evaluate the quality of traffic conditions. LOS was determined by comparing traffic volumes for each roadway segment, incorporating roadway functional classification, the number of travel lanes, and the presence of left turn lanes at peak hour LOS capacity thresholds. The LOS thresholds are shown in table 1 below.

Table 1: Roadway Functional Class and Peak Hour LOS Thresholds

Functional Class	Median	Lanes	Peak Hour Level of Service Capacity Thresholds				
			A	B	C	D	E
Freeway	N/A[1]	4	2,720	4,460	6,630	7,720	8,630
		3+Aux[2]	2,360	3,860	5,640	6,730	7,530
		3	2,000	3,270	4,660	5,740	6,430
		2+Aux	1,650	2,700	3,850	4,760	5,340
		2	1,300	2,130	3,050	3,790	4,260
State Expressway	Divided	6	2,410	3,960	5,730	7,450	8,450
		4	1,610	2,650	3,810	4,960	5,630
		2	810	1,340	1,890	2,470	2,810
City Expressway	Raised Median	6			1,860	6,170	6,520
		5			1,520	5,110	5,430
		4			1,180	4,050	4,340
		2			520	1,910	2,160
Super Arterial	Raised Median	6				4,910	6,240
		5				4,040	5,195
		4				3,170	4,150
Arterial	Raised Median	8			2,120	7,070	7,490
		6			1,560	5,270	5,610
		5			1,280	4,370	4,670
		4			1,000	3,470	3,730
		3			720	2,555	2,795
		2			440	1,640	1,860
	TWLTL	4			940	3,290	3,550
		2			420	1,550	1,760
	Undivided	4			770	2,740	2,980
		2			340	1,270	1,480
Collector	TWLTL	4			940	3,290	3,550
		2			420	1,550	1,760
	Undivided	4			770	2,740	2,980
		2			340	1,270	1,480
One-Way	Undivided	3		1,960	2,240	2,430	2,610
		2		1,250	1,490	1,620	1,740
		1		550	740	800	870
Rural State Highway	Undivided	2	310	570	1,020	1,730	2,470
Rural Arterial	Divided	4			1,950	3,580	3,780
	Undivided	2			570	1,230	1,310
Rural Collector/Local	Undivided	2			700	930	1,000

Notes:
[1] N/A – Not applicable for operational class
[2] Aux – Auxiliary Lane
– LOS is not achievable because of type of facility.

For daily segment volume LOS analysis, the Transportation Research Board's Highway Capacity Manual special report 209 was used. **Table 2** shows the level of service criteria for daily segment volumes based on volume to capacity ratios.

Table 2: LOS Thresholds for Daily Segment Volumes based on V/C Ratios

Level of Service	Description	V/C[b]
A	Free-flow conditions with unimpeded maneuverability. Stopped delay at signalized intersection is minimal.	0.00 to 0.60
B	Reasonably unimpeded operations with slightly restricted maneuverability. Stopped delays are not bothersome.	0.61 to 0.70
C	Stable operations with somewhat more restrictions in making mid-block lane changes than LOS B. Motorists will experience appreciable tension while driving.	0.71 to 0.80
D	Approaching unstable operations where small increases in volume produce substantial increases in delay and decreases in speed.	0.81 to 0.90
E	Operations with significant intersection approach delays and low average speeds.	0.91 to 1.00
F	Operations with extremely low speeds caused by intersection congestion, high delay, and adverse signal progression.	Greater Than 1.00

[a] For arterials that are multilane divided or undivided with some parking, a signalized intersection density of four to eight per mile, and moderate roadside development.
[b] Volume-to-capacity ratio.

≥ greater than or equal to.
< less than.

Source: Transportation Research Board, *Highway Capacity Manual, Special Report 209* (Washington, D.C., 1994).

The City of Fresno adopted its General Plan in December 2014 and serves as the community's guide for continued development, enhancement, and revitalization of the Fresno metropolitan area. The General Plan's policies and standards for specific plans such as the SEDA project requires a transportation impact study to assess the impact on existing and planned streets. Since the SEDA project is located in Traffic Impact Zone IV (TIZ-IV), the project would need to maintain a LOS standard of E or better for all roadway segments.

2.3 Vehicle Miles Traveled

SB 743, which was signed into law by Governor Brown in 2013 and codified in Public Resources Code 21099, tasked OPR with establishing new criteria for determining the significance of transportation impacts under CEQA. SB 743 requires the new criteria to "promote the reduction of greenhouse gas emissions, the development of multimodal transportation networks, and a diversity of land uses." SB 743 changes the way that public agencies evaluate the transportation impacts of projects under CEQA, recognizing that roadway congestion, while an inconvenience to drivers, is not itself an environmental impact (see Pub. Resource Code, § 21099, subd. (b)(2)). In December 2018, OPR circulated its most recent *Technical Advisory on Evaluating Transportation Impacts in CEQA* (OPR) that provides recommendations and describes various options for assessing VMT for transportation analysis purposes. "Vehicle miles traveled" refers to the amount and distance of automobile travel "attributable to a project". Other relevant considerations may include the effects of the project on transit or non-motorized travel. The VMT analysis options described by OPR are primarily tailored towards single-use development residential, office or office projects, not mixed use projects and not athletic facility projects. OPR recommends the following methodology and criteria for specific land uses:

- For residential projects, OPR recommends that VMT impacts be considered potentially significant if a residential project is expected to generate VMT per Capita (i.e., VMT per resident) at a rate that exceeds 85 percent of a regional average.
- For office projects, OPR recommends that VMT impacts be considered potentially significant if an office project is expected to generate VMT per Employee at a rate that exceeds 85 percent of a regional average.
- For retail projects, OPR recommends that VMT impacts be considered potentially significant if a project results in a net increase in total VMT. This approach takes into account the likelihood that retail developments may lead to increases or decreases in VMT, depending on previously existing retail travel patterns. This approach may also be used for other types of projects with customer components.
- OPR also indicates that local serving retail (projects smaller than 50,000 square feet) may be presumed to have a less than significant VMT impact.
- OPR does not provide specific guidance on evaluating other land use types, except to say that other land uses could choose to use the method applicable to the land use with the most similarity to the proposed project.
- For mixed-use projects, OPR describes several options that include (1) evaluating each land use separately; or (2) evaluating mixed-use projects based on the method applicable to the dominant land use. Evaluating each land use separately would potentially fail to measure the positive effects of mixed-use projects in reducing VMT.

OPR also recommends exempting some project types from VMT analysis based on the likelihood that such projects will generate low rates of VMT:

- OPR recommends that projects generating less than 110 trips per day generally may be assumed to cause a less than significant transportation impact.

- OPR notes that residential and office projects that located in areas with low VMT, and that incorporate similar features, will tend to exhibit similar low VMT, and can be screened out.
- OPR states that residential, retail, office and mixed-use projects near transit stations or major transit stops should be screened out based on the likelihood that such projects will have a less than significant impact on VMT.

VMT Screening Criteria

City of Fresno guidelines include the following screening criteria for identifying projects that can be presumed to have a less-than-significant impact:

- Projects that generate or attract fewer than 110 daily vehicle trips; or,
- Projects of 10,000 square feet or less of non-residential space or 20 residential units or less, or otherwise generating less than 836 VMT per day.
- Residential, retail, office projects, or mixed-use projects proposed within ½ mile of an existing major transit stop or an existing stop along a high quality transit corridor.
- Residential projects (home-based VMT) at 13% or below the baseline County-wide home-based average VMT per capita, or employment projects (employee VMT) at 13% or below the baseline Bay Area average commute VMT per employee in areas with low VMT that incorporate similar VMT reducing features (i.e., density, mix of uses, transit accessibility)
- Public facilities (e.g. emergency services, passive parks (low-intensity recreation, open space, libraries, community centers, public utilities) and government buildings.

2.4 Fresno Travel Demand Model (FresnoABM)

The latest approved version of the Fresno Activity Based Travel Demand Model (Fresno ABM) was obtained for use in travel demand forecasting and VMT analysis for this project. All traffic volume forecasts were adjusted, using the difference (DELTA) method, to account for the difference between existing counts and base year model forecasts. The FresnoABM has a base year of 2015 and a forecast year of 2035, while the count data collected from the Fresno City count database were from the year 2018.

3.0 EXISTING CONDITIONS

This section describes existing conditions in the immediate project site vicinity, including roadway facilities, bicycle and pedestrian facilities, and available transit service. In addition, existing traffic volumes and operations are presented for the study intersections, including the results of LOS calculations.

3.1 Existing Setting and Roadway System

Regional roadway facilities providing access to the proposed SEDA development is provided via State Route 180. Local access to the SEDA plan area is provided by various arterials and connectors.

State Route 180 (SR180) is a six-lane, east-west state highway in Fresno County connecting Centerville to the east and Mendota to the west. It runs through the central portion of the SEDA development and its speed limit is 65 miles per hour (mph). The highway merges with Kings Canyon Road when the highway portion ends near De Wolf Avenue.

Kings Canyon Road is a four-lane, east-west arterial that connects downtown Fresno to SR180 in the east It runs through the central portion of the SEDA development and its speed limit is 45 miles per hour (mph) to Argyle.

Clovis Avenue is primarily a four-lane, north-south arterial in eastern Fresno, connecting residents from Clovis all the way down to State Route 99. It is primarily a six lane arterial within the SEDA area and surrounding land uses include single-family and commercial/retail uses. The speed limit along Clovis Ave is 45 mph to Butler Ave.

Temperance Avenue is a four-lane, north-south super arterial in Fresno with an interchange at SR180. Temperance Avenue consists of mostly farmland and becomes a two-lane road south of Hamilton Avenue. The speed limit along Temperance Avenue is 45 mph to Church.

De Wolf Avenue is a two-lane, north-south collector in eastern Fresno that runs perpendicular to SR180. The road consists of mostly farmland and connects multiple elementary schools. It runs through the central portion of SEDA. The speed limit along De Wolf Avenue is 45 mph.

McCall Avenue is a two-lane, north-south collector in eastern Fresno that intersects with SR180. The road consists of mostly farmland and connects the city of Selma to Fresno. It runs through the eastern edge of SEDA. The speed limit along De Wolf Avenue is 45 mph.

Jensen Avenue is a four-lane, east-west super arterial in southern Fresno that connects SR99 with Sanger. Jensen Avenue consists of mostly farmland and runs through the southern portion of SEDA. The speed limit along Jensen Avenue is 45 mph within Fresno City limits, 60 mph outside in County.

Belmont Avenue is a two-lane, east-west collector in eastern Fresno that runs north of and parallel to SR180. The road consists of mostly farmland and runs through the central portion of SEDA. The speed limit along Belmont Avenue is 45 mph to Armstrong, 50 mph to Temperance Ave.

Tulare Avenue is a two-lane, east-west collector in eastern Fresno that runs south of and parallel to SR180. The road consists of mostly suburban tracts and runs through the central portion of SEDA. The speed limit along Tulare Avenue is 40 mph.

Armstrong Avenue is a two-lane, north-south collector in eastern Fresno that runs parallel to Temperance Ave. The road consists of mostly rural tracts and runs through the western portion of SEDA. The speed limit along Armstrong Avenue is 45 mph.

Fowler Avenue is a two-lane, north-south collector in eastern Fresno that runs parallel to Temperance Ave. The road consists of mostly rural tracts and is located at the western boundary of SEDA. The speed limit along Fowler Avenue is 45 mph.

3.2 Existing Pedestrian Facilities

Walkability is defined as the ability to travel easily and safely between various origins and destinations without having to rely on automobiles or other motorized travel. The ideal "walkable" community includes wide sidewalks, a mix of land uses such as residential, employment, and shopping opportunities, a limited number of conflict points with vehicle traffic, easy access to transit facilities and services and a network of pedestrian facilities. Pedestrian facilities are comprised of crosswalks, sidewalks, pedestrian signals, and off-street paths, which provide safe and convenient routes for pedestrians to access the destinations such as institutions, businesses, public transportation, and recreation facilities.

As this project is a Specific Plan for a rural area, currently there are very limited pedestrian facilities in the project vicinity.

3.3 Existing Bicycle Facilities

The 2016 City of Fresno Active Transportation Plan outlines policies and objectives to improve the current active transportation system that includes walking and biking. The various bicycle facilities throughout the county are described below.

- **Class I Shared-Use Path**: Class I bikeways are a completely separate right-of-way designed for the exclusive use of cyclists and pedestrians, with minimal crossings for motorists. These paths are often located along creeks, canals, and rail lines. There is one small Class I bike path near Temperance Ave near Shields Ave on the northern end of the SEDA area.
- **Class II Bike Lanes**: Class II bike lanes use special lane markings, pavement legends, and signage. Bike lanes provide designated street space for bicyclists, typically adjacent to outer vehicle travel lanes. Buffered bike lanes increase separation through painted buffers between vehicle lanes and/or parking, and green paint at conflict zones (e.g., driveways or intersections). There are no existing Class II facilities, but there are many planned in the Fresno General Plan and in the SEDA plan for the project area.
- **Class III Bike Routes**: Bike routes provide enhanced mixed-traffic conditions for bicyclists through signage, shared arrow (sharrow) striping, and/or traffic calming treatments and provide continuity to a bikeway network. Bike routes are typically designated along gaps between bike trails or bike lanes or along low-volume, low-speed streets. Bicycle boulevards further enhance bike routes by encouraging slower speeds and discouraging non-local vehicle traffic using traffic diverters, chicanes, traffic circles, and speed tables. There are no existing Class III facilities in the project area, but there are many planned in the SEDA plan for the project area.

- **Class IV Bikeway**: Bikeways are also known as cycle tracks or separated bikeways, are set aside for the exclusive use of bicycles and physically separated from vehicle traffic. Separated bikeways were adopted by Caltrans in 2015. Separation may include grade separation, flexible posts, physical barriers, or on-street parking. There are no existing or planned Class IV bikeways in the project area.

3.4 Existing Transit Facilities

Fresno Area Express (FAX) is the local bus system for the city of Fresno. Currently, there are no bus lines that run through the SEDA area. Bus routes 1, 22, and 35 runs on Clovis Street near the SEDA area, but do not directly serve the plan area. There are plans to bring in Fresno bus rapid transit lines into the SEDA plan area in the future.

3.5 Existing Peak Hour Traffic Volumes For Study Segments

The existing operations of the study roadway segments were evaluated for the highest one-hour volumes during weekday morning and evening peak periods. In addition to peak hour, daily volumes were also evaluated. The table below shows the list of segments that have count data from both the City and County of Fresno.

Table 3: Existing Conditions Study Segment Traffic Volumes

Segment Name	#	AM Peak	PM Peak	Daily
Clovis south of American	1	1,037	1,154	14,404
De Wolf north of McKinley	2	472	326	2,766
De Wolf south of McKinley	3	282	248	1,881
De Wolf south of Clinton	4	332	228	2,271
De Wolf north of Jensen	5	187	174	1,693
De Wolf south of Jensen	6	95	120	1,139
Jensen east of Bethel	7	924	1,057	13,941
Jensen east of De Wolf	8	608	718	9,710
Jensen west of De Wolf	9	503	715	8,609
Jensen east of Temperance	10	1,015	801	9,856
Jensen west of Temperance	11	1,019	876	10,748
Kings Canyon east of Temperance	12	4	4	52
Locan north of Tulare	13	18	17	162
Locan south of Tulare	14	12	19	154
McCall north of McKinley	15	500	382	4,197
McCall north of Ashlan	16	390	439	5,167
McCall north of Belmont	17	485	518	5,730
Tulare east of Locan	18	24	27	248

Tulare west of Locan	19	38	54	595
North Ave west of Temperance	20	193	216	2,442

3.6 Existing Vehicle Miles Traveled

For existing conditions VMT, the SEDA project area was overlaid on top of the FresnoABM loaded vehicle assignment network and the total VMT for the SEDA project was calculated by multiplying daily volumes by distance travelled. In addition, VMT per service population (which is the sum of population and employees) was calculated. **Table 4** summarizes the existing VMT from the FresnoABM for the SEDA project area.

Table 4: Existing Conditions VMT

	2015 Base Year Model
SEDA VMT	330,350
Population	3,410
Employment	2,306
SEDA VMT per Service Population	57.79

4.0 YEAR 2035 BASELINE (NO PROJECT) CONDITIONS

This chapter presents the results of the level of service calculations under the year 2035 baseline conditions without the project. Level of service analysis at the study segments were conducted for 2035 no project conditions to establish a base to evaluate the impacts due to the addition of traffic from the proposed project. Study segment volumes were forecasted using the Fresno Activity Based Travel Demand Model. **Table 5** shows the forecasted study segment volumes for the year 2035 baseline (no project) conditions.

Table 5: Year 2035 Baseline (No Project) Conditions Study Segment Traffic Volumes

Segment Name	#	AM Peak	PM Peak	Daily
Clovis south of American	1	1,071	1,163	15,309
De Wolf north of McKinley	2	688	495	4,237
De Wolf south of McKinley	3	282	258	1,881
De Wolf south of Clinton	4	484	347	3,470
De Wolf north of Jensen	5	187	174	1,693
De Wolf south of Jensen	6	95	137	1,221
Jensen east of Bethel	7	1,006	1,105	15,079
Jensen east of De Wolf	8	705	830	11,518
Jensen west of De Wolf	9	597	850	10,143
Jensen east of Temperance	10	1,606	1,095	13,894
Jensen west of Temperance	11	1,333	1,107	12,676
Kings Canyon east of Temperance	12	4	4	52
Locan north of Tulare	13	18	32	218
Locan south of Tulare	14	12	34	199
McCall north of McKinley	15	500	382	4,197
McCall north of Ashlan	16	390	439	5,167
McCall north of Belmont	17	485	518	5,730
Tulare east of Locan	18	38	45	363
Tulare west of Locan	19	59	90	861
North Ave west of Temperance	20	193	216	2,442

4.1 Study segment Level of Service Analysis – Year 2035 No Project Conditions

The study segment level of service analysis for the forecasted volumes are presented in **Table 6.** All of the study segments in the year 2035 no project conditions are forecasted to perform at a LOS of D or better.

Table 6: Year 2035 Baseline (No Project) Conditions Study Segment LOS

Segment Name	#	AM Peak	PM Peak	Daily
Clovis south of American	1	C	C	B
De Wolf north of McKinley	2	D	D	C
De Wolf south of McKinley	3	C	C	B
De Wolf south of Clinton	4	D	C	B
De Wolf north of Jensen	5	C	C	A
De Wolf south of Jensen	6	B	B	A
Jensen east of Bethel	7	C	C	B
Jensen east of De Wolf	8	B	B	A
Jensen west of De Wolf	9	B	B	A
Jensen east of Temperance	10	C	C	B
Jensen west of Temperance	11	C	C	B
Kings Canyon east of Temperance	12	A	A	A
Locan north of Tulare	13	A	A	A
Locan south of Tulare	14	A	A	A
McCall north of McKinley	15	D	D	C
McCall north of Ashlan	16	D	D	C
McCall north of Belmont	17	D	D	C
Tulare east of Locan	18	A	A	A
Tulare west of Locan	19	A	A	A
North St west of Temperance	20	A	A	A

4.2 Year 2035 No Project Conditions Vehicle Miles Traveled

For the Year 2035 baseline no project conditions VMT, the SEDA project area was overlaid on top of the FresnoABM loaded vehicle assignment network and the total VMT for the SEDA project was calculated by multiplying daily volumes by distance travelled. In addition, VMT per service population (which is the sum of population and employees) was calculated. **Table 7** summarizes the 2035 baseline no project VMT from the FresnoABM for the SEDA project area. In the forecast year no project condition, VMT per service population for the SEDA project area falls slightly compared to the existing base year condition.

Table 7: Year 2035 No Project Conditions VMT

	2035 Baseline No Project Model
SEDA Project Area VMT	371,397
Population	5,046
Employment	3,077
SEDA VMT per Service Population	45.72

5.0 YEAR 2035 PROJECT CONDITIONS

This chapter presents the results of the level of service calculations for the year 2035 conditions with the SEDA project. Level of service analysis at the study segments were conducted for 2035 with project conditions. Study segment volumes were forecasted using delta method using the Fresno Activity Based Travel Demand Model. **Table 8** shows the forecasted study segment volumes for the year 2035 with project conditions.

Table 8: Year 2035 With Project Conditions Study Segment Traffic Volumes

Segment Name	#	AM Peak	PM Peak	Daily
Clovis south of American	1	1,266	1,367	18,223
De Wolf north of McKinley	2	838	544	5,510
De Wolf south of McKinley	3	457	357	3,614
De Wolf south of Clinton	4	610	395	4,678
De Wolf north of Jensen	5	322	305	3,549
De Wolf south of Jensen	6	178	235	2,166
Jensen east of Bethel	7	1,135	1,375	18,813
Jensen east of De Wolf	8	1,040	1,179	16,757
Jensen west of De Wolf	9	866	1,180	15,122
Jensen east of Temperance	10	2,096	1,519	20,017
Jensen west of Temperance	11	1,862	1,562	19,744
Kings Canyon east of Temperance	12	8	8	111
Locan north of Tulare	13	44	44	392
Locan south of Tulare	14	29	48	320
McCall north of McKinley	15	831	651	6,377
McCall north of Ashlan	16	562	612	5,662
McCall north of Belmont	17	867	919	9,956
Tulare east of Locan	18	54	61	582
Tulare west of Locan	19	80	118	1,391
North Ave west of Temperance	20	193	286	2,442

Compared to the 2035 no project condition, Jensen Way and McCall Lane saw the most growth in AM peak, PM peak, and daily volumes with the SEDA project built out. Due to the existing low volumes from the City of Fresno count data, the forecasted with project SEDA volumes are not as high as raw FresnoABM output volumes.

5.1 Study Segment Level of Service Analysis – Year 2035 With Project Conditions

The study segment level of service analysis for the forecasted volumes are presented in **Table 9.** All of the study segments in the year 2035 with project conditions are forecasted to perform at a LOS of D or better.

Table 9: Year 2035 With Project Conditions Study Segment LOS

Segment Name	#	AM Peak	PM Peak	Daily
Clovis south of American	1	C	C	B
De Wolf north of McKinley	2	D	D	D
De Wolf south of McKinley	3	D	D	D
De Wolf south of Clinton	4	D	D	D
De Wolf north of Jensen	5	D	D	D
De Wolf south of Jensen	6	D	D	D
Jensen east of Bethel	7	C	C	B
Jensen east of De Wolf	8	C	C	B
Jensen west of De Wolf	9	C	C	B
Jensen east of Temperance	10	C	C	B
Jensen west of Temperance	11	C	C	A
Kings Canyon east of Temperance	12	A	A	A
Locan north of Tulare	13	A	A	A
Locan south of Tulare	14	A	A	A
McCall north of McKinley	15	D	D	C
McCall north of Ashlan	16	D	D	C
McCall north of Belmont	17	D	D	C
Tulare east of Locan	18	A	A	A
Tulare west of Locan	19	A	A	A
North Ave west of Temperance	20	A	A	A

5.2 Year 2035 With Project Conditions Vehicle Miles Traveled

For the Year 2035 with project conditions VMT, the SEDA project area was overlaid on top of the FresnoABM loaded vehicle assignment network and the total VMT for the SEDA project was calculated by multiplying daily volumes by distance travelled. In addition, VMT per service population (which is the sum of population and employees) was calculated. **Table 10** summarizes the 2035 baseline no project VMT from the FresnoABM for the SEDA project area.

Table 10: Year 2035 With Project Conditions VMT

	2035 With Project Model (SEDA)
SEDA VMT	974,369
Population	151,670
Employment	40,490
SEDA VMT per Service Population	5.07

The VMT per Service Population in the SEDA project area with the project built out in 2035 drops from 45.72 to 5.07. The transition from a mostly rural area (which the SEDA project area currently is) to a developed urbanized mixed use site results in a large VMT reduction. This is because trip distances for both the production side (residential) and attraction side (commercial) are shortened since residents and employees are now better connected to jobs and services within the SEDA project area.

5.3 SEDA Project Trip Generation

Table 11 summarizes daily and PM peak hour trip generation for the proposed SEDA Project. ITE Trip Generation 11th Edition was used to generate the trip rates for the four types of land uses in the SEDA Project.

Table 11: SEDA Project Trip Generation

Land Use (Units)	***Size***		***Daily***		***P.M. Peak***	
			Rate	***Trips***	***Rate***	***Trips***
Housing (Dwelling Units)	45,274	Dwelling Units	8.35	378,038	0.77	34,861
Retail / Commercial (Employees)	12,648	Employees	26.60	336,437	3.49	44,142
Office (Employees)	8,069	Employees	3.33	26,870	0.45	3,631
Government / Civic (Employees)	16,681	Employees	7.50	125,108	0.71	11,844
Total Trips				**866,452**		**94,477**

In total, the SEDA project is expected to generate 866,452 total daily trips and 94,477 PM peak hour trips from the 45,274 total dwelling units and 37,398 total employees.

6.0 FINDINGS AND RECOMMENDATIONS

The following sections provide additional analyses of other transportation issues associated with the project site, including:

- Roadway Impact Analysis
- Pedestrian, Bicycle, and Transit Recommendations

Unlike the LOS impact methodology, the analyses in these sections is based on professional judgment in accordance with the standards and methods employed by traffic engineers. Although operational issues are not considered CEQA impacts, they do describe traffic conditions that are relevant to the project environment.

6.1 Roadway Impact Analysis – Traffic Increase

The SEDA Project would have an impact on the existing roadways within the project area. While the LOS analysis does not show any deficient roadways for the 2035 project condition, De Wolf Avenue and McCall Avenue are most impacted with LOS of D in the project scenario. Widening these two collector streets from 1 lane in each direction to 2 lanes in each direction will better serve the SEDA project and allow for smoother north-south traffic flow within the SEDA project. Likewise, it is recommended that McKinley Avenue be widened from its current configuration of 1 lane in each direction to 2 lanes in each direction for better east west connectivity within the SEDA area.

Other roadways within the SEDA plan should be upgraded into a network of Complete Streets as defined by the Fresno Complete Streets Policy adopted in 2019. A Complete Street is defined as a transportation facility that is planned, designed, operated, and maintained to provide safe mobility for all users – including bicyclists, pedestrians, transit vehicles, trucks, and motorists. In addition to Complete Streets, the safety of the designed roadway network environment shall be implemented such that driver, pedestrian, and bicyclist safety are paramount.

6.2 Pedestrian, Bicycle, and Transit Recommendations

Pedestrian facilities recommended for the SEDA area include sidewalks on all roadways, trails and greenways to connect the regional town center (De Wolf and Kings Canyon Blvd) with the community town centers, and should complement the natural landscape of the SEDA plan area.

Bicycle facilities within SEDA should be compliant with the latest Fresno Active Transportation Plan guidelines and enhance connectivity between the SEDA mixed use areas to the residential areas.

Transit facilities within SEDA should provide for a safe, integrated, and efficient multimodal transportation system. The regional center of SEDA should be well connected by transit to provide access to and from central Fresno to the SEDA area. Transit stations and stops should be located near major activity centers and mixed use zones. Bus lines should connect public places, schools, medical facilities, concentrations of commercial space, and high density residential and employment areas.

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Appendix I:
Utilities and Services Systems Supporting Information

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I.1 - Water Supply Assessment

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Southeast Development Area (SEDA)
Specific Plan
Water Supply Assessment

June 28th, 2023

Prepared for:

City of FRESNO

City of Fresno, California

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EXECUTIVE SUMMARY

Purpose

The purpose of this report is to provide a Water Supply Assessment (WSA) for the Southeast Development Area (SEDA) Specific Plan Project (Proposed Project) in accordance with the requirements of the California Water Code as established by California Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221), to evaluate whether sufficient water supplies are available to meet existing and future water demands within the City of Fresno's water service area, including the demands associated with the proposed Project, during normal, single dry, and multiple dry years for a 20-year period. The WSA, prepared to support the preparation of the Program Environmental Impact Report (PEIR) for the SEDA Specific Plan, evaluates the sufficiency of the City of Fresno's water supplies (existing and future) to meet the existing and projected water demands for the City's water service area, including the Proposed Project.

Proposed Project Overview

The Proposed Project is a Specific Plan for SEDA, which includes approximately 8,400 acres of land within the City's Sphere of Influence (SOI), including single-family and multifamily residential, institutional, commercial, employment, mixed use, and public facility land uses. The Proposed Project is located in the southeastern portion of the City limits, and is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jensen and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west. The Proposed Project meets the definition of a "Project" in accordance with California Water Code Section 10910 through 10915, thus requiring the preparation of this WSA (see Section 2.2 of this WSA for a full explanation of the applicability of the Water Code).

Water Demands and Supply Availability

The projected water demand for the SEDA Specific Plan Area (Plan Area) under the Proposed Project at buildout is approximately 19.83 Million Gallons per Day (MGD), or 22,212 acre-ft/year (AFY). The projected water demand for the Plan Area under General Plan conditions was determined to be approximately 19.5 MGD, or 21,843 AFY. Thus, the projected water demand for the Plan Area under the Proposed Project is approximately 0.33 MGD, or 370 AFY greater than the projected water demand for the Plan Area under General Plan conditions. The projected water demands for the land uses included in the City's General Plan were included in the City's 2020 Urban Water Management Plan (UWMP) as part of the projections for future water demand and population growth.

If approved by the City, it is expected that the Proposed Project would be served from the City's existing and future water supplies. The City currently receives water from four sources:

- Groundwater pumped from groundwater wells throughout the City
- Surface water from the San Joaquin River through a contract with the United States Bureau of Reclamation (USBR) as part of the Central Valley Project (CVP)
- Surface water from the Kings River through a contract with the Fresno Irrigation District (FID)
- Recycled water treated from the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and the North Fresno Wastewater Reclamation Facility (NFWRF) (planned for non-potable uses)

The City has historically met water system demands regardless of regional hydrology. The City expects reductions of normal-year supplies during single and multiple dry years, but is still projected to meet water demands for the service area. If water shortages occur, the City can enact water demand reduction and conservation measures outlined in their Water Shortage Contingency Plan (WSCP) prepared for and included in the 2020 UWMP. These demand reduction and conservation measures would apply to all customers of the City's water system, including those in the Proposed Project area. The projected water supplies available and water demands through 2045 are shown in Table ES-1 for the various hydrologic years, which shows that projected water supplies are sufficient to meet projected water demands for the next 20 years. Table ES-2 shows the projected water supply and demand in 2045 with the incorporation of the projected demand for the Proposed Project; as shown, projected water supplies are sufficient to meet the projected water demands for the City's future water system including the Proposed Project.

Pursuant to Water Code 10910(c)(4), and based on the technical analyses described in this document, this WSA demonstrates that the City's existing and planned future water supplies are sufficient to meet the City's existing and future projected water demands to 2045 under all hydrologic conditions, including those demands associated with the Projected Project.

Table ES-1 City of Fresno Projected Water Supply Versus Water Demand During Normal, Single Dry, and Multiple Dry Water Years, AFY

Water Supply/Demand Property		2025	2030	2035	2040	2045
Normal Year						
Available Water Supply, AFY		329,030	341,140	346,610	352,000	357,330
Total Water Demand, AFY		199,204	212,756	222,310	231,876	241,447
	Difference, AFY	129,826	128,384	124,300	120,124	115,883
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Single Dry Year						
Available Water Supply, AFY		189,852	195,392	200,862	206,252	211,582
Total Water Demand, AFY		164,092	176,132	184,174	192,228	200,287
	Difference, AFY	25,760	19,260	16,688	14,024	11,295
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Years						
Multiple Dry Year 1	Available Water Supply, AFY	273,725	279,265	284,735	290,125	295,455
	Total Water Demand, AFY	199,204	212,756	222,310	231,876	241,447
	Difference, AFY	74,521	66,509	62,425	58,249	54,008
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Year 2	Available Water Supply, AFY	274,626	280,166	285,636	291,026	296,356
	Total Water Demand, AFY	199,204	212,756	222,310	231,876	241,447
	Difference, AFY	75,422	67,410	63,326	59,150	54,909
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Year 3	Available Water Supply, AFY	217,568	223,108	228,578	233,968	239,298
	Total Water Demand, AFY	190,267	193,637	197,736	201,753	205,708
	Difference, AFY	27,301	29,471	30,842	32,215	33,589
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A

Water Supply/Demand Property		2025	2030	2035	2040	2045
Multiple Dry Year 4	Available Water Supply, AFY	189,852	195,392	200,862	206,252	211,582
	Total Water Demand, AFY	162,551	165,920	170,020	174,036	177,992
	Difference, AFY	27,301	29,471	30,842	32,215	33589
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Year 5	Available Water Supply, AFY	314,840	320,380	325,850	331,240	336,570
	Total Water Demand, AFY	199,204	212,756	222,310	231,876	241,447
	Difference, AFY	115,636	107,624	103,540	99,364	95,123
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A

Source: City of Fresno 2020 UWMP Table 7-1 for Normal Year Data, Table 7-2 for Single Dry Year Data, and Table 7-3 for Multiple Dry Year Data.

Table ES-2 City of Fresno Projected Water Supply Versus Water Demand During Normal, Single Dry, and Multiple Dry Water Years with Project, AFY

Water Supply/Demand Property		2045
Normal Year		
Available Water Supply, AFY		357,330
Total Water Demand, AFY		241,447
Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY		+370
Total Water Demand (with Project), AFY		241,817
Difference, AFY		115,513
Amount Short of Demand		N/A
Single Dry Year		
Available Water Supply, AFY		211,582
Total Water Demand, AFY		200,287
Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY		+370
Total Water Demand (with Project), AFY		200,657
Difference, AFY		10,925
Amount Short of Demand		N/A
Multiple Dry Year		
Multiple Dry Year 1	Available Water Supply, AFY	295,455
	Total Water Demand, AFY	241,447
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	241,817
	Difference, AFY	53,638
	Amount Short of Demand	N/A
Multiple Dry Year 2	Available Water Supply, AFY	296,356
	Total Water Demand, AFY	241,447
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	241,817
	Difference, AFY	54,539
	Amount Short of Demand	N/A

Water Supply/Demand Property		2045
Multiple Dry Year 3	Available Water Supply, AFY	239,298
	Total Water Demand, AFY	205,708
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	206,078
	Difference, AFY	33,220
	Amount Short of Demand	N/A
Multiple Dry Year 4	Available Water Supply, AFY	211,582
	Total Water Demand, AFY	177,992
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	178,362
	Difference, AFY	33,220
	Amount Short of Demand	N/A
Multiple Dry Year 5	Available Water Supply, AFY	336,570
	Total Water Demand, AFY	241,447
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	241,817
	Difference, AFY	94,753
	Amount Short of Demand	N/A

Source: City of Fresno 2020 UWMP Table 7-1 for Normal Year Data, Table 7-2 for Single Dry Year Data, and Table 7-3 for Multiple Dry Year Data.

Water Supply Assessment Approval Process

The Fresno City Council must approve this WSA at a regular or special meeting. Furthermore, the City must include this WSA in the Draft Program EIR that is being prepared for the Proposed Project.

In addition, SB 221 applies to residential subdivisions of over 500 dwelling units and requires that the water supplier provide written verification that the water supply for the project is sufficient prior to the issuance of the final permits. Because the Proposed Project includes up to 45,274 residential dwelling units, it is subject to the requirements of SB 221 (Government Code Section 66473.7).

CHAPTER 1
INTRODUCTION

1.1 Proposed Project Overview

The City of Fresno (City) is preparing a Specific Plan and PEIR for the Southeast Development Area (SEDA). The SEDA Specific Plan Area (Plan Area), previously known as the Southeast Growth Area (SEGA), is located in the southeast portion of the City that is formally designated as a growth area in the City's General Plan (General Plan).

1.2 Purpose

The purpose of this report is to provide a Water Supply Assessment (WSA) for the SEDA Specific Plan Project (Proposed Project) in accordance with the requirements of the California Water Code as established by California Senate Bill 610 (SB 610) and Senate Bill 221 (SB 221), to evaluate whether sufficient water supplies are available to meet existing and future water demands within the City of Fresno's water service area, including the demands associated with the proposed Project, during normal, single dry, and multiple dry years for a 20-year period.

SB 610 and SB 221, effective January 1, 2002, amended state law to improve the link between information on water supply availability and certain land use decisions made by cities and counties. SB 610 and SB 221 were companion measures intended to promote more collaborative planning between local water suppliers and cities and counties. Both statutes require detailed information regarding water availability to be provided to the city and county decision-makers prior to approval of large development projects. Both statutes also require this detailed information be included in the administrative record that serves as the evidentiary basis for an approval action by the city or county on such projects. Both measures recognize local control and decision making regarding the availability of water for projects and the approval of projects. The purpose of these statutes was to make confirmation of water supply sufficiency a condition of approval for development projects. Confirmation is completed through an assessment of a water supplier's existing and future water supply sources, and existing and projected water demands for approved and proposed projects. The purpose of a WSA is to demonstrate the sufficiency of a water purveyor's supplies to meet the water demands of a proposed project in addition to the purveyor's existing and planned water demands/uses. California Water Code (Water Code) Sections 10910 through 10915 detail the specific requirements for WSA preparation.

This WSA has been prepared in accordance with the requirements of SB 610, Water Code Section 10910 through 10915, and the California Department of Water Resources' (DWR's) "Guidebook for Implementation of Senate Bills 610 and Senate Bill 221 of 2001: To Assist Water Suppliers, Cities, and Counties in Integrating Water and Land Use Planning."[1] The information contained in this WSA is based primarily on the 2020 Urban Water Management Plan (UWMP) prepared for the City of Fresno and approved in June 2021.[2]

[1] California Department of Water Resources, "Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001 to Assist Water Suppliers, Cities, and Counties with Integrating Water and Land Use Planning." October 8, 2003.
[2] City of Fresno, "2020 Urban Water Management Plan," July 2021.

CHAPTER 2
APPLICABILITY OF SENATE BILL 610

Water Code Section 10910 explains the applicability of SB 610 and what types of projects are subject to the requirements, including the preparation of a WSA. Relevant citations of Water Code sections 10910 through 10915 are included throughout this WSA in *italics*.

The following sections address the questions posed in SB 610 to determine its applicability to the proposed SEDA Specific Plan project.

2.1 Is the Proposed Project Subject to CEQA?

Water Code Section 10910 states:

(a) Any city or county that determines that a project, as defined in Section 10910, is subject to the California Environmental Quality Act Division 13 (commencing with Section 21000) of the Public Resources Code, under Section 21080 of the Public Resources Code shall comply with this part.

The City has determined that the project is subject to the California Environmental Quality Act (CEQA) and that an EIR is required.

2.2 Is the Proposed Project Considered a "Project" as Defined in SB 610?

Water Code Section 10912 states:

For the purposes of this part, the following terms have the following meanings:

(a) "Project" means any of the following:
(1) A proposed residential development of more than 500 dwelling units.
(2) A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
(3) A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
(4) A proposed hotel or motel, or both, having more than 500 rooms.
(5) A proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.
(6) A mixed-use project that includes one or more of the projects specified in this subdivision.
(7) A project that would demand an amount of water equivalent to, or greater than, the amount of water required by a 500 dwelling unit project.

The Proposed Project is located in Southeast Fresno within Fresno's Sphere of Influence (SOI), and is approximately 8,400 acres in size consisting of proposed residential, mixed use, employment, and public facility land uses. The Specific Plan for SEDA was developed for the buildout condition of the Plan Area of 45,000 dwelling units, and includes up to 6,728,713 square feet (SF) of office developments (see CHAPTER 3 for land use areas). As such, the project satisfies the definition of a "project" pursuant to Water Code Section 10912(a) paragraph (1), paragraph (3), paragraph (6), and possibly others. Therefore, preparation of a WSA for this project is required.

2.3 Who is Identified as the Public Water System?

Water Code Section 10910 states:

> *(b) The city or county, at the time that it determines whether an environmental impact report, a negative declaration or a mitigated negative declaration is required for any project subject to the California Environmental Quality Act pursuant to Section 21080.1 of the Public Resources Code, shall identify any water system that is, or may become as a result of supplying water to the project identified pursuant to this subdivision, a public water system, as defined in Section 10912, that may supply water for the project. If the city or county is not able to identify any public water system that may supply water for the project, the city or county shall prepare the water assessment required by this part after consulting with any entity serving domestic water supplies whose service area includes the project site, the local agency formation commission, and any public water system adjacent to the project site.*

Water Code Section 10912 states:

> *(c) "Public Water System" means a system for the provision of piped water to the public for human consumption that has 3,000 or more service connections. A public water system includes all of the following:*
> *(1) Any collection, treatment, storage, and distribution facility under control of the operator of the system which is used primarily in connection with the system.*
> *(2) Any collection or pretreatment storage facility not under the control of the operator that is used primarily in connection with the system.*
> *(3) Any person who treats water on behalf of one or more public water systems for the purpose of rendering it safe for human consumption.*

The Proposed Project is located within the City's SOI, and will therefore be supplied by the City's water supply system. The City's water system includes an estimated 140,992 service connections,[3] and therefore is considered a public water system as defined in the Water Code. Therefore, the City of Fresno is the identified public water system for the Proposed Project.

2.4 Does the City have an Adopted Urban Water Management Plan (UWMP) that Accounts for the Proposed Project?

Water Code 10910 states:

> *(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).*
> *(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).*

The City's most recently adopted UWMP was prepared in 2020 and adopted in July 2021 and is incorporated by reference into this WSA. The City's 2020 UWMP included water demand projections for current water demands within the City and anticipated water demands associated

[3] City of Fresno Department of Public Utilities, "Water Sources." https://www.fresno.gov/publicutilities/water-quality-operations-testing/water-source-distribution/.

with future development projects and planning areas within the City's General Plan SOI through 2045. The City's 2020 UWMP is included in Appendix C of this WSA.

Water demands for the Proposed Project are not specifically designated in the City's 2020 UWMP. However, the General Plan planning area (the SOI) was included in the UWMP and the SEDA Specific Plan is the implementation of the General Plan with slightly different land use types, so the Proposed Project is included in the 2020 UWMP, and the demand projections included in the UWMP may be used in preparing this WSA.

2.5 Is Groundwater a Component of the Supplies for the Project?

Water Code Section 10910 states:

> *(d) (1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.*
> *(f) If a water supply for the proposed project includes groundwater, the following additional information shall be included in the water assessment…*

Water Code 10910(f) includes additional requirements for information to be included in a WSA if the water supplies for the Proposed Project includes groundwater. Groundwater will likely be a water supply for the Proposed Project. The City produces groundwater from the Kings Subbasin of the San Joaquin Valley Groundwater Basin as one of its water supplies for potable use, and since the City will be the public water system supplying water to the Proposed Project, it will therefore use groundwater as one of its water supplies.

Each potential water supply for the Proposed Project is addressed in the following sections of the WSA with respect to water reliability. Water Code Section 10910 specifically requires an analysis of groundwater sources proposed to be used by a proposed project.

2.6 Are there Sufficient Water Supplies to Serve the Proposed Project Over the Next Twenty Years?

The sufficiency of water supplies identified as potential water sources for the Proposed Project is assessed in the following sections of the WSA.

CHAPTER 3
PROJECT DESCRIPTION

3.1 Proposed Project Location

The Proposed Project is located in the southeastern portion of the City, and is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jensen and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west; see Figure 3.1 for the Plan Area's location.

The Proposed Project consists of an approximately 8,400-acre area which is located outside of the City limits, but within the City's SOI. The Proposed Project consists of residential, employment, mixed use, open space, and public facility land uses. The Plan Area currently consists mostly of agricultural and farmlands with sparse residential and urban areas.

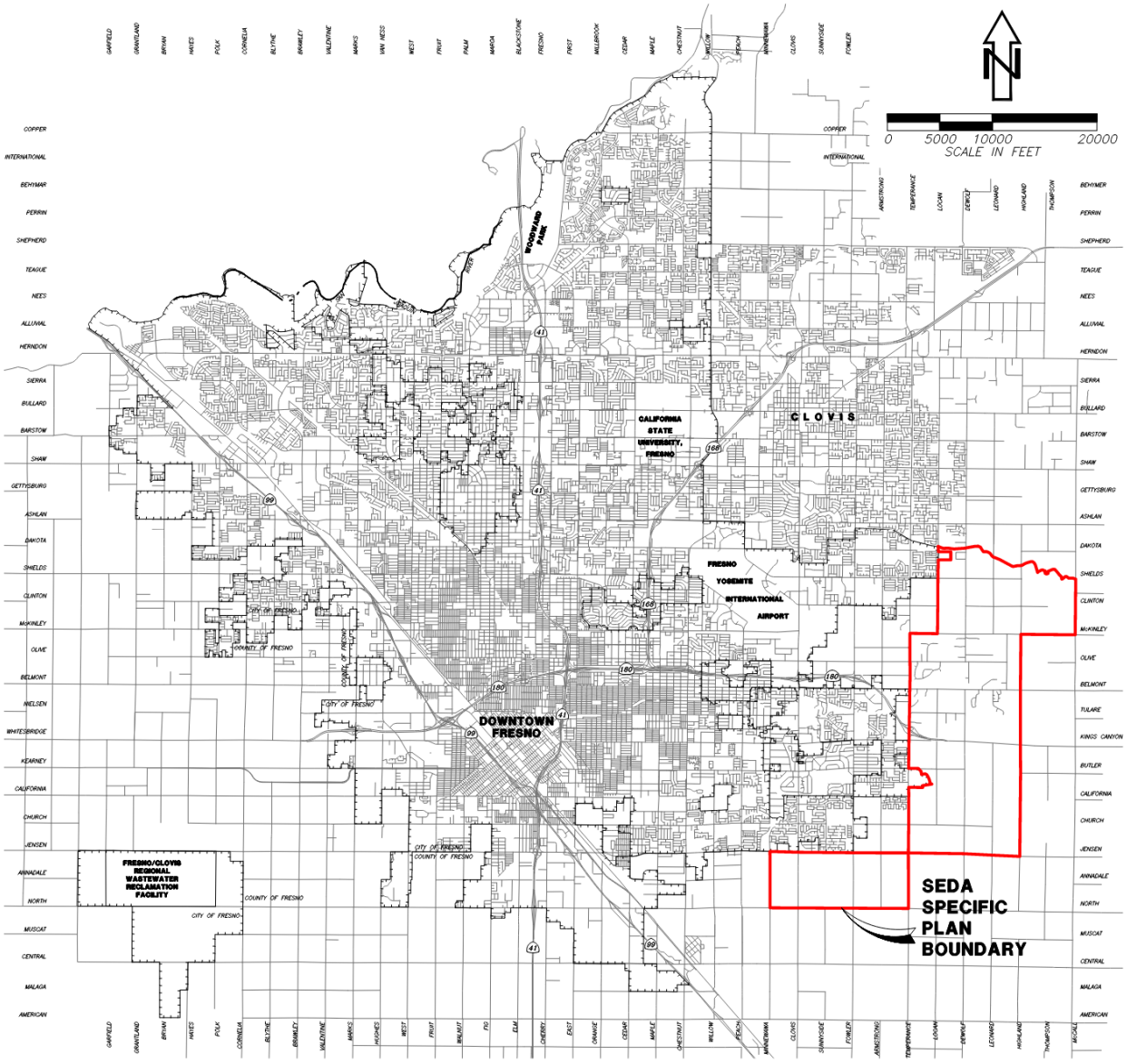


Figure 3.1 SEDA Specific Plan Location

3.2 Proposed Project Description

SEDA was approved for incorporation into the City by the Local Agency Formation Commission (LAFCo) in 2006, with a number of qualifying provisions, of which included the preparation of a Specific Plan and associated environmental documents before the land could be annexed to the City. Located in Growth Area II, SEDA was planned for development after other infill initiatives from the City's other planning efforts, and would be developed in phases. The General Plan established two levels of development – the General Plan Horizon and the General Plan Buildout. The General Plan Horizon is the level of development predicted to occur by the "Horizon Year," which was established as 2035, in accordance with the General Plan. General Plan Buildout is the level of development characterized by full occupancy of all developable sites in accordance with the General Plan; this was estimated to occur beyond 2035 (defined as past 2050).

As such, the General Plan defined development of SEDA under General Plan Horizon as a portion of the full buildout conditions – specifically, it assumed a residential development capacity of approximately 15,000 dwelling units, one third of the buildout capacity. Accordingly, the residential development capacity of SEDA under General Plan Buildout is approximately 45,000 dwelling units, and the General Plan assumed that the additional 30,000 dwelling units would not be developed until after 2035. However, though the General Plan was analyzed under the General Plan Horizon level, the associated MEIR (Master Environmental Impact Report) analyzed the environmental impacts of the General Plan under the buildout level of the SOI, which encompasses other growth areas, including SEDA.

The Specific Plan for SEDA was developed for the buildout condition of the Plan Area of 45,000 dwelling units, and provides implementation mechanisms for development in the Plan Area that accommodate for increased density and accelerated housing production. As part of the City's General Plan, SEDA was designated with land use classifications as defined in the General Plan. The Specific Plan presents alternative land use classifications for SEDA, and seeks to propose how the Plan Area will develop over time to complete buildout conditions with these newly-defined land use categories.

3.3 Proposed Land Uses and Unit Factors

The City's General Plan assigned land use classifications to areas located within the Plan Area. Each land use classification has a set of characteristics assigned to it with respect to a specific utility demand that have been determined and/or calculated by various contributing parties. The SEDA Specific Plan proposes new land use classifications for the Plan Area that may change the area's characteristics as it relates to utilities, e.g., water demand, wastewater generation, or storm water runoff, when compared to the General Plan. Additionally, some land uses have revised areas, which further alters those characteristics.

The SEDA Specific Plan does not use the same land use classifications as defined in the General Plan, and instead utilizes SEDA-specific land use classifications developed as part of the Specific Plan. See Figure 3.2 for the General Plan Land Use Map of the SEDA Specific Plan Area, and Figure 3.3 for the SEDA Specific Plan Proposed Land Use Map for the chosen alternative for the Plan Area.

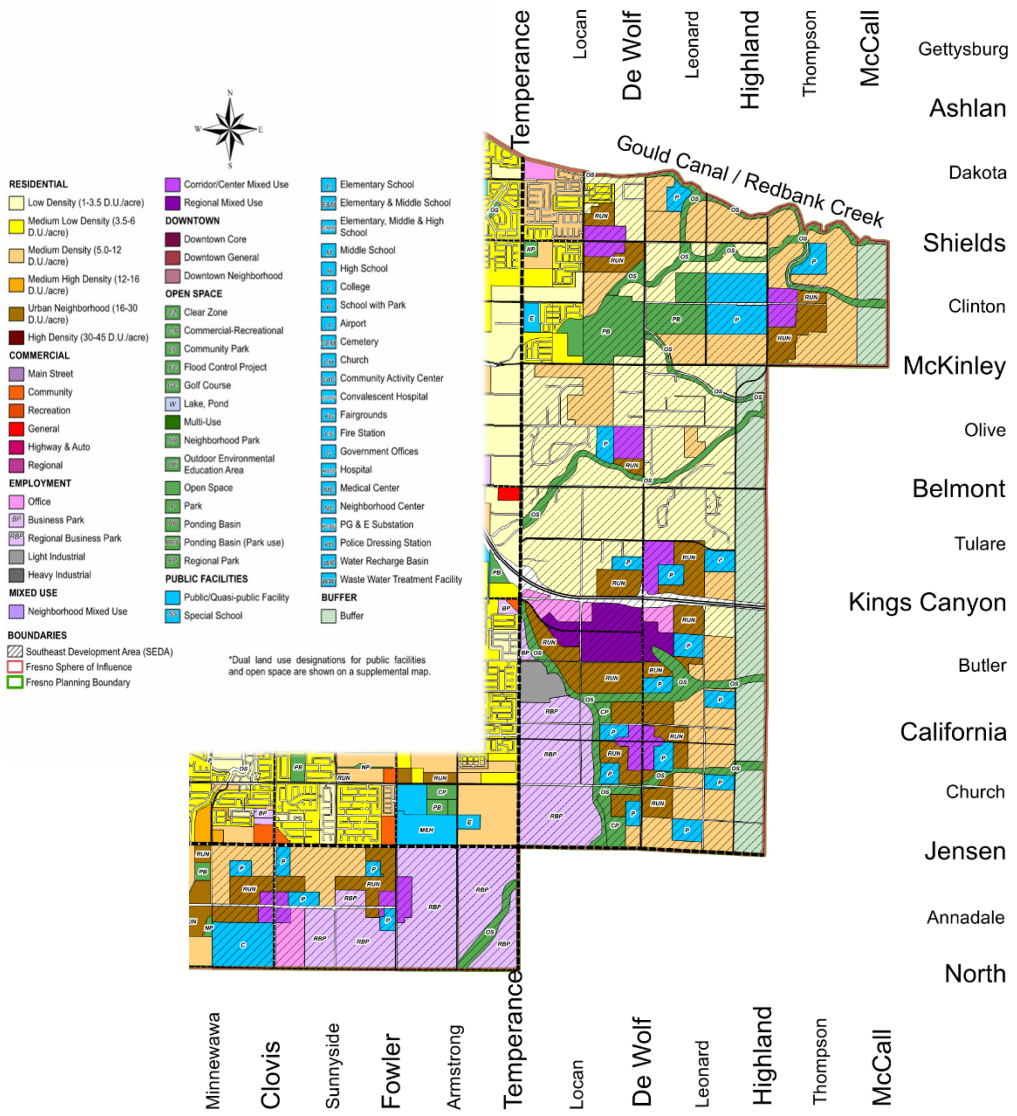
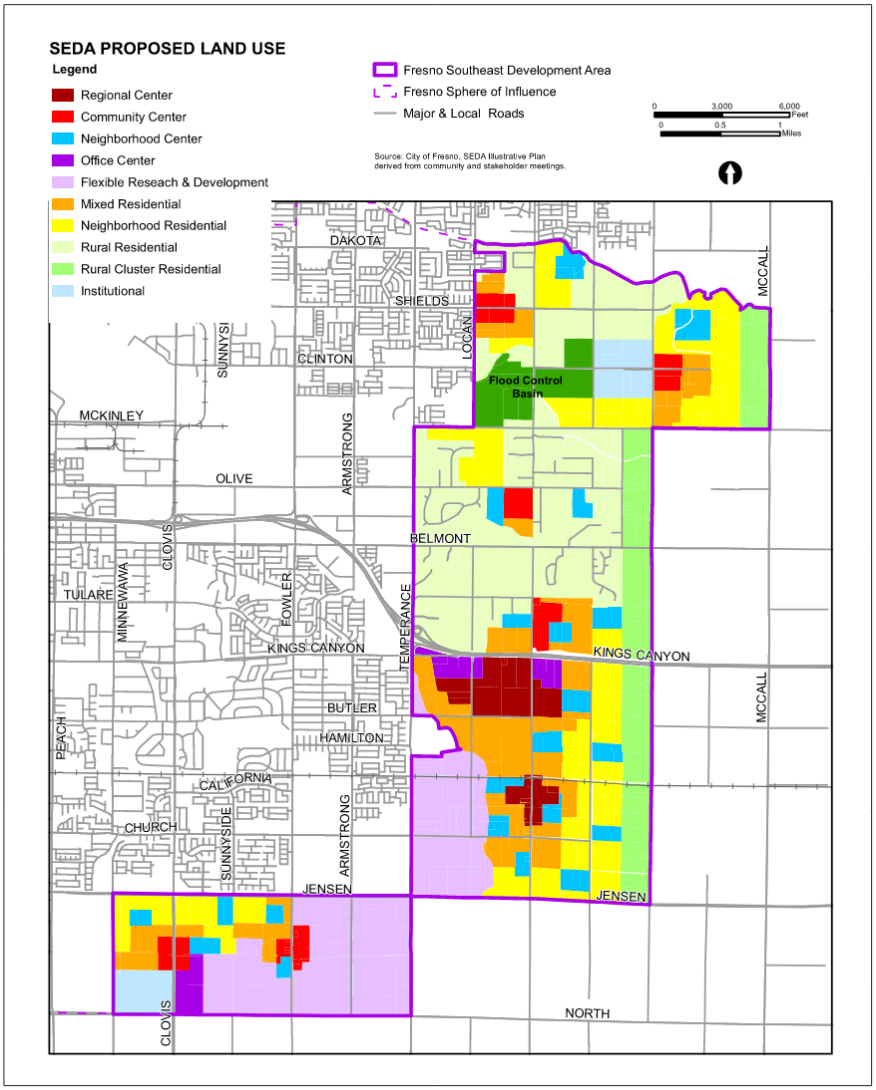


Figure 3.2 General Plan Land Use Map for SEDA Specific Plan Area
Source: City of Fresno General Plan, Figure LU-1, December 2014, Figure Updated 3/2/2021



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

Figure 3.3 SEDA Specific Plan Proposed Land Use Map
Source: Southeast Development Area Specific Plan Notice of Preparation,
First Carbon Solutions, 02/2022

At the time of preparation of the SEDA PEIR documents, including a water technical study prepared by Blair, Church & Flynn, the City was developing water demand factors for the SEDA-specific land uses as was done for the General Plan land uses; these factors were unavailable during the completion of the PEIR documents and water technical study analysis. However, the SEDA-specific land uses are similar in nature to many of the General Plan land uses, and similarities can be drawn between the two land use categories. Thus, a number of reasonable assumptions were made to determine equivalent General Plan land uses for each SEDA-specific land use in order to utilize the water demand factors for General Plan land uses. Table 3.1 shows the equivalent General Plan land uses established for each Specific Plan land use case as described below.

For the General Plan land use case, the technical memorandum prepared for the City of Fresno General Plan Update MEIR[4] was used to obtain projected water demand data for SEDA. In the

[4] West Yost Associates, "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report," "Table 2. Water Demand Comparison for General Land Use Plan Land Changes," January 21, 2013.

memorandum, analyses were completed to project water demands for 2035, which is the buildout year for the City's General Plan. The analyses included one completed for SEDA based on the land uses included in the General Plan; the demand determined for SEDA was 21,834 AFY.

For the Specific Plan analysis, the water demand factors used were prepared by Akel Engineering as part of the Update to the City's Metropolitan Water Resources Management Plan (Metro Plan).[5] Table 3.1 shows the equivalent General Plan land uses and the associated category included in the Metro Plan updated table of factors, and Table 3.2 shows the water demand factors used for each equivalent General Plan land use classification that was determined for each SEDA Specific Plan land use. It should be noted that some General Plan land uses did not exactly match up with those listed in the water demand factors, and some assumptions were made to determine approximate water demand factors; see Appendix B for the full list of water demand factors.

Table 3.1 General Plan–SEDA–General Plan Equivalent Land Use Classifications

SEDA Specific Plan Land Use Classifications [A]	Equivalent General Plan Land Use Classification [B]	Water Demand Factor Category [C]
Residential – Mixed Residential	Residential – Urban Neighborhood	Residential – Medium High & High Density
Residential – Neighborhood Residential	Residential – Medium Density	Residential – Medium Density
Residential – Rural Residential	Residential – Low Density	Residential – Low Density
Residential – Rural Cluster Residential	Residential – Low Density	Residential – Rural Density
Employment – Office Center	Employment – Office	Commercial – Office
Employment – Flexible Research & Development	Employment – Business Park	Commercial – Professional Services Office
	Employment – Regional Business Park	Commercial – Regional
Employment – Institutional	Public Facilities – College	Public Facilities – College
Employment – Institutional	Public Facilities – School with Park	Public Facilities – SEGA School with Park
Mixed Use – Regional Center	Mixed Use – Regional Mixed Use	Residential – High Density, Commercial – Regional, & Public Facilities – Community Activity Center
Mixed Use – Community Center	Mixed Use – Corridor/Center Mixed Use	Public Facilities – Community Activity Center
Mixed Use – Neighborhood Center	Public Facilities – Neighborhood Center	Residential – Medium High Density, Commercial – Neighborhood, & Public Facilities – Neighborhood Center
Open Space – Flood Control Basin	Open Space – Ponding Basin	Open Space – Ponding Basin
Other	Streets/Railroad/Canals/Etc.	N/A

[A] City of Fresno, "Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California," February 22, 2022.

[B] City of Fresno, "Fresno General Plan," December 18, 2014.

[C] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update, October 2020.

[5]Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update," October 2020.

Table 3.2 Metro Plan Update Water Demand Factors[6]

Water Demand Factor Category	Water Demand Factor (gpd/ac)
Residential	
Medium High & High Density	5,140 [A]
Medium Density	2,810
Low Density	2,050
Rural Density	1,415
Commercial	
Office	2,440
Professional Services Office	2,420
Regional	1,685
Public Facilities	
College	1,665
SEGA School with Park	2,895
High Density Residential, Regional Commercial, & Community Activity Center	2,106 [B]
Community Activity Center	1,930
Medium High Density Residential, Neighborhood Commercial, & Neighborhood Center	1,851 [C]
Open Space	
Ponding Basin	0
Other	
Railroad/Streets/Canals/Etc.	N/A

[A] Average of Medium High and High Density Residential Water Demand Factors
[B] Combination of High Density Residential, Regional Commercial, and Community Activity Center
[C] Combination of Medium High Density Residential, Neighborhood Commercial, and Neighborhood Center

3.4 Projected Water Demand

The analysis completed to determine the change in water demands for the General and Specific Plans involved comparing the total demand determined for the Plan Area under both the General Plan and Specific Plan land use cases. The analysis of the land use changes in the Plan Area was focused on comparing the change in water demand from the General Plan Land Use case to the Specific Plan Land Use case. General Plan land use classifications and Specific Plan land use classifications were provided by the City of Fresno Planning and Development Department in the form of GIS (Geographic Information System) and Shape files. GIS and Shape files were also obtained from the City of Fresno Department of Public Utilities (DPU) for the existing water facilities in the City.

The GIS files for the General and Specific Plan land uses were georeferenced to the California State Plane Coordinate System, Zone 4, Foot, NAD83 Datum for analysis. This allowed mapping of the land uses to pull information necessary to complete the analysis, including the area of each land use. The water demand factors were then used with the area of the corresponding land use classification to determine a total water demand for the Plan Area based on the General Plan and

[6] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update," October 2020.

the Specific Plan developments. The total water demand for the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in water demand for the Plan Area.

The base water demand for all land uses in the Plan Area was found for both the General Plan and the Specific Plan conditions. The total General Plan base water demand was 21,843 AFY, or 19.50 MGD, and the Specific Plan base water demand was found to be 19.83 MGD, resulting in an increase in water demand of approximately 0.33 MGD, or 1.7%. See Table 3.3 and Table 3.4 for the results of the analysis and a direct comparison of the General Plan and Specific Plan water demands; see Appendix A for a more detailed version of the analysis.

Table 3.3 Specific Plan (SP) Anticipated Water Demand per Land Use Classification

GP Land Use Classification	SP Equivalent Land Use Classification	Water Demand Factor [A,B] (GPD/ac)	SP Area (ac)	SP Base Water (MGD)
Residential - Low Density	Residential - Rural Residential	2,050	2,037.69	4.18
Residential - Medium Density	Residential - Neighborhood Residential	2,810	1,434.91	4.03
Residential - Urban Neighborhood	Residential - Mixed Residential	5,140 [A]	1,026.26	5.27
Employment - Office	Employment - Office Center	2,440	154.47	0.38
Employment - Business Park	Employment - Flexible Research and Development	2,420	16.54	0.04
Employment - Regional Business Park		1,685	1,287.53	2.17
Mixed Use -Corridor/Center Mixed Use	Mixed Used - Community Center	1,930	273.88	0.53
Mixed Use - Regional Mixed Use	Mixed Use - Regional Center	2,106 [B]	291.71	0.61
Open Space - Open Space	N/A	865	0	0.00
Open Space - Community Park	N/A	2,620	0	0.00
Open Space - Ponding Basin	Other - Flood Control Basin	0	265.78	0.00
Public Facilities - College	Employment - Institutional	1,665	116.26	0.19
Public Facilities - School with Park		2,895	149.77	0.43
Public Facilities - School with Park	Mixed Use - Neighborhood Center	1,851 [C]	491.38	0.91
Buffer - Buffer	Residential - Rural Cluster Residential	1,415 [D]	766.47	1.08
Other - Street/Rail/ Canal, etc.	Other	0	12.94	0.00
Totals	**-**	**-**	**8,325.57**	**19.83**

[A] Average of Medium High and High Density Residential Water Demand Factors

[B] Combination of High Density Residential, Regional Commercial, and Community Activity Center

[C] Combination of Medium High Density Residential, Neighborhood Commercial, and Neighborhood Center

[D] Rural Density Water Demand Factor used for Rural Cluster Residential Land Use.

Table 3.4 Difference Between General Plan and Specific Plan Anticipated Water Demand

SEDA General Plan Total Base Water Demand (MGD)	SEDA Specific Plan Total Base Water Demand (MGD)	Usage Δ (MGD)	Usage Δ (%)
19.5	19.83	0.33	1.7%

CHAPTER 4
CITY OF FRESNO WATER SERVICE AREA

4.1 Water Service Area

The City's water system is managed by the City DPU. Currently, the incorporated area of the City covers approximately 115 square miles (73,500 acres), and largely consists of single-family residential, commercial, public, and industrial development.[7] The City water system currently serves the area encompassed within the City limits, with the exception of customers served by the Bakman Water Company, Pinedale County Water District, Park Van Ness Mutual Water Company, California State University Fresno, and private groundwater users located in Fresno County islands. The City plans to eventually provide water service to all areas included in the General Plan, including the City's SOI, which includes lands outside of the City limits that are expected to be annexed and developed by the City in the future.

According to the City's 2020 UWMP, the City's planning area covers approximately 106,000 acres (165.6 square miles), which includes approximately 73,500 acres (115 square miles) of incorporated land and 32,500 acres (50.8 square miles) of unincorporated land. Of the planning area, the City's water service area covers 70,400 acres (110 square miles) of land within the SOI, which includes most of the 73,500 acres incorporated area and the unincorporated Fresno County islands not within the City limits. The remaining areas within the City's SOI are either served by other systems or are unserved by a water system, mainly consisting of open space, agricultural land, and land used by roads, highways, and railroads. Table 4.1 shows the characteristics of the City's water service area.

Table 4.1 Current City of Fresno Water Service Area Characteristics

Land Use Type	Area (Acres)	% of Total Area	Service Connections	% of Total Connections
Single-Family Residential	27,700	39.3%	118,775	85.1%
Multifamily Residential	3,700	5.3%	6,087	4.4%
Commercial	4,500	6.4%	11,982	8.6%
Public	5,600	8.0%	2,504	1.8%
Industrial	4,500	6.4%	175	0.1%
Open Space/Landscape Irrigation	13,100	18.6%	N/A[1]	N/A
Total	**59,100**		**139,523** [2]	**100%**
Vacant/Partially Vacant [3]	11,300	15.9%	N/A	N/A
Total	**70,400**			

Source: City of Fresno 2020 UWMP, Table 3-1.
1. Dedicated irrigation meters are included in commercial and public meter total.
2. Approx. 3,633 dedicated fire service connections are included in the total services connections, most of which are included in the commercial and public meter total.
3. For partially vacant land, half of the area is included in the zoned land use type and the other half is assumed vacant.

4.2 Population

Since the City's founding in 1872 through the mid-1990's, the City has experienced an annual growth rate of greater than 2%. However, from 1995 to 2015, the annual growth rate decreased to an average of 1.3%, and it has not surpassed 1.0% since 2015. According to the most recently available United States population data, the population estimate as of July 1, 2021 was 545,567,

[7] City of Fresno, "2020 Urban Water Management Plan," July 2021.

and the population estimate as of April 1, 2020 was 542,107, presenting a growth in population of approximately 0.4%.[8]

The population served by the City water system is slightly higher than the City's population with the inclusion of the unincorporated areas served by the City, the exclusion of areas within the City limits served by private water companies, special districts, or private wells, and inclusion of the Fresno County service areas; the City acquired County service areas and facilities in 1989, which increased the service area population to slightly greater than the City population.

The City's General Plan is the City's primary growth planning document from which baseline water service area population projections were developed for the UWMP.[9] The General Plan includes population estimates for the City planning area that are based on projections developed by the Fresno Council of Governments, which estimates a buildout population of 921,057 in 2056. In 2017, the Fresno Council of Governments developed population projections in 5-year increments through the year 2050 for all cities within Fresno County (Applied Development Economics, Inc. and Mintier Harnish Associates, 2017). The 2017 report published by the Fresno Council of Governments projected that the City's population will grow at an annual growth rate ranging from 0.92% - 1.44%, with an average growth rate between 2020 and 2056 of 1.03% per year.[10]

According to the City's 2020 UWMP, the City's water service area population is expected to continue to grow along with the City; some slightly higher growth years are anticipated within the next 10 years due to multiple large developments planned for completion in the future.[10] The UWMP assumes that the City will slowly incorporate areas served by others within the City's SOI by the buildout year of 2056, and therefore the long-term water service area population annual growth rate is projected to be 1.44% between 2020 and 2056 to account for the City's absorbing of these areas into its water system. Table 4.2 shows the City's water service area population projections through 2045 in five-year increments.

Table 4.2 City of Fresno Existing and Projected Water Service Area Population

Year	2020	2025	2030	2035	2040	2045
Population Served Projection	550,217	609,433	674,677	719,327	765,278	812,529

Source: City of Fresno 2020 UWMP, Table 3-3

4.3 Water System

The City's water system consists of approximately 1,860 miles of distribution and transmission pipes, 202 active groundwater wells, three (3) surface water treatment facilities (SWTFs), five (5) water storage facilities with pump stations, and three (3) booster pump facilities. The Service Area declines in elevation generally from the northeast to the southwest; to assist with pressure regulation, the area is divided into five (5) pressure zones: Highway 41, Shepherd, Sierra, Southwest, and Booster Pump 4 (BP04). The zones are separated by a series of closed/partially closed valves to prevent and/or impede flow from one zone to another. See Figure 3-2 of the City of Fresno 2020 UWMP for an overview of the existing water system.

[8] United States Census Bureau, QuickFacts, Fresno City, California. https://www.census.gov/quickfacts/fact/dashboard/fresnocitycalifornia/PST045222.
[9] City of Fresno, "Fresno General Plan," December 18, 2014.
[10] City of Fresno, "2020 Urban Water Management Plan," July 2021.

4.4 Climate

The City experiences a wide range of temperatures throughout the year. Fresno is located in the San Joaquin Valley, and the climate is characterized by hot dry summers and cool winters. Precipitation averages around 11 inches per year as shown in Table 4.3, however rainfall can vary significantly from year to year. As shown by the evapotranspiration (ET_O) and temperature values in Table 4.3, the City's water use is significantly higher in the summer months compared to the winter months, reflecting an increased water use for irrigation purposes during summer.

Table 4.3 Average Climate Characteristics

Month	ET_O (inches)	Average Precipitation (inches)	Average Temp-High (°F)	Average Temp-Low (°F)
Jan	1.17	2.39	57.1	37.3
Feb	2.05	1.79	62.7	39.4
Mar	3.76	2.02	68.3	43.3
Apr	5.47	0.92	74.0	46.8
May	7.42	0.51	81.5	53.1
Jun	8.46	0.18	89.8	59.2
Jul	8.84	0.02	95.9	63.9
Aug	7.84	0.02	94.9	62.6
Sept	5.69	0.08	89.8	58.0
Oct	3.70	0.58	79.4	49.3
Nov	1.86	0.98	66.1	40.5
Dec	1.04	2.02	56.5	36.2
Total/ Average	**57.30**	**11.51**	**76.3**	**49.1**

Source: CIMIS Website: http://www.cimis.water.ca.gov, Station 80 Fresno State (1988 to 2023) Monthly Average ETO Report and Monthly Report, October 1988 – April 2023 (downloaded May 2023)

CHAPTER 5
CITY OF FRESNO WATER DEMAND ANALYSIS

The WSA must comply with the following requirements with regards to water demand analysis:

Water Code Section 10910

(c) (1) The city or county, at the time it makes the determination required under Section 21080.1 of the Public Resources Code, shall request each public water system identified pursuant to subdivision (b) to determine whether the projected water demand associated with a proposed project was included as part of the most recently adopted urban water management plan adopted pursuant to Part 2.6 (commencing with Section 10610).

(2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

The descriptions provided in this section for the City's water demand data have been taken, for the most part, from the City's 2020 UWMP. Additional information from other sources has been included as needed.

Water demands for the Proposed Project are not specifically designated in the City's 2020 UWMP. However, the General Plan planning area (the SOI) was included in the UWMP and the SEDA Specific Plan is the implementation of the General Plan with slightly different land use types, so the Proposed Project is included in the 2020 UWMP, and the demand projections included in the UWMP may be used in preparing this WSA.

5.1 Historical and Existing Water Demand

The City serves customers for residential, commercial, institutional, industrial, and landscape irrigation demands through its potable water distribution system. The City also diverts raw surface water to recharge basins throughout the service area to recharge the groundwater basin. Groundwater recharge volume varies based on availability and is represented as an addition to annual groundwater supplies. The City also serves a portion of its customers undisinfected secondary treated or disinfected tertiary treated recycled water for agricultural irrigation or landscape irrigation, respectively.

The City tracks water consumption across different water use sectors listed in the Water Code, including Single-Family Residential, Multifamily Residential, Commercial and Institutional/ Governmental, Industrial, Landscape, and Distribution System Losses. The City also participates in exchanges and transfers, provides temporary travel meters for temporary water use, and diverts non-potable surface supplies for groundwater recharge.

The City's water demand has decreased over time in part due to the economic downturn of 2008 to 2011, water use reductions in response to recent drought conditions, and metering of residential properties. Since 2013, all water services in the City's water service area have been metered. As a result of the metering program, single-family residential water use has decreased since 2013. Water use for multifamily residential, commercial, and institutional services have also decreased since 2013, even though these services were metered prior to 2013. Industrial and irrigation demands have remained at similar levels to 2013; irrigation demands have fluctuated over the years due to various conservation restrictions. Table 5.1 details the water consumption for the City's water service area by customer type for the period of 2013 to 2020.

Table 5.1 Historical Water Demand by Customer Type, 2013-2020

	Metered Consumption (AFY)							
Customer Type	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
Single-Family Residential	76,029	67,179	54,189	53,805	57,842	57,314	54,719	60,065
Multifamily Residential	20,901	19,807	17,522	17,774	18,393	18,448	17,922	18,842
Commercial/ Institutional	20,062	20,047	17,469	17,887	19,008	19,089	17,938	16,971
Industrial	5,747	5,800	5,618	5,533	5,698	5,561	5,554	5,729
Landscape Irrigation	10,666	9,130	7,358	7,726	9,021	9,872	10,019	10,478
Other (Travel Meters)	287	228	152	320	563	441	348	341
Losses	*	*	*	*	*	*	*	9,568
Total:	**133,692**	**122,191**	**102,308**	**103,045**	**110,525**	**110,725**	**106,500**	**121,993**

Source: City of Fresno 2020 UWMP, Figure 4-1, City of Fresno 2020 UWMP, Table 4-2.
* Data not provided in City of Fresno 2020 UWMP

The City's 2020 UWMP provides a breakdown of actual water use by sector for the calendar year of 2020. As shown in Figure 5.1, single-family residential use is the largest use type in the City, while multifamily residential use was the second largest, combining for a total of approximately 65% of total water use being attributed to residential demands.

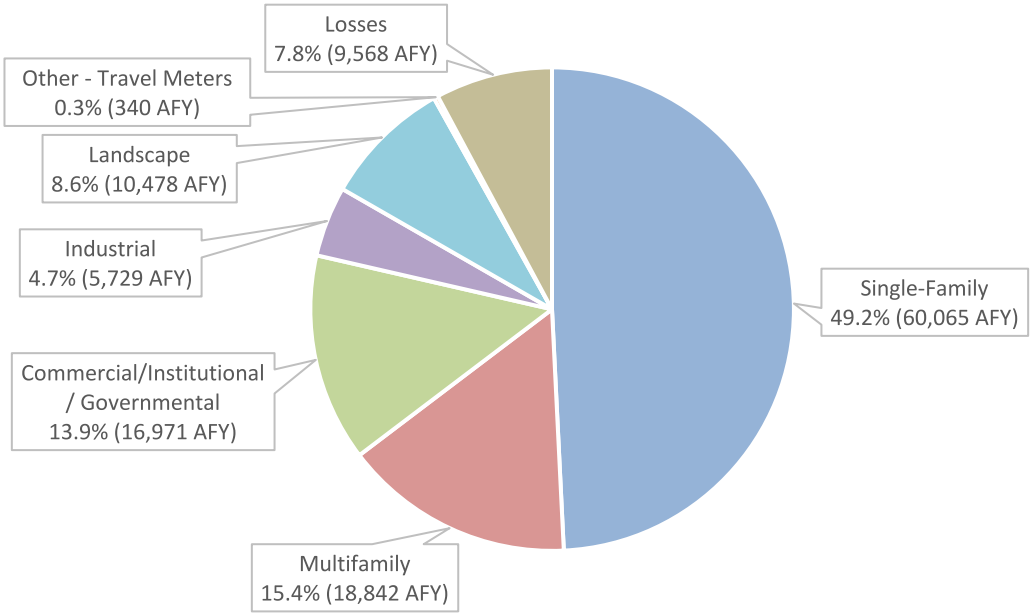


Figure 5.1 Actual Demands for Potable Water, 2020
Source: City of Fresno 2020 UWMP, Table 4-2.

For 2020, the City's water use averaged 198 GPCD (Gallons per Capita per Day). This is significantly lower than the City's 2020 daily per capita water use target of 247 GCPD due to extensive conservation efforts implemented by the City in the past decade.

The City utilizes raw surface water for groundwater recharge, which has varied significantly over time. Over a 20-year period from 2000 to 2020, the average annual intentional recharge of surface water was 49,240 AFY. Total recharge has ranged from a high of 82,900 AF in 2019 to a low of 19,700 AF in 2015.[11] Annual variability in raw surface water for groundwater recharge is caused by several factors, including basin availability, water delivery season, pond maintenance, and length of wet seasons. Table 5.2 shows the historic volume of surface water used for recharge each year from 2000 to 2020.

Table 5.2 Historic Recharge of City Surface Water

Year	Volume of Surface Water Used for Recharge (AFY)
2000	54,995
2001	46,538
2002	46,514
2003	55,461
2004	44,925
2005	42,881
2006	39,749
2007	36,583
2008	49,852
2009	52,538
2010	50,961
2011	48,919
2012	45,471
2013	45,169
2014	34,681
2015	19,762
2016	65,650
2017	72,116
2018	49,119
2019	82,933
2020	42,686

Source: City of Fresno 2020 UWMP, Figure 4-2

As mentioned, the City serves a portion of its customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively. Recycled water is produced at the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and the North Fresno Wastewater Reclamation Facility (NFWRF). The Fresno-Clovis RWRF produces both undisinfected secondary treated recycled water and disinfected tertiary treated recycled water, while the NFWRF only produces disinfected tertiary treated recycled water. The undisinfected secondary treated recycled water is used for the irrigation of non-food crops, and the disinfected tertiary treated recycled water is mainly used for irrigation of landscaping including parks, cemeteries, and golf courses. The recycled water produced by the NFWRF is used exclusively to irrigate the Copper River Golf Course. Table 5.3 shows the previous recycled water demands from 2015 to 2020, and Table 5.4 shows the existing recycled water demand within the City's service area in 2020 and the projected recycled water demands.

[11] City of Fresno, "2020 Urban Water Management Plan," July 2021.

Table 5.3 Historic Recycled Water Use within Service Area, AFY

Recycled Water Facility	2015	2016	2017	2018	2019	2020
RWRF, Secondary Treated Effluent	8,688	7,329	4,540	7,031	3,652	3,845
RWRF, Tertiary Treated Effluent	531	485	423	867	912	858
NFWRF, Tertiary Treated Effluent	62	110	0	0	19	54
Total	**9,281**	**7,924**	**4,963**	**7,898**	**4,583**	**4,757**

Source: City of Fresno 2020 UWMP, Table 6-5.

Table 5.4 Existing and Projected Recycled Water Demand, AFY

Beneficial Use Type	Level of Treatment	2020	2025	2030	2035	2040	2045
Agricultural Irrigation	Secondary, Undisinfected	3,845	7,900	7,900	7,900	7,900	7,900
Landscape Irrigation (excludes golf courses)	Tertiary	858	5,800	5,800	5,800	5,800	5,800
Agricultural Irrigation	Tertiary	0	410	410	410	410	410
Golf Course Irrigation	Tertiary	54	110	110	110	110	110
	Total:	**4,757**	**14,220**	**14,220**	**14,220**	**14,220**	**14,220**

Source: City of Fresno 2020 UWMP, Table 6-6.

5.2 Future Water Demand

The projected water demands presented in the City's 2020 UWMP through 2045 were determined using the methodology for land use-based projections, allowing different demand factors to be applied to current land use areas and future land use areas to determine a projected water demand. The future land use area included the planned land use at buildout of the City's General Plan, which has been represented as the year 2056. Although the City does not have any plans to serve areas currently served by others within the City limits, all areas within the City SOI were assumed to be served by the City by buildout. Demand factors used in the projections were developed using 2018 metered consumption data with 72 categories of land use data. These demand factors were applied to the 2020 land use areas by category to develop the demand projection beginning in 2020. Table 5.5 details the projected potable water demands for the City's service area by use type, and Table 5.6 shows the projected non-potable water demands.

Table 5.5 Projected Potable Water Demands

	Projected Water Use (AFY)				
User Type	**2025**	**2030**	**2035**	**2040**	**2045**
Single Family	76,255	80,429	82,934	85,437	87,936
Multifamily	19,000	20,654	21,737	22,831	23,935
Commercial/Institutional/Governmental	19,052	21,135	22,587	24,041	25,496
Industrial	7,410	9,003	9,922	10,841	11,758
Landscape	4,490	5,035	5,422	5,809	6,196
Other (Travel Meters)	200	200	200	200	200
Losses	10,097	10,900	11,408	11,917	12,426
Total:	**136,504**	**147,356**	**154,210**	**161,076**	**167,947**

Source: City of Fresno 2020 UWMP, Figure 4-1, City of Fresno 2020 UWMP, Table 4-6.

Table 5.6 Projected Non-Potable Water Demands

		Projected Water Use (AFY)				
Use Type	**Water Type**	**2025**	**2030**	**2035**	**2040**	**2045**
Groundwater Recharge	Raw Water	62,700	65,400	68,100	70,800	73,500
Total		**62,700**	**65,400**	**68,100**	**70,800**	**73,500**

Source: City of Fresno 2020 UWMP, Figure 4-1, City of Fresno 2020 UWMP, Table 4-7.

The City's 2045 projected water demand at buildout (based on existing water demand, the projected demands for the SEDA under the General Plan conditions, the difference in demands for the SEDA between the Specific Plan and General Plan conditions, and undefined future developments) is summarized on Table 5.7. The General Plan is expected to be built out by 2056, but for the purposes of this WSA, the SEDA was assumed to be annexed and built out by 2045, which is the furthest projected data included in the City's 2020 UWMP.[12]

Table 5.7 Projected Future Water Demand at 2045

	Water Demand, AFY
Current 2020 Water Demand [1]	121,993
SEDA Water Demand under General Plan [2]	21,843
Subtotal (without project)	143,836
Change in SEDA Water Demand under Specific Plan [3]	+370
Subtotal (with project)	144,206
Undefined Future Developments [4]	97,241
Total Water Demand [5]	**241,447**

[1] Data from Table 5.1 of this WSA.
[2] Data from Table 3.4 of this WSA converted to AFY (SEDA General Plan Total Base Water Demand = 19.5 MGD).
[3] Data from Table 3.4 of this WSA converted to AFY (Usage Δ = 0.33 MGD).
[4] Balance between Subtotal (with project) and Total Water Demand.
[5] Data from Table 5.3 and 5.4 of this WSA (2045 Projected Potable Demand + 2045 Non-Potable Projected Water Demand).

5.3 Dry Year Water Demand

As shown in Table 5.1, the City's water demand in 2015 was the lowest amount recorded between the years of 2013 and 2020. Table 5.2 also shows that the lowest amount of recharge also occurred in 2015. This reduction in water demand was a direct result of the drought conditions at the time, and the Governor's April 2015 Executive Order B-29-15 mandating 25% water conservation statewide. Over time, the City has adopted a set of restrictions on water usage to help promote water conservation and overall water consumption. These measures are included in Section 6-520(a) of the City's Municipal Code, which include water conservation measures that are intended to take place under normal water supply conditions. The City's Water Shortage Contingency Plan (WSCP), included in Section 8 and Appendix J of the City's 2020 UWMP, includes a five-stage plan describing specific actions to reduce water demand more than 50% in the event of a water supply shortage or emergency. Demand is expected to decrease over time as conservation measures are enacted in response to single or multiple dry years, or other changes to the City's water supplies.[12]

As of 2023, there are still water consumption restrictions in place due to ongoing drought conditions, which were enacted on January 18, 2022, and readopted in December 2022 for another year. These restrictions include the prohibition of the use of potable water for the following:

[12] City of Fresno, "2020 Urban Water Management Plan," July 2021.

- Outdoor watering that lets water run onto sidewalks and other areas (except incidental runoff)
- Washing vehicles without an automatic shutoff nozzle
- Washing hard surfaces, like driveways and sidewalks, that don't absorb water
- Street cleaning or construction site preparation
- Filling decorative fountains, lakes, or ponds
- Outdoor watering within 48 hours after it rains at least 1/4 inch of rainfall
- Watering ornamental turf on public medians

An additional emergency water conservation regulation was enacted in June 2022 that prohibits the use of potable water to water decorative grass in commercial, industrial, and institutional areas including common areas of homeowners' associations.[13] The regulation also requires urban water suppliers to implement all demand-reduction actions under "Level 2" of their Water Shortage Contingency Plans, which are actions meant to address a 10% to 20% water shortage. Additionally, urban water suppliers are required to fast-track their submissions of supply and demand assessments to plan for potential extended dry conditions. "Level 2" actions vary for each water supplier, but often include things like increasing communication about the importance of water conservation, limiting outdoor irrigation to certain days or hours, increasing patrolling to identify water waste, and enforcing water-use prohibitions.

The City's 2020 UWMP includes characterizations for various year types depending on projected water supplies and drought conditions. These include the Normal Year, Single Dry Year, and Multiple Dry Years. The Normal Year supply availability includes estimated sustainable yield of groundwater supply, long-term allocations of surface water supplies, and projected recycled water supply. The Single-Dry-Year supply availability is based on 2015 data during the 2012-2017 drought because the City had the lowest surface water supply available in 2015; supplies include the estimated sustainable yield for groundwater with pumping beyond sustainable yield as needed during dry periods to be balanced with recharge during normal or wet periods, surface water allocations matching those from 2012 to 2016, and the projected recycled water supply. The Multiple-Dry-Year supply availability is based on the five-year drought condition; supplies are similar to those stated for the single-dry-year supplies. Table 5.8 shows the projected future dry year potable water demands.

Table 5.8 Projected Normal and Future Dry Year Water Demand, AFY

Hydrologic Condition	2025	2030	2035	2040	2045
Normal Year	199,204	212,756	222,310	231,876	241,447
Single Dry Year	164,092	176,132	184,174	192,228	200,287
Multiple Dry Year First Year	199,204	212,756	222,310	231,876	241,447
Multiple Dry Year Second Year	199,204	212,756	222,310	231,876	241,447
Multiple Dry Year Third Year	190,267	193,637	197,736	201,753	205,708
Multiple Dry Year Fourth Year	162,551	165,920	170,020	174,036	177,992
Multiple Dry Year Fifth Year	199,204	212,756	222,310	231,876	241,447

Source: City of Fresno 2020 UWMP Table 7-1 for Normal Year Data, Table 7-2 for Single Dry Year Data, and Table 7-3 for Multiple Dry Year Data.

[13] State Water Resources Control Board Resolution No. 2022-0018, "To Adopt an Emergency Regulation to Reduce Water Demand and Improve Water Conservation." 2022.

The WSA must comply with the following requirements with regards to water supply analysis:

Water Code Section 10910

(c) (2) If the projected water demand associated with the proposed project was accounted for in the most recently adopted urban water management plan, the public water system may incorporate the requested information from the urban water management plan in preparing the elements of the assessment required to comply with subdivisions (d), (e), (f), and (g).

(d) (1) The assessment required by this section shall include an identification of any existing water supply entitlements, water rights, or water service contracts relevant to the identified water supply for the proposed project, and a description of the quantities of water received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts.

(2) An identification of existing water supply entitlements, water rights, or water service contracts held by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall be demonstrated by providing information related to all of the following:

(A) Written contracts or other proof of entitlement to an identified water supply.

(B) Copies of a capital outlay program for financing the delivery of a water supply that has been adopted by the public water system.

(C) Federal, state, and local permits for construction of necessary infrastructure associated with delivering the water supply.

(D) Any necessary regulatory approvals that are required in order to be able to coney or deliver the water supply.

(e) If no water has been received in prior years by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), under the existing water supply entitlements, water rights, or water service contracts, the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), shall also include in its water assessment pursuant to subdivision (c), an identification of the other public water systems or water service contract holders that receive a water supply or have existing water supply entitlements, water rights, or water service contracts, to the same source of water as the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has identified as a source of water supply within its water assessments.

It is anticipated that the Proposed Project will be served from the City's existing and future water supplies, if approved by the City. The inclusion of existing and planned future water supplies is specifically allowed by the Water Code:

Water Code Section 10631

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).

The water supply for the proposed project will have the same water supply reliability and water supply quality as those available to the City's other existing and future customers. The water supplies required to serve the Proposed Project are described in the City's 2020 UWMP. As such, the descriptions provided in this section have been taken, for the most part, from the UWMP.[14] Additional information from other sources has been included as needed.

[14] City of Fresno, "2020 Urban Water Management Plan," July 2021.

6.1 Existing Water Supplies

The City relies on water supplies from four main sources:

1. Groundwater pumped from groundwater wells throughout the City
2. Surface water from the San Joaquin River through a contract with the United States Bureau of Reclamation (USBR) as part of the Central Valley Project (CVP)
3. Surface water from the Kings River through a contract with the Fresno Irrigation District (FID)
4. Recycled water treated from the Fresno-Clovis RWRF and the NFWRF

Historically, the City has relied heavily on groundwater pumped from the underground basin and aquifers to provide 100% of its water demands. The City commissioned its first surface water treatment facility (SWTF) in 2004, and currently operates three total SWTFs that provide approximately half of all potable water demands in the City's service area.

6.1.1 Groundwater

There are additional requirements included in SB 610 for the preparation of a WSA if groundwater is an existing source of water supply.

Water Code Section 10910

(f) If a water supply for a proposed project includes groundwater, the following additional information shall be included in the water assessment:

(1) A review of any information contained in the urban water management plan relevant to the identified water supply for the proposed project.

(2) A description of any groundwater basin or basins from which the proposed project will be supplied. For those basins for which a court or board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), has the legal right to pump under the order or decree. For basins that have not been adjudicated, information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current bulletin of the department that characterizes the condition of the groundwater basin, and a detailed description by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), of the efforts being undertaken in the basin or basins to eliminate the long-term overdraft conditions.

(3) A detailed description and analysis of the amount and location of groundwater pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), for the past five years from any groundwater basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(4) A detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the public water system, or the city or county if either is required to comply with this part pursuant to subdivision (b), from any basin from which the proposed project will be supplied. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

(5) An analysis of the sufficiency of the groundwater from the basin or basins from which the proposed project will be supplied to meet the projected water demand associated

with the proposed project. A water assessment shall not be required to include the information required by this paragraph if the public water system determines, as part of the review required by paragraph (1), that the sufficiency of groundwater necessary to meet the initial and projected water demand associated with the project was addressed in the description and analysis required by paragraph (4) of subdivision (b) of Section 10631.

6.1.1.1 Groundwater Supply Overview

The City is located within the Kings Subbasin of the San Joaquin Valley Groundwater Basin. Per the City's 2020 UWMP, the City has a network of over 270 municipal water wells and operates approximately 202 active municipal supply wells that access groundwater from said basin.[15] The production capacity from the active wells is approximately 403 MGD, and the total capacity including inactive wells is approximately 487 MGD. Most wells are directly connected to the water distribution system. The City's water system depended completely upon groundwater as a water source until 2004 when the first SWTF was commissioned. Today, groundwater is still heavily relied upon as a primary water source for the City.

Groundwater quality generally meets primary and secondary drinking water standards for municipal water use, however the groundwater basin has been impacted by several chemical contaminant plumes and nitrates that require monitoring and wellhead treatment or blending plans. Treatment efforts and removal of specific wells from service are conducted as required to maintain drinking water supply quality and standards.

6.1.1.2 Basin Description

The information included here on the subbasin is largely taken from the City's 2020 UWMP and the Department of Water Resources (DWR) Bulletin 118 Interim Update which was most recently updated in 2020.[16] The City's groundwater wells pump water from the northern portion of the Kings Subbasin (DWR Groundwater Subbasin Number 5-22.08) within the larger San Joaquin Valley Basin. The Kings Subbasin covers approximately 1,530 square miles. The Kings Subbasin is unadjudicated and there are no legal restrictions on groundwater pumping.

The San Joaquin Valley Groundwater Basin is generally bound by the Sacramento-San Joaquin Delta and Sacramento Valley to the north, the Sierra Nevada Mountains to the east, the San Emigdio and Tehachapi Mountains to the south, and the Coast Ranges to the west. The Kings Subbasin is located within the southern half of the San Joaquin Valley Groundwater Basin, and is generally bound by the San Joaquin River to the north, the Sierra Nevada foothills to the east, the Kings River to the south, and the Delta-Mendota and Westside Subbasins to the west. The Kings Subbasin is divided into seven Groundwater Sustainability Agency (GSA) management areas, and Fresno is located in the North Kings GSA. The upper several hundred feet of the Kings Subbasin generally consists of highly permeable, coarse-grained deposits, which are termed older alluvium. Coarse-grained stream channel deposits, associated with deposits by the ancestral San Joaquin and Kings Rivers, underlie much of the northwest area of the City. A laterally extensive layer of clay exists beneath most of the south and southeastern portions of the City at an average depth of 250 feet below the ground surface. Below the older alluvium, finer-grained sediments of the tertiary-quaternary continental deposits exist at depths ranging from 600 to 1,200 feet below ground surface. Substantial groundwater has been produced and utilized from these depths by the City. However, deeper deposits located in the southeastern and northern portions of the City have produced less groundwater. There are also reduced deposits in the

[15] City of Fresno, "2020 Urban Water Management Plan," July 2021.
[16] California Department of Water Resources, "California's Groundwater Update 2020 Bulletin 118." November 2021.

northern and eastern portions of the City at depths generally below 700 or 800 feet which are associated with high concentrations of iron, manganese, arsenic, hydrogen sulfide, and methane gas. Groundwater at these depths does not generally provide a significant source for municipal supply wells. Current groundwater depth depends on the location within the City. Figure 6-4 in the City's 2020 UWMP illustrates the City's depth to groundwater for six representative wells across the City's SOI since 1960.[17]

6.1.1.3 Groundwater Management

The Groundwater Management Act (GWMA) was signed into law in 1992, and made groundwater management part of the California Water Code (Division 6, Part 2.75, Chapters 1-5, Section 10750-10755.4). First introduced as Assembly Bill (AB) 3030, the GWMA established specific procedures on how Groundwater Management Plans (GWMPs) are to be developed and adopted by local agencies. The intent of the GWMA is to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdictions and to provide a methodology for developing a GWMP. The GWMA has since been modified by SB 1938 in 2002 and AB 359 in 2011.

- AB 3030 provided a systematic procedure for existing local agencies to develop GWMPs.
- SB 1938 modified the GWMA by requiring any public agency seeking State funds administered through the California DWR for the construction of groundwater projects to prepare and implement a GWMP.
- AB359 further modified the GWMA by requiring public agencies to prepare and implement GWMPs with an additional required component that focused on identifying groundwater recharge areas. It also included several plan adoption procedural changes, requires GWMPs to be submitted to DWR, and requires DWR to provide public access to this information.

Th next step in groundwater management came in 2014 when the Sustainable Groundwater Management Act (SGMA) was signed into law (Water Code Section 10720 et seq.). This act includes a three-bill legislative package composed of AB 1739, SB 1168, and SB 1319, and requires local agencies to form GSAs for high and medium priority basins, and develop and implement Groundwater Sustainability Plans (GSPs) to avoid and mitigate overdraft of groundwater within 20 years. SGMA places the authority of groundwater management with local agencies; it establishes a definition of sustainable groundwater management, establishes a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources, prioritizes basins with the greatest problems, and sets a 20-year timeline for implementation. The Kings Subbasin was designated as critically overdrafted in the DWR's Bulletin 118.

The City was a founding member of the North Kings GSA, which includes the following public and participating agencies: Fresno Irrigation District (FID, member), City of Fresno (member), City of Clovis (member), City of Kerman (member), County of Fresno (member), Bakman Water Company (participating agency), Biola Community Services District (member), Garfield Water District (member), International Water District (member), and the Fresno Metropolitan Flood Control District (FMFCD, participating agency). The North Kings GSA cooperates with the other six GSAs within the Kings Subbasin to enact common approaches to sustainability items. The North Kings GSA prepared and submitted its GSP on January 28, 2020 (prepared by Provost & Pritchard, November 2019). The DWR issued a response in January 2022 stating that the GSP was incomplete, after which the GSP was revised and resubmitted on July 27, 2022. As of the preparation of this WSA, the DWR has issued a letter stating that they expect to recommend

[17] City of Fresno, "2020 Urban Water Management Plan," July 2021.

approval of the plan, along with a number of additional recommended corrective actions to be included per the DWR SGMA Portal GSP Status Summary.[18]

6.1.1.4 Conditions of Overdraft

SGMA requires DWR to identify groundwater basins and subbasins that are critically overdrafted. Per SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." SGMA uses a number of sustainability indicators to make such a determination, which includes chronic lowering of groundwater levels, reduction of groundwater storage, seawater intrusion, degraded water quality, land subsidence, and depletions of interconnected surface water. As mentioned, the Kings Subbasin has been classified as being in a condition of critical overdraft by the DWR in their most recent edition of California's Groundwater Update 2020 (Bulletin 118) published by the DWR in November 2021.[19]

The groundwater levels beneath the City in the Kings Subbasin were relatively shallow in 1940 prior to the start of World War II at about 25 feet below ground surface. After the war, the City rapidly grew, and the groundwater level declined at a rate of 2.8 feet per year from 1959 to 1968.[20] Since 1990, groundwater levels have declined at a slower rate, further slowing after the City brought their first surface water treatment plant online – the Northeast Surface Water Treatment Facility (NESWTF) – which allowed the City to focus on groundwater recharge operations. Groundwater levels have begun to rise in the last few years in various parts of the City due to a decreased dependence on groundwater pumping. The City plans to continue operation of their SWTFs and to increase groundwater recharge efforts to contribute to basin recovery, including via the cooperative agreements that the City maintains with FMFCD and FID for access to recharge basins and the exchange of surface waters. The City has historically averaged 60,000 AFY of recharge, and plans to increase recharge by 540 AFY each year moving forward. During wet years, the City plans on recharging more water when it's available to offset additional groundwater pumping expected during dry years.

DWR is required to prioritize groundwater basins via provisions of SGMA and the California Statewide Groundwater Elevation Monitoring (CASGEM) program into four categories – high-, medium-, low-, or very low-priority. SGMA requires medium- and high-priority basins to develop GSAs, GSPs, and manage groundwater for long-term sustainability. According to the SGMA Basin Prioritization Dashboard, the Kings Subbasin has been prioritized as a high-priority basin, leading to the formation of the North Kings GSA and the preparation of their GSP, as stated above.

6.1.1.5 Groundwater Quality

Groundwater in the Kings Subbasin generally meets the primary and secondary drinking water standards for municipal water use. It is described as being bicarbonate type water containing calcium, magnesium, and sodium as the dominant ions. Total Dissolved Solids (TDS) concentrations range from 200 to 700 mg/L. However, the basin has been impacted by multiple chemical contaminants which has affected the City's ability to fully utilize its resources without some kind of wellhead treatment in certain areas. The primary contaminants present in the basin include nitrate, 1,2-dibromo-3-chloropropane (DBCP), 1,2,3-trichloropropane (1,2,3-TCP), and volatile organic compounds including trichloroethylene (TCE) and perchloroethylene (PCE). The City has installed wellhead treatment systems and implemented blending plans for a number of

[18] California Department of Water Resources, SGMA Portal, "GSP Status Summary." https://sgma.water.ca.gov/portal/gsp/status.
[19] California Department of Water Resources, "California's Groundwater Update 2020 Bulletin 118." November 2021.
[20] City of Fresno, "2020 Urban Water Management Plan," July 2021.

wells around the City that are affected by these contaminants. Approximately 40 wells are being treated for various contaminants, including those listed here, and an additional 20 wells are being treated for iron, manganese, and hydrogen sulfide or corrosion control. The City also actively pumps specific wells within certain contaminant plumes to manage contamination and stop the plume's spread.

6.1.1.6 Historical Groundwater Use

The City has over 270 municipal water wells and operates approximately 202 active municipal supply wells that access groundwater from the Kings Subbasin. The City has reduced it's dependance on groundwater through its investment in surface water infrastructure, which has contributed to a reduction in groundwater pumping. As seen in Table 6.1, the amount of groundwater production has declined significantly from 2003 to 2020.

Table 6.1 Historic Groundwater Production, 2003-2020

Year	Groundwater Production (AFY)
2003	165,200
2004	160,000
2005	141,500
2006	136,000
2007	146,300
2008	148,700
2009	138,200
2010	128,600
2011	119,900
2012	119,500
2013	123,200
2014	106,800
2015	82,500
2016	99,100
2017	105,200
2018	76,800
2019	54,600
2020	55,000

Source: City of Fresno 2020 UWMP Figure 6-7

6.1.1.7 Projected Groundwater Use

Groundwater consists of three main components – natural recharge, net subsurface inflow, and intentional recharge.

- Natural recharge consists of deep percolation water from rainfall and irrigation-applied water. As urbanization continues within the City's SOI, the amount of deep percolation recharge will decrease due to an increase in impervious surfaces leading to more runoff and less open spaces where natural recharge can occur.
- Net subsurface inflow is the groundwater that flows underground into the basin. This may be from stormwater runoff or other neighboring basins. This amount is projected to increase in future years as the City annexes more land until the SOI is built out.

- Intentional groundwater recharge occurs when surface water is purposefully managed to infiltrate into the groundwater aquifer. The City maintains an intentional recharge program and has recharged approximately 60,000 AFY on average from 2000 to 2019.[21]

Table 6.2 details the existing and projected future groundwater yield for normal years.

Table 6.2 Existing and Projected Future Groundwater Production in Normal Years, AFY

Groundwater Component	2020	2025	2030	2035	2040	2045
Natural Recharge	24,970	25,480	25,910	26,280	26,570	26,790
Net Subsurface Inflow	47,510	49,910	52,320	54,720	57,120	59,530
Sustainable Yield	**72,480**	**75,390**	**78,230**	**81,000**	**83,690**	**86,320**
Intentional Recharge	60,000	62,700	65,400	68,100	70,800	73,500
Total Estimated Groundwater Yield	**132,480**	**138,090**	**143,630**	**149,100**	**154,490**	**159,820**

Source: City of Fresno 2020 UWMP Table 6-1.

Per the City's 2020 UWMP, the amount of groundwater pumped during dry years is not expected to change from the amount pumped during normal years. Table 6.3 shows the projected groundwater production for the normal and dry years combined.

Table 6.3 Projected Future Groundwater Production in Normal and Dry Years, AFY

	2025	2030	2035	2040	2045
Total Groundwater Production During Normal Year	138,090	143,630	149,100	154,490	159,820
Total Groundwater Production During Dry Years (Single and Multiple)	138,090	143,630	149,100	154,490	159,820

Source: City of Fresno 2020 UWMP Table 7-1, 7-2, and 7-3.

6.1.1.8 Groundwater Sufficiency

The City's 2020 UWMP addressed the sufficiency of the City's groundwater supplies in conjunction with its other water supplies to meet the City's existing and planned future uses. Based on the information provided in this section and in the City's 2020 UWMP, the City's groundwater supply, together with the other existing and planned future City water supplies, is sufficient to meet the water demands of the proposed project, in addition to the City's existing and planned future uses. See CHAPTER 7 for a detailed analysis of the sufficiency of the City's water supplies to meet the demands of the proposed project.

6.1.2 Surface Water

The City currently receives surface water from two sources: the San Joaquin River via a contract with the USBR and the CVP Friant Division, and the Kings River via an agreement with FID. Surface water is treated either at the Northeast Surface Water Treatment Facility (NESWTF), which was completed and activated in 2004, or the Southeast Surface Water Treatment Facility (SESWTF), which was completed in 2018. With the NESWTF (30 MGD-rated facility) and the SESWTF (54 MGD design with 80 MGD buildout capacity), the City provided greater than 50% of the City's potable water supply with surface water in 2019 and 2020.[21] The Kings River water year is October through September, while the USBR uses a water year of March through

[21] City of Fresno, "2020 Urban Water Management Plan," July 2021.

February. The City typically uses a calendar year for its analyses, so monthly water supply information was compiled in calendar year format for the City's 2020 UWMP.

6.1.2.1 USBR Agreement Surface Water

Through an agreement originally executed in January 1961, the City secured a surface water supply from the USBR CVP Friant Division. The agreement is for an annual water supply of 60,000 AF of Class 1 water, and was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. Class 1 water was intended to be a supply that would be dependable in practically every year, regardless of the type of hydrologic water year. Class 2 water is essentially excess water available as determined by the USBR and less reliable than Class 1 water. The USBR CVP Friant Division facilities generally include the Friant Dam (Millerton Reservoir), the Friant-Kern Canal, and the Madera Canal. The Friant-Kern Canal is maintained and operated by the Friant Water Authority. The USBR water supply is a wholesale supply. The agreement between the City and USBR is included in the City's 2020 UWMP as Appendix H.

Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement between the Department of the Interior and Commerce, the Natural Resources Defense Council, and the Friant Water Users Authority (which is now the Friant Water Authority, of which the City is a member of). The Settlement Agreement characterized Class 1 deliveries by six hydrologic year types based on a recurrence over an 82-year simulation (1922-2003): wet, normal-wet, normal-dry, dry, critical-high, and critical-low. The projected surface water available for the City from the USBR during each hydrologic year defined by the Settlement Agreement is included in Table 6.4. The average simulated delivery is 53,680 AFY and the median simulated delivery is 60,000 AFY, similar to normal year delivery. The dry and critical years of the simulation result in substantial reductions of deliveries, bringing down the average compared to the median allocation. Restrictions on exports from the Delta have also hindered the USBR from making deliveries to Exchange Contractors via the Delta-Mendota Canal. If the USBR is unable to deliver water to the Exchange Contractors, they have the right to receive their water from the San Joaquin River, which reduces the availability of Class 1 water. Table 6.5 shows the annual USBR deliveries received by the City since 2007.

Table 6.4 Available USBR Simulated Supplies, 1992-2003

Water Year Type	% of Years Over Simulated Period of Deliveries	Number of Years in that Year Type	Range of Allocation to City (AFY)	Average Allocation to City (AFY)
Wet	Highest 20%	16	60,000	60,000
Norma-Wet	50% to 80%	25	60,000	60,000
Normal-Dry	20% to 50%	25	47,500 to 60,000	57,060
Dry	5% to 20%	12	28,100 to 46,800	36,575
Critical	Lowest 5%	4	13,900 to 24,700	19,025
	Total	**82**	**Average**	**53,680**
			Median	**60,000**

Source: City of Fresno 2020 UWMP Table 6-2.

Table 6.5 USBR Deliveries to City

Calendar Year	Volume, AFY
2007	39,342
2008	59,450
2009	49,776
2010	60,864
2011	59,625
2012	24,492
2013	7,902
2014	12,954
2015	0
2016	47,678
2017	62,919
2018	58,220

Source: City of Fresno 2020 UWMP Figure 6-8.

6.1.2.2 FID Agreement Surface Water

FID receives an entitlement of water from the Kings River through the Kings River Water Association. In 1976, FID executed an agreement with the City that stipulated that as land is annexed in the City, the City will receive a pro rata share of FID's Kings River entitlement. The pro rata share is based on the area annexed to the City and within FID's boundaries, as compared to the total area of FID's water service area. The agreement required that the allocation is reviewed by both agencies each year to address new annexations by the City; as such, the allocation will increase as the City annexes new areas.

The agreement was revised, amended and restated in December 2016. The agreement is included in the City's 2020 UWMP as Appendix I. The agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly each year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID (roughly 200,000 acres per the City's 2020 UWMP).[22] As stated, the percentage of FID supply received by the City will increase as the City annexes new land into its service area. However, the 2016 agreement sets the maximum percentage at 29.0%, although the City's service area is expected to expand and encompass more than 29.0% of FID's service area between 2025 and 2030. In 2020, the City's percentage of overall FID Kings River deliveries was 25.79%. The City's supply projections from the FID are limited by the 29.0% restriction, but if the agreement is revised in the future, the City's allocation percentage could increase beyond 29.0% as the City's water service area expands.

The City has historically not used all of its available allocation in any given year, but pays a flat rate for its total allocation regardless. Any unused water is reallocated by FID to its other customers. The City's potential supply has been summarized in the City's 2020 UWMP using actual Kings River deliveries from 1964 to 2019, then categorized by the same water year types defined under the USBR agreement. The range and average FID deliveries by water year are shown in Table 6.6. Table 6.7 shows the projected allocation of FID supplies estimated assuming the City's water service area will grow from 59,100 to 84,300 acres by buildout, as shown in the City's 2020 UWMP[22] using the projected percentage of allocation multiplied by the estimated normal year diversion by FID of 453,800 AFY per Table 6.6.

[22] City of Fresno, "2020 Urban Water Management Plan," July 2021.

Table 6.6 FID Supplies by Water Year Type, 1964 to 2019

Water Year Type	% of Years	No. of Years Between 1964 and 2019	Total FID Deliveries (AF)		Example Average Available to City (AF)
			Range	Average	
Wet	Highest 20%	11	563,500 to 644,600	590,700	171,300
Normal-Wet	50% to 80%	17	452,800 to 563,300	213,700	149,000
Normal-Dry	20% to 50%	17	362,600 to 448,000	415,000	120,400
Dry	5% to 20%	8	253,700 to 362,000	315,700	91,600
Critical	Lowest 5%	3	158,100 to 253,300	210,200	61,000
Total		**56**	**Average**	**453,800**	**131,600**

Source: City of Fresno 2020 UWMP Table 6-3.

Table 6.7 Projected FID Allocation to City in Normal Years

Year	Projected Total FID Allocation, AFY	Projected Allocation to City, AFY
2025	27.55%	125,030
2030	29.00%	131,600
2035	29.00%	131,600
2040	29.00%	131,600
2045	29.00%	131,600

Source: City of Fresno 2020 UWMP Table 6-4.

6.1.3 Recycled Water

The City is currently expanding its recycled water supplies to increase offset of potable water use for landscape irrigation and other beneficial uses. In 2010, the City completed a Recycled Water Master Plan (adopted in 2013) to evaluate and plan for increased recycled water use in the City. Additionally, a recycled water engineering report was prepared for the City by Blair Church & Flynn to further explore the recycled water system in 2015.[23] The City's last Metro Plan also included proposed projects and improvements to increase the use of recycled water.[24] The City is currently updating the Metro Plan and will reevaluate recommendations and projects to increase recycled water use. The City owns and operates two water reclamation facilities – the Fresno-Clovis RWRF and the NFWRF.

Since the adoption of the City's Recycled Water Master Plan in 2010, a number of recycled water facilities have been constructed and are currently in service throughout the Fresno area. Segments of the recycled water distribution system outlined in the Recycled Water Master Plan have been designed and constructed over the last several years mainly within the Southwest Quadrant of the distribution system, as well as some small portions of the Northeast and Northwest systems. Pipeline sizes range up to 54 inches in diameter, with several users actively utilizing recycled water for irrigation. These existing facilities represent a portion of the future recycled water system. Per the City's 2020 UWMP, the recycled water distribution system mainly consists of the southwest recycled water system, which includes a 3.2 million-gallon recycled water reservoir located at the Fresno-Clovis RWRF, a 6,000 gpm (8.64 MGD) recycled water

[23] City of Fresno, "Engineering Report for the Production, Distribution and Use of Recycled Water," September 2015.
[24] City of Fresno, "Metropolitan Water Resources Management Plan Update Phase 1 Baseline System Characterization," December 2007, and "Phase 2 Development and Evaluation of Future Water Supply Plan," January 2011.

pump station located at the Fresno-Clovis RWRF, a 640-gpm booster pump station located at Roeding Park (Roeding Park Booster), and approximately 15.7 miles of recycled water distribution pipelines ranging in size from 10-inches to 54-inches in diamater.[25]

6.1.3.1 Fresno-Clovis RWRF

In partnership with the City of Clovis, the City of Fresno owns and operates the Fresno-Clovis RWRF located near the intersection of Jensen and Cornelia Avenues in southwest Fresno. The RWRF receives and treats the majority of domestic, commercial, and industrial wastewater generated within the Cities of Fresno and Clovis, as well was some unincorporated areas of Fresno County. The RWRF is currently operated by the City, who holds responsibility for ensuring regulatory compliance with Waste Discharge Requirements (WDRs), and the Central Valley RWQCB (Regional Water Quality Control Board) Order No. 5-01-254, "Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County." Developed under a Joint Powers Authority agreement with the City of Fresno, City of Clovis, and County of Fresno, the RWRF has a rated annual monthly average daily discharge flow of 80 MGD and an maximum monthly average daily discharge flow of 88 MGD,[26] but the average annual flow is approximately 68 MGD[27]. The RWRF produces undisinfected secondary-treated wastewater and disinfected tertiary-treated wastewater. The undisinfected secondary-treated wastewater is disposed into on-site disposal ponds and conveyed to farmers for restricted irrigation of non-food crops on agricultural land on surrounding properties. The disinfected tertiary-treated wastewater is delivered through the City's recycled water distribution system to various recycled water use areas around the City, mainly for irrigation of landscaping at sites including but not limited to parks, median landscape strips, and cemeteries. The RWRF also owns and operates a number of reclamation wells that extract water from on-site percolation ponds, and discharges that water into FID canals for irrigation use of farmland downstream of the RWRF.

Flows received at the Fresno-Clovis RWRF peaked in 2006 at 81,000 AFY and have been decreasing steadily since then, with influent flows averaging about 63,000 AFY over the past 5 years. The RWRF includes preliminary, primary, secondary, and tertiary treatment units with disinfection. Secondary treatment has an annual capacity of 87 MGD, and in 2017 a 5-MGD tertiary treatment system (Tertiary Treatment and Disinfection Facility – TTDF) was completed; this TTDF can be expanded to 15 MGD with an ultimate capacity of 30 MGD. The City has three primary means of effluent disposal – undisinfected secondary effluent to onsite and offsite farmland for restricted irrigation, undisinfected secondary effluent to percolation ponds, and disinfected tertiary effluent to the recycled water distribution system. The percolated effluent has been deemed equivalent to Title 22 tertiary treated water by the State Water Resources Control Board Division of Drinking Water (DDW), and the City has been extracting this water for reuse in areas within and surrounding the RWRF and to FID canals through an exchange agreement with FID for delivery of the water to their agricultural customers.

6.1.3.2 North Fresno WRF (NFWRF)

The City owns and operates the NFWRF located in northeast Fresno on the north side of Copper Avenue between Cedar and Maple Avenues. This facility receives and treats wastewater generated within a small area of the City generally bound by Copper, Friant, and Willow Avenues, including wastewater generated from Copper River Ranch. The NFWRF is a tertiary level

[25] City of Fresno, "2020 Urban Water Management Plan," July 2021.
[26] City of Fresno, "Engineering Report for the Production, Distribution and Use of Recycled Water," prepared by Blair, Church & Flynn. September 18, 2015.
[27] City of Fresno, Department of Public Utilities, "Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF)." https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-2.

treatment facility, and the treated wastewater is mainly used for irrigation of the Copper River Country Club and Golf Course. The NFWRF, completed in 2008, was constructed as part of a residential, commercial, and golf course master planned development located in the northern portion of the City.

The facility is presently rated at 0.71 MGD average monthly flow and 1.07 MGD maximum daily flow of tertiary treated disinfected effluent.[28] However, the DDW only approved the UV disinfection system for 300 gpm (0.43 MGD), which is the current flow limit until the DDW approves a higher flow. The NFWRF is expandable to 1.25 MGD average monthly flow. The disinfected tertiary effluent is mainly used for irrigation of the Copper River Ranch Golf Course. In 2020, 54 AF of a total of 325 AF of recycled water was used for irrigation of turf; any remaining recycled water is diverted to the City's collection system to be conveyed to the Fresno-Clovis RWRF.

6.1.3.3 Historic and Projected Recycled Water Use

The City's Metro Plan recommended expanding reuse by using the NFWRF to irrigate the Copper River Ranch Golf Course and up to 25,000 AFY of recycled water for landscape irrigation or other non-potable uses from the Fresno-Clovis RWRF or other new satellite WRFs. Since then, the City has irrigated the Copper River Ranch Golf Course with recycled water and constructed much of the southwest portion of the recycled water distribution system. However, the City is currently updating the Metro Plan and reevaluating the target volume of reuse in the City beyond the southwest system considering new conditions and regulations, including the potential for potable reuse in the future. Table 6.8 shows historical recycled water use within the City's service area from 2015 to 2020. It should be noted that in 2017 and 2018, the NFWRF was offline for repairs and produced no recycled water; per the City's 2020 UWMP, 2016 is representative of operations going forward.[29]

Table 6.8 Historic Recycled Water Use in Service Area, 2015-2020

Recycled Water Facility	Level of Treatment	Quantity (AFY)					
		2015	2016	2017	2018	2019	2020
Fresno-Clovis RWRF	Secondary Effluent (Non-Food Crop Irrigation)	8,688	7,329	4,540	7,031	3,652	2,845
	Tertiary Effluent	531	485	423	867	912	858
NFWRF	Tertiary Effluent	62	110	0	0	19	54
Total		**9,281**	**7,924**	**4,963**	**7,898**	**4,583**	**4,757**

Source: City of Fresno 2020 UWMP Table 6-5.

Table 6.9 shows the current and projected recycled water use in the City's service area. It is expected that secondary undisinfected recycled water will continue to be used to irrigate non-food crops. As such, for the projections included in the City's 2020 UWMP, recycled water for agricultural irrigation does not offset the City's potable water demands and is excluded from the table.

[28] City of Fresno, Department of Public Utilities, "North Fresno Wastewater Treatment Facility (NFWTF)." https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-3.

[29] City of Fresno, "2020 Urban Water Management Plan," July 2021.

Table 6.9 Existing and Projected Recycled Water Use in City Service Area

Recycled Water Use Type	Amount of Potential Uses of Recycled Water (AFY)	Level of Treatment	Quantity, AFY					
			2020	2025	2030	2035	2040	2045
Landscape Irrigation	5,800	Tertiary	858	5,800	5,800	5,800	5,800	5,800
Golf Course Irrigation	110	Tertiary	54	110	110	110	110	110
Total			**4,757**	**14,220**	**14,220**	**14,220**	**14,220**	**14,220**

Source: City of Fresno 2020 UWMP Table 6-6.

6.2 Future Water Supplies

The inclusion of planned water supplies in this WSA is allowed by the Water Code:

Water Code Section 10631

(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).

The City has a number of capital improvement projects planned to maintain and upgrade the existing water supply and distribution systems. The City's ongoing and future projects to improve its water supply portfolio include the expansion of the recycled water distribution system, the expansion of the groundwater recharge program, the expansion of surface water treatment capacity, and beneficial transfers and exchanges. The City is also updating its Metro Plan, which will recommend programs and projects to improve the City's water supply portfolio.

6.2.1 Expansion of Recycled Water Distribution System

The City has made significant progress in developing its recycled water distribution system, completing additional sections of the Southwest quadrant of the distribution system in the last few years. The completed distribution system will allow an additional 5,000 AF of recycled water use in the City to offset potable water demands that can be used in all hydrological year types. The expansion is projected to be completed by 2025.[30]

Additionally, the City plans to blend the extracted recycled water from the Fresno-Clovis RWRF with disinfected tertiary treated recycled water to feed the southwest recycled water distribution system. As new sales grow for recycled water, additional recycled extraction well water will be utilized to feed the City's recycled water system.

6.2.2 Expansion of Groundwater Recharge Program

The City is currently evaluating an expanded recharge program as part of the Metro Plan update. Expanding intentional groundwater recharge may include the development of new dedicated intentional recharge facilities and/or joint projects for basins with FMFCD and FID. The goal for recharge expansion is to maximize the storage within the groundwater basin and optimize use of available surface water supplies in normal years. The stored water will be used more in the single-

[30] City of Fresno, "2020 Urban Water Management Plan," July 2021.

dry and multiple dry years when surface water supplies are less available. The timing for groundwater recharge expansion will be examined in the Metro Plan update, and is assumed to increase to allow for an additional 540 AFY of recharge to occur on average each year.[30]

6.2.3 Expansion of Surface Water Treatment Capacity

A major component of the City's ability to reverse the long-time overreliance on groundwater is the construction of its surface water treatment facilities. The NESWTF has been upgraded from 30 MGD to 60 MGD, and the SESWTF has been constructed and is producing 54 MGD with an ultimate capacity of 80 MGD, per the City's 2020 UWMP.[31] The timing for SWTF expansion will be examined in the Metro Plan update and determined based on need as the City grows and demands increase.

6.2.4 Beneficial Transfers and Exchanges

The City is evaluating future beneficial transfers and exchanges of the City's USBR water in normal years when available water supplies exceed demands. The Central Valley Project Improvement Act (CVPIA) of 1992 authorized the transfer of all or a portion of a CVP contractor's water supply to any other California water users or water agencies. The CVPIA allows transfers of water as long as they are consistent with federal and state water laws. As part of the Metro Plan update, the City will evaluate potential future water transfers and exchanges of its periodically available USBR water.

The City is also evaluating the agreement with the FID for the exchange of recycled water and surface water. Since 1974, the City has maintained an agreement with FID to exchange recycled water for the delivery of surface water. The agreement specifically allows the exchange of the extracted recycled water from beneath the Fresno-Clovis RWRF (undisinfected secondary treated water that is stored on site and allowed to percolate into the groundwater basin that is later pumped via groundwater extraction wells) to be conveyed to FID's Dry Creek and Houghton Canals for delivery to FID customers west of the City. In exchange, FID agreed to deliver 46% of the total from either its Kings River entitlement of USBR Class 2 supply to growers or basins in the eastern portion of FID "insofar as feasible and practical." The water is considered to be in addition to the water that would have been delivered to the eastern portion of FID such that the additional delivered water used by growers is assumed to offset groundwater pumping in the area and provide a benefit to the groundwater basin. The agreement includes a minimum of 100,000 AF delivered over a 10-year period and no more than 30,000 AF in any given year. The City has maintained more than 100,000 AF of deliveries over a 10-year period since 2000. However, since 2016, the City has reduced the amount of recycled water groundwater exchange deliveries. The City is currently discussing an update to the FID agreement, and the Metro Plan update will identify and recommend other beneficial uses for the City's percolated recycled water effluent.

6.3 Summary of Existing and Additional Planned Future Water Supplies

Table 6.10 provides a summary of the City's 2020 actual water supply deliveries included in this WSA and projected future available water supplies. A discussion of the future anticipated availability of these existing and planned water supplies during dry years is included in the following section.

[31] City of Fresno, "2020 Urban Water Management Plan," July 2021.

Table 6.10 Existing and Projected Water Supplies in City Service Area

Water Source	Reasonably Available Volume, AFY					
	2020	2025	2030	2035	2040	2045
Groundwater	55,028	138,090	143,630	149,100	154,490	159,820
Surface Water, USBR CVP	37,447	60,000	60,000	60,000	60,000	60,000
Surface Water, FID	71,292	125,030	131,600	131,600	131,600	131,600
Total Potable Water Supply	**163,767**	**323,120**	**335,230**	**340,700**	**346,090**	**351,420**
Recycled Water, RWRF	858	5,800	5,800	5,800	5,800	5,800
Recycled Water, NFWRF	54	110	110	110	110	110
Total Recycled Water Supply	**912**	**5,910**	**5,910**	**5,910**	**5,910**	**5,910**
Total Water Supply	**164,679**	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**

Source: City of Fresno 2020 UWMP Table 6-7 for 2020 existing data and Table 6-8 for projected data.

6.4 Water Supply Availability and Reliability

Water Code Section 10910 requires that a WSA includes a discussion with regard to whether the projected water supplies will be sufficient to supply the Proposed Project as well as existing and planned uses.

Water Code Section 10910

> *(c) (4) If the city or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

In response to the historical drought conditions experienced by California and the Central Valley, this WSA includes a discussion of the availability and reliability of the City's available water supplies to meet the City's water demands in the event of emergency water supply conditions that may limit the City's surface water supplies.

6.4.1 Water Supply Management

The City currently balances its surface water and groundwater supplies based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes. The minimum operation conditions typically occur during the winter months when demand is historically low, and the City can increase surface water production during peak demand months when surface water is available. The City intends to rely more heavily on surface water supplies and recharge groundwater with raw surface water during normal and wet years to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will increase groundwater production to meet water demands. The City is expected to maintain this management strategy in the future. Current management actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

6.4.2 Normal, Single Dry, and Multiple Dry Years

The reliability of each of the City's existing and planned water supplies and their projected availability during normal, single dry, and multiple dry years is described in Chapter 7 of the City's 2020 UWMP, and is included below. Table 6.11 includes a summary of the projected water supplies during the aforementioned hydrological years. Normal-water, single-dry-water-year, and five-consecutive-year-drought-period supply projections were made in the City's 2020 UWMP based on historic water allocations for surface water supplies, historic municipal water well pumping for groundwater, and projected utilization for recycled water.[32]

Per the City's 2020 UWMP, the City expects to meet the system water demand regardless of regional hydrology. However, each water source is likely to encompass some degree of constraints associated with it during dry years.

6.4.2.1 Constraints on Groundwater

Prior to the utilization of surface water, groundwater was the primary water supply for the City's water demands. During that time, groundwater levels were declining steadily over time, presenting a potential constraint to groundwater reliability during dry years. However, with the use of surface water, groundwater reliance has decreased, and groundwater levels have either slowed significantly in their decline or increased as a result. Groundwater levels are expected to continue to increase as the City continues to pump less groundwater. Historically, the groundwater supply has declined, requiring new wells to be deeper and existing well pumps to be lowered. A constraint to lowering existing well pumps is the limited depth of numerous existing wells. Another constraint to the use of groundwater is the negative impacts from contamination. To ensure the continued beneficial use of the groundwater supply, the City has set minimum pumping requirements for specific wells to prevent the spread of existing groundwater contaminant plumes to other areas in the City and to protect the groundwater basin. The City will continue to pursue responsible parties so the proper remediation is conducted to preserve the groundwater system as a viable and sustainable resource in perpetuity. Given these constraints, groundwater supply during normal and dry years was still assumed to be constant, per the City's 2020 UWMP and as shown in Table 6.11.

6.4.2.2 Surface Water – USBR

The amount of water supplied from the San Joaquin River via the agreement with the USBR is based on and therefore constrained by flows downstream of Millerton Dam for varying hydrologic conditions, and restrictions on water diversions from the Delta. The restrictions on water diversions have resulted in years in which CVP Friant Division Contractors, including the City, received zero allocations. The water supply is also restricted by regular maintenance of infrastructure, which can result in the termination of water supply. Every three years, the Friant-Kern Canal is taken down for maintenance, causing disruptions to the water supply.[32] However, the City has constructed a 4.6-mile long raw water pipeline to convey USBR water from the Friant-Kern Canal to the NESWTF, known as the Friant-Kern Canal Pipeline. This has improved the reliability and quality of water deliveries to the NESWTF, and has allowed direct delivery of USBR water to allow year-around operation of the NESWTF.

[32] City of Fresno, "2020 Urban Water Management Plan," July 2021.

6.4.2.3 Surface Water – FID

Water supplied from the Kings River via the City's agreement with FID is most susceptible to annual hydrologic conditions. Annual precipitation, Sierra Nevada mountain snowpack, and natural river flow conditions will effect and potentially constrain the City's allocation from this surface water source. Another factor that may constrain the availability of the surface water supply from the Kings River is scheduled maintenance of FID's canal network and infrastructure. FID typically terminates water deliveries to the City's SWTFs in November and/or December so that necessary infrastructure repairs and maintenance can be performed.[32] However, the City has constructed a 13-mile 72-inch raw water pipeline to deliver Kings River water directly to the SESWTF to allow for year-around operations and prevent shutdowns due to FID maintenance. Deliveries to intentional recharge facilities will continue to be supplied through the FID canal system.

6.4.2.4 Recycled Water

The largest constraint to the recycled water supply is the lack of infrastructure to distribute the water to end users. The City has recently increased recycled water production capabilities and constructed much of the southwest recycled water system. The City plans to expand its recycled water delivery system, which will improve availability of recycled water throughout the City. The supply of recycled water is expected to be unaffected by single or multiple dry years, however the supply of wastewater used to produce recycled water may decrease if voluntary or mandatory water conservation measures are enacted.

Table 6.11 Projected Normal, Single Dry, and Multiple Dry Year Water Supply

Water Year Type	Quantity (AFY)				
	2025	2030	2035	2040	2045
Normal Year	329,030	341,140	346,610	352,000	357,330
Single Dry Year	189,852	195,392	200,862	206,252	211,582
Multiple Dry Year 1	273,725	279,265	284,735	290,125	295,455
Multiple Dry Year 2	274,626	280,166	285,636	291,026	296,356
Multiple Dry Year 3	217,568	223,108	228,578	233,968	239,298
Multiple Dry Year 4	189,852	195,392	200,862	206,252	211,582
Multiple Dry Year 5	314,840	320,380	325,850	331,240	336,570

Source: City of Fresno 2020 UWMP Table 7-1 for Normal Year Data, Table 7-2 for Single Dry Year Data, and Table 7-3 for Multiple Dry Year Data.

6.4.3 Emergency Water Supply Conditions

The City's 2020 UWMP includes a Water Shortage Contingency Plan (WSCP), a detailed plan for how the City intends to respond to expected and unexpected water shortages. Water shortages occur when the water supply is reduced to a level that cannot support typical demand at any given time. Shortages may occur during events such as regional power outages, earthquakes or other natural disasters, and during drought conditions. The City's WSCP includes an analysis of existing and projected water supplies and demands, a water conservation and rationing plan with mandatory prohibitions and penalties, and an analysis of projected revenues and expenditures. The WSCP outlines five stages of action to be taken in response to water supply shortages. The City also has a Water Quality Emergency Notification Plan in place to coordinate the City's response in the event of a catastrophic water supply interruption.

Water supply conditions will determine how the City progresses through the stages of the WSCP. Factors that can affect the water supply conditions include decreases in surface water supplies,

reductions in infrastructure capacity related to water treatment plants or pipelines, a decrease in groundwater levels, or climate or state political conditions that would impact the allotment of water supply. The WSCP also includes significant water consumption reduction measures that subject all water users with mandatory prohibitions and penalties for excessive water use or violation of conservation/reduction ordinances. Water use reduction measures in the WSCP vary depending on the stage of the water shortage. These measures include, but are not limited to: decreasing line flushing, limiting landscape irrigation to specific times or prohibiting landscape irrigation all together, prohibiting the use of potable water for construction and dust control, prohibiting vehicle washing except at facilities using recycled or recirculated water, requiring covers for all pools or spas, prohibiting the use of potable water for sewer system maintenance or fire protection training without prior approval by the City Manager, and limiting or banning new water service connections within the service area (Appendix J of City's 2020 UWMP).[33]

If an emergency were to occur that requires the City to enact its WSCP, all of the City's customers, including those within the Proposed Project Area, would be subject to the same WSCP water conservation measures and restrictions.

[33] City of Fresno, "2020 Urban Water Management Plan," July 2021.

CHAPTER 7
DETERMINATION OF WATER SUPPLY SUFFICIENCY

SB 610 requires a WSA to answer a central question: Is the projected water supply sufficient for the proposed project? Specifically, the water code requires the following:

Water Code Section 10910

> *(c) (4) If the city or county is required to comply with this part pursuant to subdivision (b), the water assessment for the project shall include a discussion with regard to whether the total projected water supplies, determined to be available by the city or county for the project during normal, single dry, and multiple dry water years during a 20-year projection, will meet the projected water demand associated with the proposed project, in addition to existing and planned future uses, including agricultural and manufacturing uses.*

Pursuant to Water Code Section 10910(c)(4) and based on the technical analyses described in this WSA, the total projected water supplies for the Proposed Project during normal, single dry, and multiple dry water years during a 20-year projection will meet the projected water demand associated with the Proposed Project in addition to existing and planned future uses. Table 7.1 summarizes the projected availability of the City's existing and planned future potable water supplies and demands in normal, single dry, and multiple dry years through 2045. As shown, demand within the City's service area is not expected to exceed the City's supplies in any normal, single dry, or multiple dry year between 2020 and 2045. As shown in Section 3.4 of this WSA, the projected increase in water demand for the proposed project is 0.33 MGD, or approximately 370 AFY. Table 7.2 shows the projected water demands from Table 7.1 with the inclusion of the increase associated with the Proposed Plan. As shown, the increase in water demand due to the Proposed Project will not exceed the projected available water supplies for the normal, single dry, and multiple dry years.

Table 7.1 City of Fresno Projected Water Supply Versus Water Demand During Normal, Single Dry, and Multiple Dry Water Years, AFY

Water Supply/Demand Property		2025	2030	2035	2040	2045
Normal Year						
Available Water Supply, AFY		329,030	341,140	346,610	352,000	357,330
Total Water Demand, AFY		199,204	212,756	222,310	231,876	241,447
Difference, AFY		129,826	128,384	124,300	120,124	115,883
Amount Short of Demand		N/A	N/A	N/A	N/A	N/A
Single Dry Year						
Available Water Supply, AFY		189,852	195,392	200,862	206,252	211,582
Total Water Demand, AFY		164,092	176,132	184,174	192,228	200,287
Difference, AFY		25,760	19,260	16,688	14,024	11,295
Amount Short of Demand		N/A	N/A	N/A	N/A	N/A
Multiple Dry Years						
Multiple Dry Year 1	Available Water Supply, AFY	273,725	279,265	284,735	290,125	295,455
	Total Water Demand, AFY	199,204	212,756	222,310	231,876	241,447
	Difference, AFY	74,521	66,509	62,425	58,249	54,008
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Year 2	Available Water Supply, AFY	274,626	280,166	285,636	291,026	296,356
	Total Water Demand, AFY	199,204	212,756	222,310	231,876	241,447
	Difference, AFY	75,422	67,410	63,326	59,150	54,909
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A

Water Supply/Demand Property		2025	2030	2035	2040	2045
Multiple Dry Year 3	Available Water Supply, AFY	217,568	223,108	228,578	233,968	239,298
	Total Water Demand, AFY	190,267	193,637	197,736	201,753	205,708
	Difference, AFY	27,301	29,471	30,842	32,215	33,589
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Year 4	Available Water Supply, AFY	189,852	195,392	200,862	206,252	211,582
	Total Water Demand, AFY	162,551	165,920	170,020	174,036	177,992
	Difference, AFY	27,301	29,471	30,842	32,215	33589
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A
Multiple Dry Year 5	Available Water Supply, AFY	314,840	320,380	325,850	331,240	336,570
	Total Water Demand, AFY	199,204	212,756	222,310	231,876	241,447
	Difference, AFY	115,636	107,624	103,540	99,364	95,123
	Amount Short of Demand	N/A	N/A	N/A	N/A	N/A

Source: City of Fresno 2020 UWMP Table 7-1 for Normal Year Data, Table 7-2 for Single Dry Year Data, and Table 7-3 for Multiple Dry Year Data.

Table 7.2 City of Fresno Projected Water Supply Versus Water Demand During Normal, Single Dry, and Multiple Dry Water Years with Project, AFY

Water Supply/Demand Property		2045
Normal Year		
Available Water Supply, AFY		357,330
Total Water Demand, AFY		241,447
Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY		+370
Total Water Demand (with Project), AFY		241,817
Difference, AFY		115,513
Amount Short of Demand		N/A
Single Dry Year		
Available Water Supply, AFY		211,582
Total Water Demand, AFY		200,287
Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY		+370
Total Water Demand (with Project), AFY		200,657
Difference, AFY		10,925
Amount Short of Demand		N/A
Multiple Dry Year		
Multiple Dry Year 1	Available Water Supply, AFY	295,455
	Total Water Demand, AFY	241,447
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	241,817
	Difference, AFY	53,638
	Amount Short of Demand	N/A

Water Supply/Demand Property		2045
Multiple Dry Year 2	Available Water Supply, AFY	296,356
	Total Water Demand, AFY	241,447
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	241,817
	Difference, AFY	54,539
	Amount Short of Demand	N/A
Multiple Dry Year 3	Available Water Supply, AFY	239,298
	Total Water Demand, AFY	205,708
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	206,078
	Difference, AFY	33,220
	Amount Short of Demand	N/A
Multiple Dry Year 4	Available Water Supply, AFY	211,582
	Total Water Demand, AFY	177,992
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	178,362
	Difference, AFY	33,220
	Amount Short of Demand	N/A
Multiple Dry Year 5	Available Water Supply, AFY	336,570
	Total Water Demand, AFY	241,447
	Change in SEDA Water Demand under Specific Plan (Proposed Project), AFY	+370
	Total Water Demand (with Project), AFY	241,817
	Difference, AFY	94,753
	Amount Short of Demand	N/A

Source: City of Fresno 2020 UWMP Table 7-1 for Normal Year Data, Table 7-2 for Single Dry Year Data, and Table 7-3 for Multiple Dry Year Data.

CHAPTER 8
WSA APPROVAL PROCESS

The approval process for a WSA is explained in the Water Code as follows:

Water Code Section 10910

> *(g) (1) Subject to paragraph (2), the governing body of each public water system shall submit the assessment to the city or county not later than 90 days from the date on which the request was received. The governing body of each public water system, or the city or county if either is required to comply with this act pursuant to subdivision (b), shall approve the assessment prepared pursuant to this section at a regular or special meeting.*

Water Code Section 10911

> *(b) The city or county shall include the water supply assessment provided pursuant to Section 10910, and any information provided pursuant to subdivision (a), in any environmental document prepared fir the project pursuant to Division 13 (commencing with Section 21000) of the Public Resources Code.*

The Fresno City Council must approve this WSA at a regular or special meeting. Furthermore, the City must include this WSA in the Draft PEIR that is being prepared for the Proposed Project.

In addition, SB 221 applies to residential subdivisions of over 500 dwelling units and requires that the water supplier provide written verification that the water supply for the project is sufficient prior to the issuance of the final permits. Because the Proposed Project includes up to 45,274 residential dwelling units, it is subject to the requirements of SB 221 (Government Code Section 66473.7).

CHAPTER 9
REFERENCES

- Akel Engineering Group, Inc., *Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update*, October 2020.
- California Department of Water Resources, *California's Groundwater Update 2020 Bulletin 118*, November 2021.
- California Department of Water Resources, *Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001 to Assist Water Suppliers, Cities, and Counties with Integrating Water and Land Use Planning*. October 8, 2003.
- California Department of Water Resources, SGMA Portal, *GSP Status Summary*, accessed May 2023. https://sgma.water.ca.gov/portal/gsp/status.
- California Irrigation Management Information System (CIMIS), California Department of Water Resources, *CIMIS Station Reports, Station 80 Fresno State (1988 to 2023), Monthly Average ETO Report and Monthly Report, October 1988 – April 2023*, accessed and downloaded May 2023. https://cimis.water.ca.gov/WSNReportCriteria.aspx.
- City of Fresno, Department of Public Utilities, *Wastewater Facilities and Infrastructure – North Fresno Water Reclamation Facility*, accessed May 2023. https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-3.
- City of Fresno, Department of Public Utilities, *Wastewater Facilities and Infrastructure – Regional Wastewater Reclamation Facility*, accessed May 2023. https://www.fresno.gov/publicutilities/sewer-wastewater/wastewater-facilities-infrastructure/#tab-2.
- City of Fresno, Department of Public Utilities, *Water Sources*, accessed May 2023. https://www.fresno.gov/publicutilities/water-quality-operations-testing/water-source-distribution/.
- Dyett & Bhatia Urban and Regional Planners, *Fresno General Plan*, prepared for the City of Fresno, December 2014.
- First Carbon Solutions, *Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan*, prepared for the City of Fresno, February 2022.
- State Water Resources Control Board, Water Conservation Portal Eater Conservation Emergency Regulations, Resolution No. 2022-0018, *To Adopt an Emergency Regulation to Reduce Water Demand and Improve Water Conservation*, June 2022, accessed May 2023. https://www.waterboards.ca.gov/water_issues/programs/conservation_portal/regs/emergency_regulation.html.
- United States Census Bureau, *QuickFacts, Fresno City, California*, accessed May 2023. https://www.census.gov/quickfacts/fact/dashboard/fresnocitycalifornia/PST045222.

- Water Systems Consulting, Inc., *City of Fresno 2020 Urban Water Management Plan*, prepared for the City of Fresno, July 2021.
- West Yost Associates, *City of Fresno Metropolitan Water Resources Management Plan Update Phase 1 Baseline System Characterization*, prepared for the City of Fresno, December 2007.
- West Yost Associates, *City of Fresno Metropolitan Water Resources Management Plan Update Phase 2 Development and Evaluation of Future Water Supply Plan*, prepared for the City of Fresno, January 2011.
- West Yost Associates, *Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report*, prepared for the City of Fresno, January 2013.

APPENDIX A

Proposed Project (SEDA Specific Plan) Water Demand Supporting Calculation

GP Land Use Classification	Abbrv.	GP Area (ac)	SP Equivalent Land Use Classification	Abbrv.	Water Demand Factor (GPD/ac)	SP Area (ac)	SP Base Water (MGD)
Residential - Low Density	RL	1,700.92	Residential - Rural Residential	RR	2,050	2,037.69	4.18
Residential - Medium Density	RM	1,473.32	Residential - Neighborhood Residential	NR	2,810	1,434.91	4.03
Residential - Urban Neighborhood	RUN	891.47	Residential - Mixed Residential	MR	5,140	1,026.26	5.27
Employment - Office	O	144.37	Employment - Office Center	OC	2,440	154.47	0.38
Employment - Business Park	BP	12.78	Employment - Flexible Research and Development	F	2,420	16.54	0.04
Employment - Regional Business Park	RBP	1,219.71	Employment - Flexible Research and Development	F	1,685	1,287.53	2.17
Mixed Use -Corridor/Center Mixed Use	CMX	315.41	Mixed Used - Community Center	CC	1,930	273.88	0.53
Mixed Use - Regional Mixed Use	RMX	209.77	Mixed Use - Regional Center	RC	2,106	291.71	0.61
Open Space - Open Space	OS	569.53	N/A	N/A	865	0	0.00
Open Space - Community Park	CP	47.46	N/A	N/A	2,620	0	0.00
Open Space - Ponding Basin	PB	263.32	Other - Flood Control Basin	POF	0	265.78	0.00
Public Facilities - College	C	116.26	Employment - Institutional	I	1,665	116.26	0.19
Public Facilities - School with Park	P	149.77	Employment - Institutional	I	2,895	149.77	0.43
Public Facilities - School with Park	P	413.45	Mixed Use - Neighborhood Center	NC	1,851	491.38	0.91

APPENDIX B

City of Fresno Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update (Prepared by Akel Engineering, Inc.)

CITY OF FRESNO

Water and Wastewater Unit Factor Update

FOR

Metropolitan Water Resources Management Plan Update

PRELIMINARY

October 2020

AKEL
ENGINEERING GROUP, INC.

City of Fresno

Water and Wastewater Unit Factor Update

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Table 2 Sewer Flow Factors by Land Use Classification

Table 1 Water Demand Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update

City of Fresno

PRELIMINARY

(Revised October 2020)

Land Use Classifications		Water Service Area[1,2,3] (acres)	2018 Water Demands[4] (mgd)	Recommended Water Demand Factors[5] (gpd/acre)	(ac-ft/yr/acre)
Residential					
1	Rural Density	746	0.85	1,415	1.59
2	Low Density	1,283	2.12	2,050	2.30
3	Medium Low Density	10,139	23.18	2,845	3.19
4	Medium Density	11,033	24.91	2,810	3.15
5	Medium High Density	1,953	6.94	4,425	4.96
6	High Density	1,314	6.19	5,855	6.56
	Subtotal - Residential	**26,467**	**64.18**		
Commercial					
7	Community	558	1.04	2,330	2.61
8	General Heavy	1,124	2.11	2,340	2.62
9	Neighborhood	530	1.08	2,525	2.83
10	Neighborhood Limited	0	0.00	-	-
11	Office	932	1.83	2,440	2.73
12	Professional Services Office	89	0.17	2,420	2.71
13	Regional	294	0.40	1,685	1.89
14	Recreational	109	0.23	2,575	2.88
15	Storage	273	0.07	335	0.38
	Subtotal - Commercial	**3,909**	**6.93**		
Public Facilities					
16	Airport	1,147	0.12	130	0.15
17	College	304	0.41	1,665	1.87
18	High School	505	0.60	1,485	1.66
19	Elementary and High School	141	0.21	1,825	2.04
20	Middle School	305	0.43	1,765	1.98
21	Elementary and Middle School	191	0.30	1,930	2.16
22	Elementary School	792	1.53	2,405	2.69
23	Special School	52	0.05	1,110	1.24
24	SEGA School with Park	6	0.01	2,895	3.24
25	Cemetery	159	0.10	810	0.91
26	Church	662	0.81	1,525	1.71
27	Community Activity Center	11	0.02	1,930	2.16
28	Neighborhood Center	10	0.01	795	0.89
29	Convention Center	17	0.03	1,955	2.19
30	Fairgrounds	90	0.09	1,290	1.45
31	Fire Station	15	0.02	1,855	2.08
32	Government Offices	162	0.26	1,985	2.22
33	Court House Central Area	19	0.15	9,590	10.74
34	Hospital	189	0.76	5,005	5.61
35	Medical Center	20	0.02	1,385	1.55
36	Convalescent Hospital	119	0.39	4,080	4.57
37	Military	55	0.01	170	0.19
38	Mobile Home Park	274	0.49	2,225	2.49
39	Municipal Service Center	37	0.07	2,200	2.46
40	Post Office	30	0.02	750	0.84
41	Public Facility	7	0.01	1,010	1.13
42	Public/Quasi-Public Facility	46	0.10	2,670	2.99
43	Fresno County Jail	3	0.19	80,765	90.47

Table 1 Water Demand Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update

City of Fresno

PRELIMINARY

(Revised October 2020)

Land Use Classifications		Water Service Area[1,2,3] (acres)	2018 Water Demands[4] (mgd)	Recommended Water Demand Factors[5] (gpd/acre)	(ac-ft/yr/acre)
44	Pump Station	9	0.01	805	0.90
	Subtotal - Public Facility	**5,376**	**7.19**		
Industrial					
45	Light Industrial	2,301	3.42	1,850	2.07
46	Heavy Industrial	1,905	5.91	3,860	4.32
	Subtotal - Industrial	**4,206**	**9.34**		
Open Space					
47	Open Space	177	0.12	865	0.97
48	Recreational Use/Clear Zone	15	0.00	-	-
49	Ag	1,531	0.00	-	-
50	Canal	20	0.00	-	-
51	Community Park	24	0.05	2,620	2.93
52	Golf Course	662	0.23	435	0.49
53	Lake or Pond	54	0.00	-	-
54	Multi-Use	0	0.00	-	-
55	Neighborhood Park	218	0.62	3,510	3.93
56	Recreational Park	97	0.15	1,980	2.22
57	Recreational Use	17	0.02	1,235	1.38
58	Regional Park	436	0.18	525	0.59
59	Recreational Commercial	0	0.00	-	-
60	Environmental Education Area	0	0.00	-	-
61	Gravel Mining	0	0.00	-	-
62	Parking	48	0.00	-	-
63	PGE Sub Station	102	0.00	-	-
64	Ponding Basin	236	0.00	-	-
65	Ponding Basin/Park	128	0.16	1,535	1.72
	Subtotal - Open Space	**3,764**	**1.53**		
Total					
	Subtotal - Residential	**26,467**	**64.18**		
	Subtotal - Commercial	**3,909**	**6.93**		
	Subtotal - Public Facility	**5,376**	**7.19**		
	Subtotal - Industrial	**4,206**	**9.34**		
	Subtotal - Open Space	**3,764**	**1.53**		
	Total	**43,722**	**89.17**		

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10/2/2020

Notes:

1. Source: Land use and acreages based on City of Fresno parcel shapefile downloaded July 16, 2019.
2. Acreages exclude Bakman, Pinedale, and CSU Fresno service areas.
3. Acreages reflect demand generating parcels only.
4. Demand based on 2018 annual metered consumption records.
5. Recommended Water Demand Factors include the following adjustments:
   - Demand Factors normalized to 2018 production to account for system losses
   - Demand Factors increased to account for City-wide vacancy rate of 8.1% based on CA Department of Finance population estimat

Table 2 Sewer Flow Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update
City of Fresno

PRELIMINARY

	Land Use Classifications	Sewer Service Area[1,2,3] (acres)	Return to Sewer Ratio	Unadjusted Wastewater Unit Factor[4] (gpd/acres)	Estimated Sewer Flow (mgd)	Recommended Wastewater Unit Factor[5] (gpd/acres)
Residential						
1	Rural Density	714	0.20	227	0.16	250
2	Low Density	1,063	0.35	577	0.61	625
3	Medium Low Density	9,875	0.40	915	9.03	990
4	Medium Density	11,001	0.50	1,129	12.42	1,225
5	Medium High Density	1,950	0.55	1,956	3.81	2,115
6	High Density	1,314	0.60	2,825	3.71	3,055
				Subtotal - Residential Flow	**29.75**	
Commercial						
7	Community	558	0.80	1,497	0.84	1,620
8	General Heavy	1,124	0.80	1,504	1.69	1,630
9	Neighborhood	530	0.80	1,623	0.86	1,755
10	Neighborhood Limited	0	0.00	0	0.00	0
11	Office	932	0.80	1,567	1.46	1,695
12	Professional Services Office	89	0.80	1,556	0.14	1,685
13	Regional	294	0.80	1,084	0.32	1,175
14	Recreational	109	0.30	621	0.07	675
15	Storage	273	0.80	213	0.06	235
				Subtotal - Commercial Flow	**5.43**	
Public Facility						
16	Airport	1,147	0.80	81	0.09	90
17	College	304	0.70	937	0.29	1,015
18	High School	505	0.70	835	0.42	905
19	Elementary and High School	141	0.70	1,026	0.14	1,110
20	Middle School	305	0.70	993	0.30	1,075
21	Elementary and Middle School	191	0.70	1,087	0.21	1,175
22	Elementary School	792	0.70	1,354	1.07	1,465
23	Special School	52	0.70	625	0.03	680
24	SEGA School with Park	6	0.80	1,860	0.01	2,015
25	Cemetery	159	0.25	163	0.03	180
26	Church	662	0.80	981	0.65	1,065
27	Community Activity Center	11	0.80	1,241	0.01	1,345
28	Neighborhood Center	10	0.80	510	0.00	555
29	Convention Center	17	0.80	1,258	0.02	1,360
30	Fairgrounds	90	0.80	827	0.07	895
31	Fire Station	15	0.80	1,192	0.02	1,290
32	Government Offices	162	0.80	1,277	0.21	1,385
33	Court House Central Area	19	0.80	6,169	0.12	6,670
34	Hospital	189	0.80	3,219	0.61	3,480
35	Medical Center	20	0.80	889	0.02	965
36	Convalescent Hospital	119	0.80	2,624	0.31	2,840
37	Military	55	0.80	109	0.01	120
38	Mobile Home Park	274	0.60	1,072	0.29	1,160
39	Municipal Service Center	37	0.80	1,415	0.05	1,530
40	Post Office	30	0.80	480	0.01	520
41	Public Facility	7	0.80	649	0.00	705
42	Public/Quasi-Public Facility	46	0.80	1,716	0.08	1,855
43	Fresno County Jail	3	0.80	51,972	0.15	56,185
44	Pump Station	9	0.00	0	0.00	0
				Subtotal - Public Facility Flow	**5.24**	

Table 2 Sewer Flow Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update
City of Fresno

PRELIMINARY

	Land Use Classifications	Sewer Service Area[1,2,3] (acres)	Return to Sewer Ratio	Unadjusted Wastewater Unit Factor[4] (gpd/acres)	Estimated Sewer Flow (mgd)	Recommended Wastewater Unit Factor[5] (gpd/acres)
Industrial[6]						
45	Light Industrial	2,301	0.80	1,190	2.74	1,290
46	Heavy Industrial	1,905	0.80	2,484	4.73	2,690
				Subtotal - Industrial Flow	**7.47**	
Open Space						
47	Open Space	177	0.00	0	0.00	0
48	Recreational Use/Clear Zone	15	0.00	0	0.00	0
49	Ag	1,531	0.00	0	0.00	0
50	Canal	20	0.00	0	0.00	0
51	Community Park	24	0.00	0	0.00	0
52	Golf Course	525	0.30	104	0.05	115
53	Lake or Pond	54	0.00	0	0.00	0
54	Multi-Use	0	0.00	0	0.00	0
55	Neighborhood Park	218	0.00	0	0.00	0
56	Recreational Park	97	0.00	0	0.00	0
57	Recreational Use	17	0.00	0	0.00	0
58	Regional Park	436	0.00	0	0.00	0
59	Recreational Commercial	0	0.00	0	0.00	0
60	Environmental Education Area	0	0.00	0	0.00	0
61	Gravel Mining	0	0.00	0	0.00	0
62	Parking	48	0.00	0	0.00	0
63	PGE Sub Station	102	0.00	0	0.00	0
64	Ponding Basin	236	0.00	0	0.00	0
65	Ponding Basin/Park	128	0.00	0	0.00	0
				Subtotal - Open Space Flow	**0.05**	
Non-Metered[7,8,9]						
	Pinedale Public Utilities	-	-	-	0.63	
	Pinedale County Water District	-	-	-	0.46	
	Tarpey Village	-	-	-	0.37	
	Bakman	-	-	-	1.82	
	Clovis	-	-	-	0.20	
	City of Clovis	-	-	-	5.12	
	CSU Fresno	-	-	-	0.13	
				Subtotal - Non-Metered Flow	**8.73**	
Total						
				Subtotal - Residential Flow	**29.75**	
				Subtotal - Commercial Flow	**5.43**	
				Subtotal - Public Facility Flow	**5.24**	
				Subtotal - Industrial Flow	**7.47**	
				Subtotal - Open Space Flow	**0.05**	
				Subtotal - Non-Metered Flow	**8.73**	
				Total Balanced WWTP Flow	**56.68**	
				2018 WWTP Average Annual Flow[10]	**56.81**	

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10/2/2020

Notes:

1. Source: Land use and acreages based on City of Fresno parcel shapefile downloaded July 16, 2019.
2. Acreages exclude Bakman, Pinedale, and CSU Fresno service areas.
3. Acreages reflect flow generating parcels only and do not account for Septic Users.
4. Demand based on 2018 annual metered consumption records.
5. Wastewater Unit Factors increased to account for City-wide vacancy rate of 8.1% based on CA Department of Finance population estimates.
6. Industrial flow does not exclude the City's top industrial users (Foster Farms, Cal Dairies, Gallo, and Cargil Beef).
7. Development information for non-metered areas provided by City Staff.
8. City of Clovis BWF extracted from City of Fresno Wastewater Collection System Master Plan Update (September 2015).
9. CSU Fresno flows extracted from flow meter data provided by City Staff on April 30, 2019.
10. Historical WWTP flows provided by City Staff on February 13, 2019.

APPENDIX C

City of Fresno 2020 Urban Water Management Plan (UWMP)

Includes:

- Appendix H: City of Fresno's Central Valley Project (CVP) Contract (Surface Water Source)
- Appendix I: City of Fresno and Fresno Irrigation District Agreements (Surface Water Source)
- Appendix J: Water Shortage Contingency Plan

City of FRESNO
Department of Public Utilities

2020 Urban Water Management Plan

Final

JULY 2021

CITY OF FRESNO



Photo Credit: Downtown Fresno Partnership

City of FRESNO
Department of Public Utilities

CITY OF FRESNO

Final 2020 Urban Water Management Plan

JULY 2021



Prepared by Water Systems Consulting, Inc.

WSC

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ACRONYMS & ABBREVIATIONS

°F	degrees Fahrenheit
1,2,3-TCP	1,2,3-trichloropropane
AF	acre-feet
AFY	acre-feet per year
AMI	advanced metering infrastructure
AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
BP04	Booster Pump 4
CII	Commercial, Institutional, and Industrial
CIMIS	California Irrigation Management Information System
City	City of Fresno
COG	Council of Governments
CPC	California Plumbing Code
CSUF	California State University Fresno
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVWAC	Central Valley Water Awareness Committee
CWC	California Water Code
CY	Calendar Year
DBCP	1,2-dibromo-3-chloropropane
DMM	Demand Management Measures
DDW	Department of Drinking Water
DPU	Department of Public Utilities
DRA	Drought Risk Assessment
DWR	Department of Water Resources
EDB	ethylene dibromide or 1,2-dibromoethane
ETo	Evapotranspiration
FID	Fresno Irrigation District
FMFCD	Fresno Metropolitan Flood Control District
GIS	Geographic Information System
GPCD	gallons per capita per day
GSA	Groundwater Sustainability Agency

GSP	Groundwater Sustainability Plan
HCF	hundred cubic feet
IGSM	Integrated Groundwater and Surface Water Model
Metro Plan	Fresno Metropolitan Water Resource Management Plan
mgd	million gallons per day
NESWTF	Northeast Surface Water Treatment Facility
NFWRF	North Fresno Wastewater Reclamation Facility
NKGSP	North Kings Groundwater Sustainability Plan
NRDC	Natural Resources Defense Council
PCE	perchloroethylene or tetrachloroethylene
PEIR	Programmatic Environmental Impact Report
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
RHNA	Regional Housing Needs Allocation
RWMP	Recycled Water Master Plan
RWRF	Regional Wastewater Reclamation Facility
SB	Senate Bill
SBx7-7	Senate Bill x 7-7
SESWTF	Southeast Surface Water Treatment Facility
SGMA	Sustainable Groundwater Management Act
SOI	Sphere of Influence
sq mi	square miles
SWTF	Surface Water Treatment Facility
T-3 SWTF	T-3 Water Storage and Modular Surface Water Treatment Facility
TCE	trichloroethylene
TDS	total dissolved solids
TTDF	Tertiary Treatment and Disinfection Facility
USBR	United States Bureau of Reclamation
UV	ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act
WSCP	Water Shortage Contingency Plan
WSIP	Water Storage Investment Program
WY	Water Year

CITY OF FRESNO

Executive Summary

This section summarizes the 2020 Urban Water Management Plan (UWMP) for the City of Fresno (City). It provides a lay description of the 2020 UWMP in a manner that is accessible to non-technical readers. This summary describes the fundamental purposes of the UWMP, including water service reliability, future challenges, and strategies for managing water reliability risks.

UWMPs are updated every five years and outline each suppliers' long-term water resource planning to ensure there is enough water to meet both existing and future demands. They set the roadmap for how the City will use water over the coming years.

The original Fresno water system began operations in 1876 as a non-profit organization established by a group of public-minded citizens. Today, the City covers approximately 115 square miles (sq mi) (73,500 acres) consisting largely of single-family residential, commercial, public, and industrial development. The City's General Plan projects buildout of the 106,000 acres planning area in 2056. This UWMP addresses the City's water service reliability, future challenges, and strategies for managing risks to water reliability through 2045. The City's Fresno Metropolitan Water Resource Management Plan (Metro Plan), which is currently being prepared, addresses a 50-year horizon – through 2070.

IN THIS SECTION

- Service Area Description
- Water Use
- Water Sources
- Water Supply Reliability

Purpose and Organization of the Plan

This plan comprises the 2020 UWMP for the City, as required by the California Urban Water Management Planning Act, which requires all urban water suppliers with more than 3,000 connections or distributing more than 3,000 acre-feet per year (AFY) to complete an UWMP every five years. As of the close of the 2020 calendar year, the City has over 139,500 residential, commercial, industrial, and institutional water service connections and produced nearly 122,000 acre-feet (AF) of water. As a result, the City is required to prepare and adopt an UWMP and submit it to the Department of Water Resources (DWR) by the July 1, 2021, due date.

Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

The UWMP is a valuable planning document used for multiple purposes:

- Serves as a valuable resource to the community and other interested parties regarding water supply and demand, conservation, and water related information
- Meets a statutory requirement of the California Water Code (CWC)
- Provides a key source of information for water supply assessments and written verifications of water supply
- Supports regional long-range planning, including City and County General Plans
- Provides a standardized methodology for water utilities to assess their water resource needs and availability
- Provides a resource for regional involvement in the California Water Plan
- Provides for a plan during water drought situations

Outreach and Engagement

The City has coordinated the preparation of its 2020 UWMP with its water suppliers, Fresno County, the City of Clovis, nearby water agencies, and community members to develop a UWMP that adheres to the requirements of the CWC and plans for a resilient water future. In total, the City has coordinated preparation of the 2020 UWMP and solicited participation and comments with the following agencies:

- Bakman Water Company
- City of Clovis
- County of Fresno
- Fresno Irrigation District
- Fresno Metropolitan Flood Control District
- Friant Water Authority
- Garfield Water District
- Malaga County Water District
- Pinedale County Water District
- North Kings Groundwater Sustainability Agency
- US Bureau of Reclamation

Service Area Description

The City's General Plan planning area covers approximately 106,000 acres comprised of approximately 73,500 acres of incorporated land and 32,500 acres of unincorporated land. The City's water service area covers 70,400 acres consisting largely of single-family residential, commercial, public, and industrial development, shown in **Figure ES-6** (located at the end of the Executive Summary). The service area excludes areas served by the Bakman Water Company, Pinedale County Water District, Park Van Ness Mutual Water Company, California State University Fresno, and private groundwater users located within Fresno County islands. The City will eventually serve out to the Sphere of Influence (SOI) boundary adopted in the 2014 General Plan and includes all lands planned to be annexed by the City at the projected 2056 buildout of the General Plan, summarized in **Table ES-1**.

Table ES-1. Existing and Future Water Service Area

LAND USE CATEGORY	2020 WATER SERVICE AREA		2056 WATER SERVICE AREA	
	ACRES	PERCENT	ACRES	PERCENT
Single-Family Residential	27,700	39.3%	40,000	47.4%
Multifamily Residential	3,700	5.3%	3,800	4.5%
Commercial	4,500	6.4%	8,600	10.2%
Public Facility	5,600	8.0%	7,200	8.5%
Industrial	4,500	6.4%	9,300	11.0%
Open Space/ Landscape Irrigation	13,100	18.6%	11,000	13.0%
Mixed Use	0	0%	3,900	4.6%
Downtown	0	0%	600	0.7%
Vacant / Partially Vacant	11,300	15.9%	0	0%
TOTAL	**70,400**	**100%**	**84,400**	**100%**

Note: Acreage from City GIS Shapefile of Land Uses and aligns with the General Plan for buildout in year 2056.

Population Projections

The City experienced rapid growth since it was founded by the Central Pacific Railroad in 1872 up through the mid-1990s, when the City's annual growth rate was typically greater than 2%. From 1995 to 2015, the annual growth rate has decreased to an average of 1.3%, and since 2015, the rate has not surpassed 1.0%. Achieving General Plan buildout population estimates requires an average annual growth rate of 1.44% from 2020 to 2056. The City's water service area population is anticipated to continue to grow along with the City, with some slightly higher growth years anticipated in the next 10 years due to multiple large developments planned for completion in the near term. As a result, population growth, shown in **Figure ES-1** on the following page, occurs at an annual rate of ranging from 1.1–2.1% between 2020 and 2056.

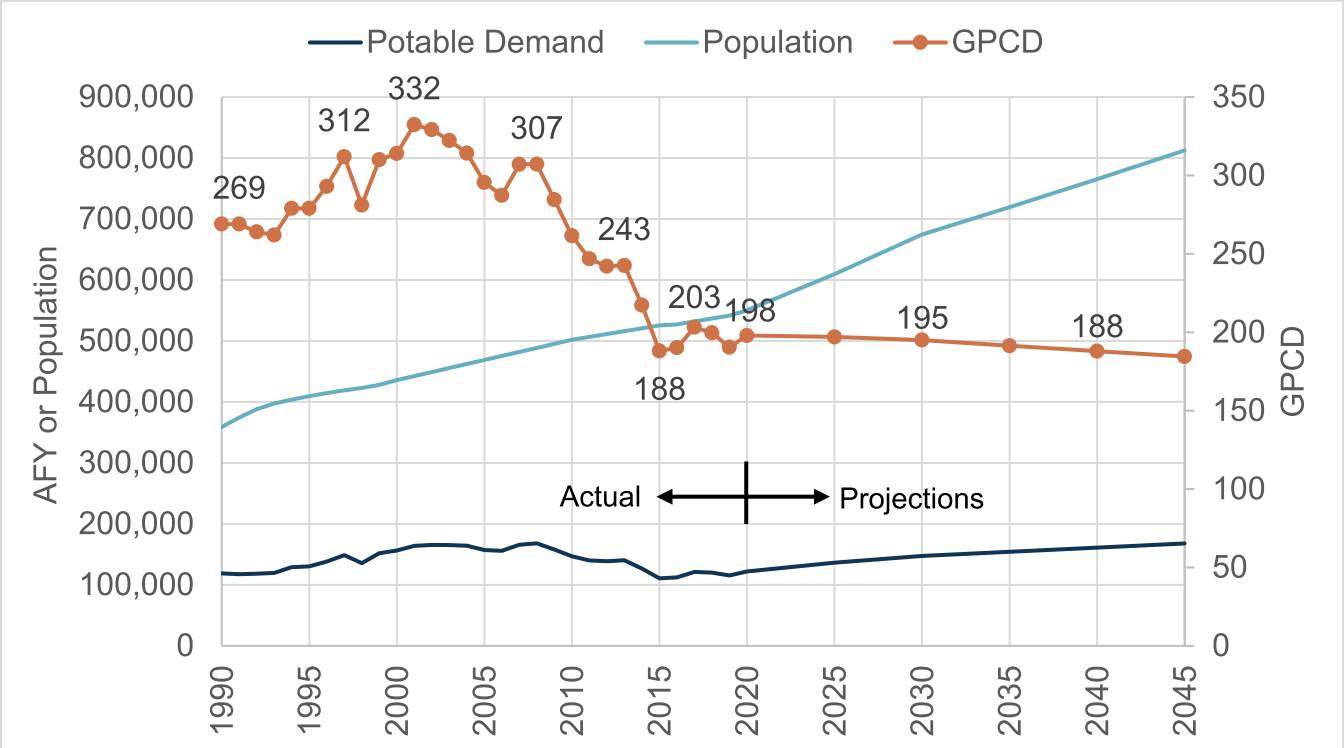
Water Use

Water consumption in the City is characterized by the typical demand sectors of residential, commercial, institutional, industrial, and irrigational. The difference between production and consumption is losses, which may be attributed to system leaks, meter inaccuracies, fire flows, theft, unmetered use, or other factors.

As shown in **Figure ES-1**, the City's water demand has decreased even as the City has grown over the past several decades, and demands are projected to grow slower than population growth. This trend is captured by the City's daily per capita water use, measured as gallons per capita per day (GPCD). For 2020, the City's water use averaged 198 GPCD based on 121,993 AF of water production and a service area population of 550,217. The City is far below its 2020 daily per capita water use target of 247 GPCD due to the extensive conservation efforts implemented by the City in the past decade.

The City also diverts raw surface water obtained from the United States Bureau of Reclamation (USBR) and the Fresno Irrigation District (FID) to recharge basins throughout the service area. The City coordinates with FID for the delivery of the recharge water, utilizing FID's existing system of channels and pipelines to covey the raw water, and with Fresno Metropolitan Flood Control District (FMFCD) to deliver water to FMFCD's stormwater retention and recharge basins or the City's own recharge basins. The raw surface water recharges the groundwater basin to sustain the groundwater supply for the City. The groundwater recharge volume can vary based on surface water supply availability and is represented as an addition to annual groundwater supplies. In addition, the City serves a limited number of customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively.

Figure ES-1. City of Fresno Demand Projections



The City's per capita water usage is projected to continue to decline through 2045 due to more water efficiency in future construction and passive conservation; however, due to the increase in population the demand is expected to slowly increase in the next 25 years. The potable demand projections for normal water use are based on land use where future land use areas are expected to be more water efficient than existing land uses and buildings due to the California Plumbing Code (CPC) and use of higher efficiency appliances and landscapes. Demand for existing land uses is also expected to slowly reduce over time due to passive conservation, which includes the replacement of older water fixtures and appliances with more efficient types now required as part of the CPC.

Water Sources

The City relies on groundwater from the North Kings Subbasin; surface water from Central Valley Project (CVP), through a contract with the USBR; Kings River water, through a contract with FID; and recycled water. Water production in the City has consisted of 100% groundwater prior to the commissioning of the City's first surface water treatment facility (SWTF) in 2004. Since 2004, the City has invested in expanding its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demands in the service area.

Groundwater

The City overlies the Kings Subbasin, which is part of the greater San Joaquin Valley Groundwater Basin. The City is one of many water purveyors that use groundwater from the Kings Subbasin. The City has a network of over 270 municipal wells and currently operates approximately 202 municipal supply wells within the Kings Subbasin.

The City was a founding member of the North Kings Groundwater Sustainability Agency (North Kings GSA), which was formed following passage of the Sustainable Groundwater Management Act (SGMA) of 2014. This legislation created a statutory framework for groundwater management in California that can be sustained during the planning and implementation horizon without causing undesirable results. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040. The Kings Subbasin was designated a critically overdrafted basin by DWR and the North Kings GSA is working within the SGMA framework to reach groundwater sustainability.

Due to the City's investments in other supplies – surface water, recycled water, and conservation – groundwater levels beneath the City have already begun to recover from low levels experienced during the recent drought. The City plans to continue to use groundwater within a larger conjunctive use program that maximizes its existing water rights and surface water supply sources.

Surface Water

With the completion and operation of the Southeast Surface Water Treatment Facility (SESWTF), surface water is now a primary water supply used to meet potable demands within the City. The City contracts with FID for Kings River water and with USBR for CVP water from the Friant-Kern Canal. The surface water supply is used either for potable uses through treatment and distribution or delivery to recharge basins for groundwater recharge. The City has historically not used all its available FID allocation in any given year, although it pays a flat rate for its total allocation regardless of use. Water unused by the City is reallocated by FID to its other customers.

The City, through an agreement originally executed in 1961, secured a surface water supply from USBR CVP Friant Division for an annual water supply of 60,000 AF of Class 1 water. The agreement was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement, which ended an 18-year legal dispute over the operation of Friant Dam brought by a coalition of conservation and fishing groups. The projected surface water available for the City from USBR is based on USBR simulations for the 2006 Settlement Agreement. Average simulated delivery is 53,680 AFY and the median simulated delivery is 60,000 AFY. However, very dry years have previously resulted in substantial reductions as demonstrated by the zero allocations that occurred in 2014 and 2015.

FID is one of 28 agencies that receives an entitlement of water from the Kings River through the Kings River Water Association. The City executed its most recent agreement with FID in 2016. The 2016 agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly every year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID, and is roughly 200,000 acres. As the City incorporates new users and the water service area expands, the percentage of FID supply increases. However, the 2016 FID Agreement sets the City's maximum percentage of FID's Kings River water as 29.0%, which is expected to be reached between 2025 and 2030.

The City's potential supply from FID was projected using actual Kings River deliveries for 1964–2019. The average FID Kings River delivery over that time was 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29.0% City supply percentage. The projected City percentage of FID supplies was estimated based on City's water service area growth projections through buildout in 2056.

Recycled Water

The Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) has developed from what was once a sewer farm to what is now a state-of-the-art wastewater treatment facility. The RWRF treats flows from not only the City, but also sewered County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District. Flows received at this facility peaked at 81,100 AF in 2006 and have been steadily decreasing since, with the average influent flow about 63,000 AF over the last five years.

The City has three primary means of effluent disposal from the RWRF:

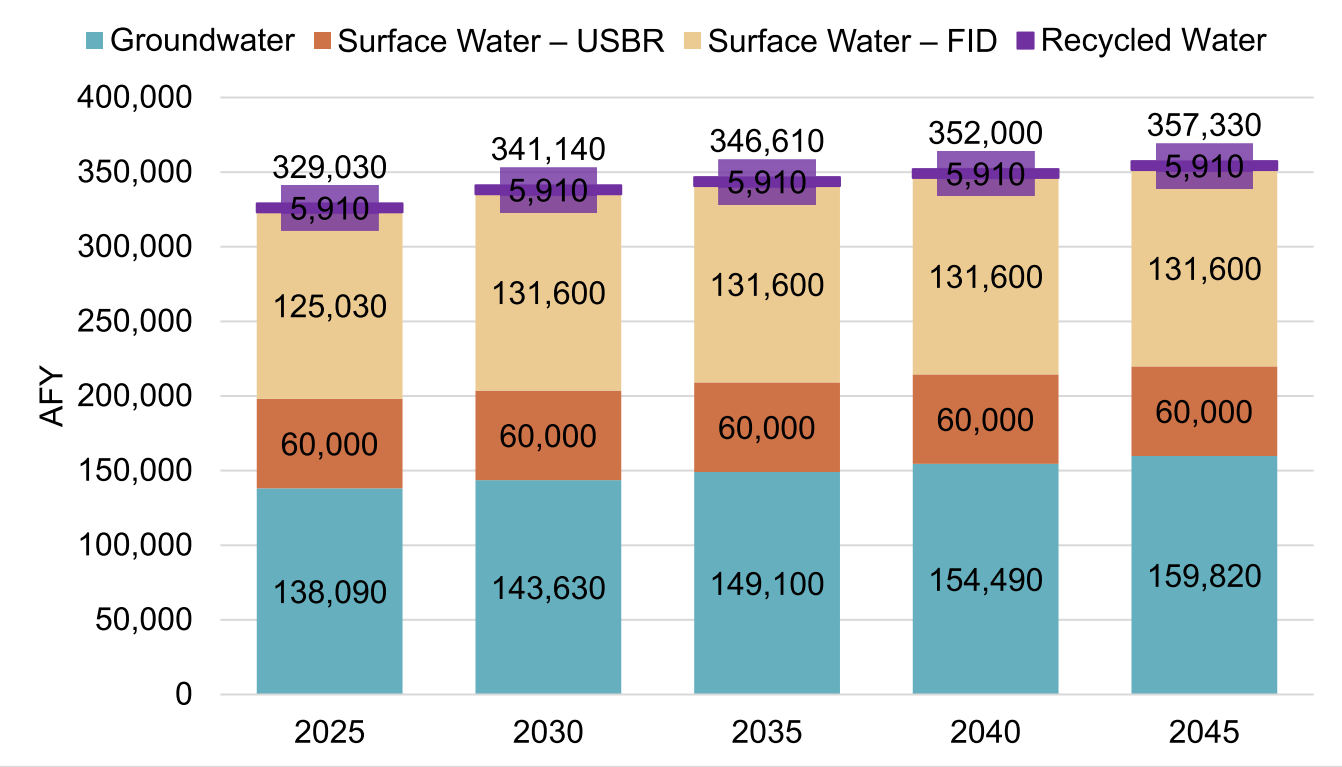
1. Undisinfected secondary effluent to on-site and off-site farmland for restricted irrigation
2. Undisinfected secondary effluent to percolation ponds
3. Disinfected tertiary effluent to the recycled water distribution system

The percolated effluent has been deemed equivalent to tertiary treated water by the State and the City has been extracting this water for reuse in areas within and surrounding the RWRF, as well as to FID's canals, through an exchange agreement for delivery to FID agricultural customers. The City recently constructed the Tertiary Treatment and Disinfection Facility (TTDF) at the RWRF and has constructed most of the southwest recycled water system, which is projected to increase deliveries from roughly 1,000 AFY today to eventually meet 5,800 AFY of non-potable demands. In addition, the City uses recycled water from the North Fresno Wastewater Reclamation Facility (NFWRF) to irrigate Copper River Ranch Golf Course.

Summary of Supplies

The City currently balances its surface water supplies and groundwater based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes and prevent their spread. The minimum operation conditions typically occur in the low-demand winter months, and the City can increase surface water production during peak demand months when surface water is available. In normal and wet years, the City intends to rely on more surface water supply and recharge raw surface water to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will ramp up well production to meet demands. The City is expected to continue this supply management strategy in the future. **Figure ES-2** shows the City's annual average projected water supplies through 2045.

Figure ES-2. Projected Water Supplies



Water Supply Reliability

The City currently manages its surface water and groundwater supply by maximizing surface water for potable use and intentional recharge during wet and normal years, while relying on groundwater during dry years. The City is currently updating its Metro Plan, which will recommend projects and programs to optimize the use of its supply portfolio and further improve supply resilience. Supply management tools are an expected outcome of the Metro Plan update; however, the City's ongoing supply management is intended to maximize local supplies and improve the groundwater basin storage. Current actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

Normal water year, single dry water year, and five-year consecutive drought period supply projections were made based on historic water allocations for surface water supplies, sustainable yield for groundwater, and projected utilization for recycled water. For surface water, the single dry year is based on 2015 allocations and the five-year drought is based on 2012 to 2016. Groundwater supplies, due to intentional recharge augmentation, remain reliable in all hydrologic conditions.

Despite severe reductions of surface water supplies during recent dry years, sufficient good-quality water was available to operate the SWTFs. The projected supplies and demands for a normal year, single dry year, and five-year consecutive drought, shown in **Figure ES-3** through **Figure ES-5** on the next page and in **Table 7-1** through **Table 7-3** in **Section 7.1.4**, demonstrate that the City is projected to have greater than 100,000 AF of available supply after meeting demands in normal years; the City's surface water supplies are reduced in a single dry year, but all potable demands are met and groundwater recharge of raw surface water is reduced; and the City is projected to meet all demands during a five-year drought with its existing supplies with reduced groundwater recharge in years three and four of a five-year drought to accommodate low surface water allocations.

Managed recharge of surface water is an essential component of the City's groundwater supply and the City must average 60,000 AFY to 70,000 AFY of recharge with surface water to meet the projections. This highlights the City's priority of recharging available surface water in the coming years.

Figure ES-3. Normal Year Supply vs. Demand

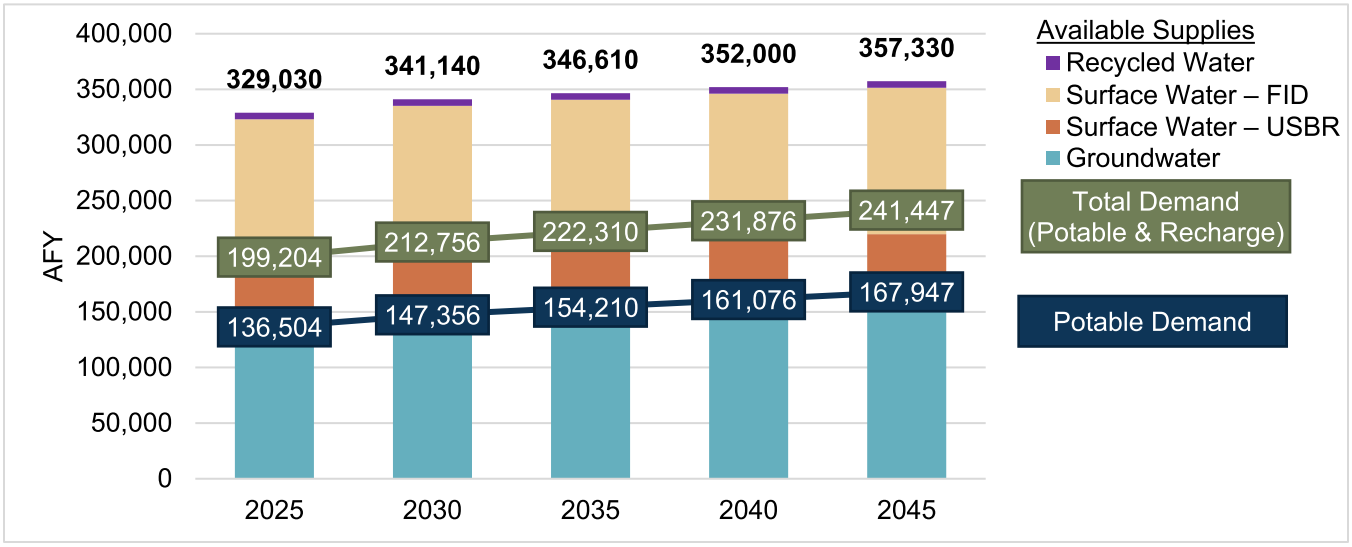


Figure ES-4. Single Dry Year Supply vs. Demand

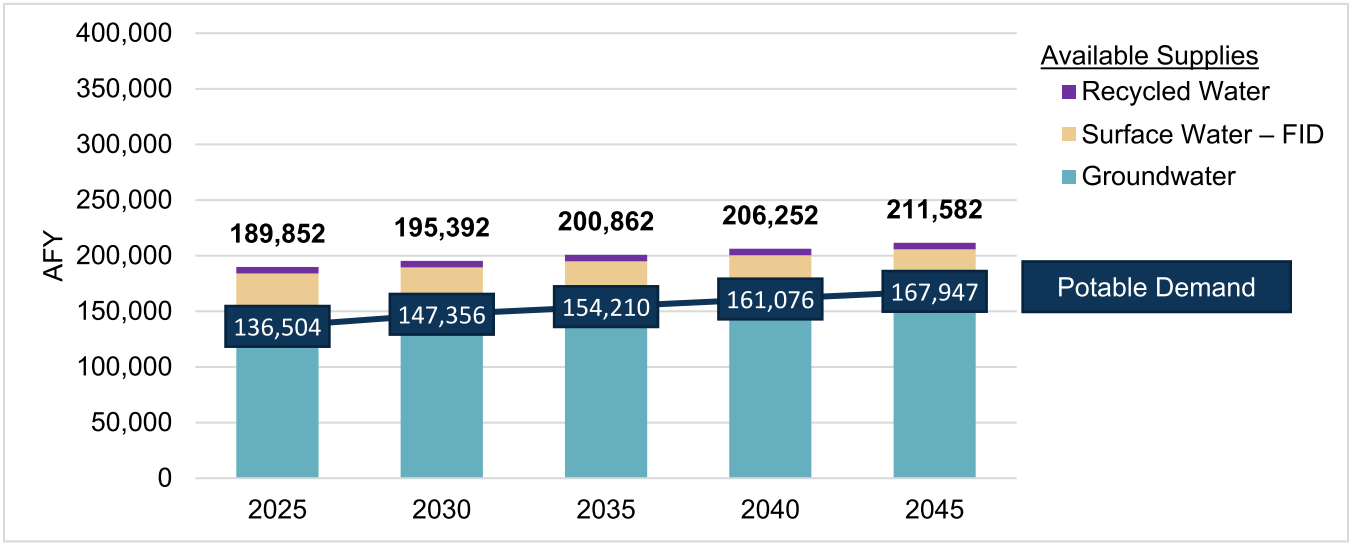
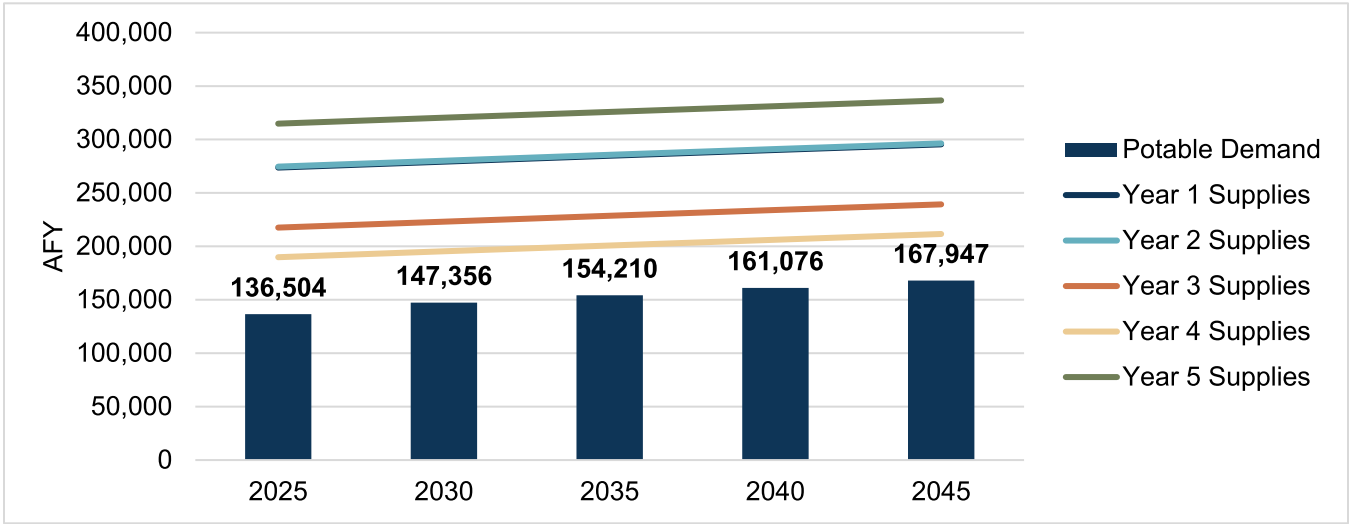


Figure ES-5. Multiple Dry Years Supply vs. Demand



2021-2025 Drought Risk Assessment

A new provision of the Water Code directs Suppliers to prepare a Drought Risk Assessment (DRA), assuming a drought period lasting five consecutive years, starting from the year following the year when the assessment is conducted. The DRA analysis allows the City to examine the management of its supplies during stressed hydrologic conditions and an opportunity to evaluate whether the City may need to enact its Water Shortage Contingency Plan (WSCP) during the next actual drought period lasting at least five years. The projected gross water use for the five-year DRA is based on unrestricted potable demand, a reduction in raw-water demand for intentional recharge in years three and four of the five-year drought, and unrestricted recycled water demand. Surface water supply availability is based on actual allocations during the previous drought – from 2012 to 2016.

Table ES-2 compares the total projected supply and demand for the five-year DRA for 2021 through 2025. As shown, the City does not expect to enact its WSCP for a five-consecutive-year drought based on the unrestricted potable demand projections and the reliability of the current supply portfolio. Available surface water supplies during this period would be utilized for groundwater recharge to sustain the groundwater basin.

Table ES-2. Five-Year Drought Risk Assessment

WATER USE TYPE	2021	2022	2023	2024	2025
Groundwater	133,602	134,724	135,846	136,968	138,090
Surface Water – USBR	30,000	37,200	0	0	45,000
Surface Water – FID	93,354	83,085	65,425	40,776	111,911
Recycled Water	1,912	2,911	3,911	4,910	5,910
TOTAL SUPPLY	**258,868**	**257,920**	**205,181**	**182,655**	**300,911**
Potable Demand	124,910	127,827	130,745	133,662	136,504
Non-Potable Demand	60,000	60,000	48,287	22,260	60,000
TOTAL DEMAND	**184,910**	**187,827**	**179,032**	**155,922**	**196,504**
AVAILABLE SUPPLIES	**73,958**	**70,093**	**26,149**	**26,732**	**104,407**

Water Shortage Contingency Plan

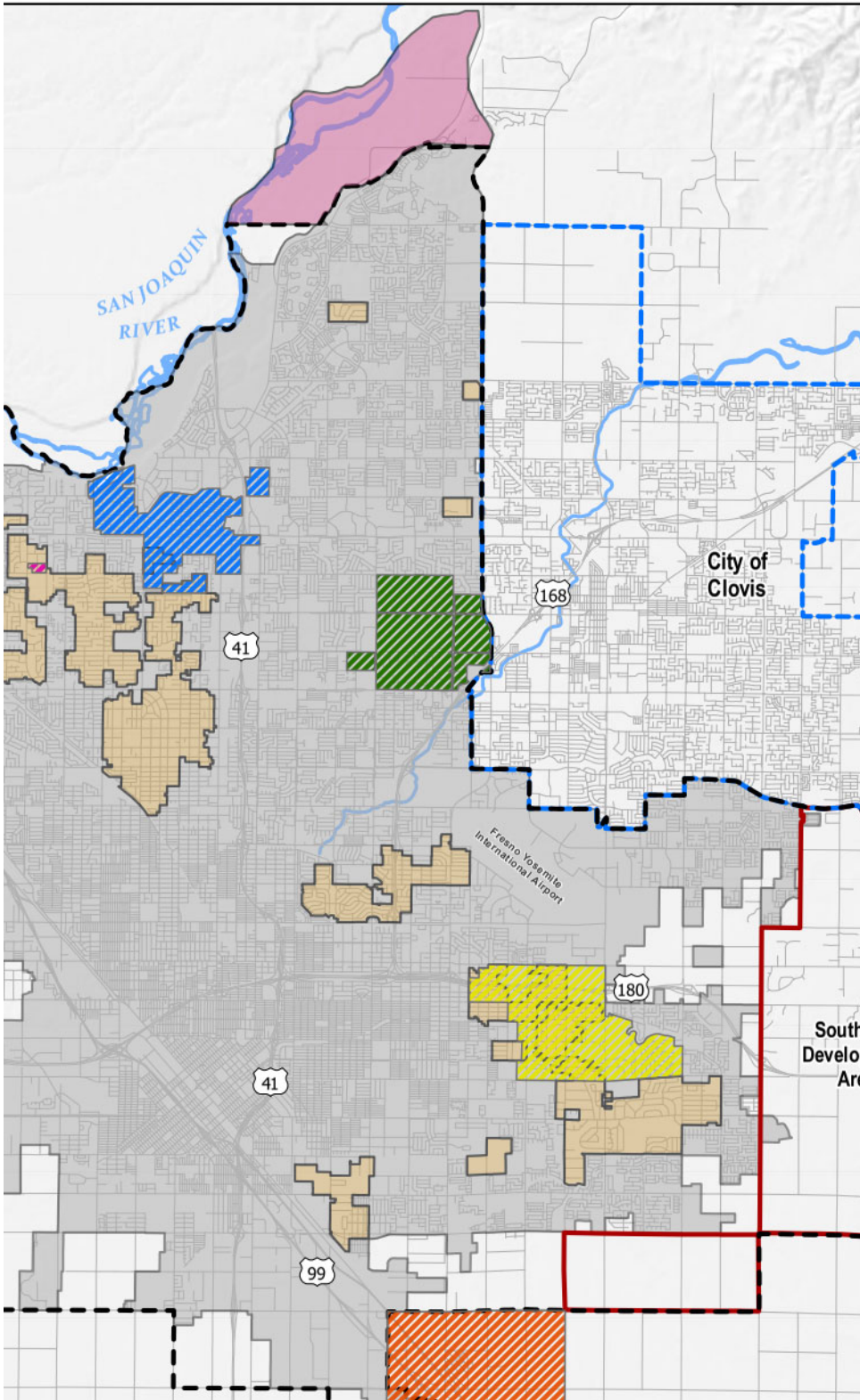
This WSCP is a detailed plan for how the City intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time.

The WSCP is used to provide guidance to the City's governing body, staff, and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

The WSCP describes the following:

- Water Supply Reliability Analysis
- Annual Water Supply and Demand Assessment Procedures
- Six Standard Shortage Stages
- Shortage Response Actions
- Communication Protocols
- Compliance and Enforcement
- Legal Authority
- Financial Consequences of WSCP Implementation
- Monitoring and Reporting
- WSCP Refinement Procedures
- Special Water Features Distinctions
- Plan Adoption, Submittal, and Availability

The 2020 WSCP is a standalone document that can be modified as needed and is included as **Appendix J** in the 2020 UWMP.


SAN JOAQUIN
RIVER
City of
Clovis
168
41
Fresno Yosemite
International Airport
180
41
99

1 CITY OF FRESNO Introduction

This plan comprises the 2020 Urban Water Management Plan (UWMP) for the City of Fresno (City), as required by the California Urban Water Management Planning Act (UWMP Act).

The UWMP Act requires all urban water suppliers with more than 3,000 connections or distributing more than 3,000 acre-feet per year (AFY) to complete an UWMP every five years.

As of the close of the 2020 calendar year, the City has over 139,500 residential, commercial, industrial, and institutional water service connections and produced nearly 122,000 AF of water. As a result, the City is required to prepare and adopt an UWMP and submit it to DWR by the July 1, 2021, due date.

IN THIS SECTION

- California Water Code
- UWMP Organization

The UWMP is a valuable planning document used for multiple purposes:

- Serves as a valuable resource to the community and other interested parties regarding water supply and demand, conservation, and water related information
- Meets a statutory requirement of the California Water Code (CWC)
- Provides a key source of information for water supply assessments and written verifications of water supply
- Supports regional long-range planning documents, including City and County General Plans
- Provides a standardized methodology for water utilities to assess their water resource needs and availability
- Provides a resource for regional involvement in the California Water Plan
- Provides for a plan during water drought situations

1.1 The California Water Code

The UWMP Act is administered by the California Department of Water Resources (DWR), which is responsible for compiling data for statewide and regional analysis and publishing the adopted documents online for public access. This report was prepared according to the requirements of the CWC, UWMP Act, and the 2020 UWMP Guidebook.

CWC Section 10620 (a) of the UWMP Act states, "Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640)." These plans are to be updated every five years and submitted to DWR.

Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

In November 2009, the State legislation passed Senate Bill (SB) x 7-7, referred to as SBx7-7 or the Water Conservation Act of 2009. SBx7-7 set the goal of achieving a 20% reduction in urban per capita water use statewide by 2020. Retail water agencies were required to set targets and track progress toward decreasing daily per capita urban water use in their service areas, which would assist the State in meeting its 20% reduction goal by 2020.

This law requires that every UWMP include:

- Baseline per capita water use
- Urban water use target for 2020
- Compliance daily per capita water use

This 2020 UWMP has been prepared to comply with the UWMP Act and SBx7-7. In addition to meeting the requirements of the Act, this report will be used to support water supply assessments and written verifications of water supply required by SB 610 and SB 221 of 2001. These bills require that water supply information be provided to counties and cities for projects of a certain size, prior to discretionary project approval. Both bills allow an UWMP to be used as a source document to fulfill these legislative requirements. The UWMP Act has undergone significant expansion since it was originally passed, particularly since the City's previous UWMP was prepared in 2015. Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions affect the reliability of each water supplier as well as the statewide water reliability overseen by DWR, the State Water Resources Control Board, and the Legislature. Accordingly, the UWMP Act has grown to address changing conditions, and the current requirements are found in Sections 10610–10656 and 10608 of the CWC.

Since 2015, several amendments have been added to the UWMP Act. These require urban water suppliers to prepare a five-year consecutive drought supply and demand assessment and a five-year drought risk assessment to evaluate the functionality of the Water Shortage Contingency Plan (WSCP) in the event of a continuous five-year drought beginning next year.

There are also new requirements for the WSCP, and it is now required to be adopted as a separate plan from the UWMP. This 2020 UWMP was developed to incorporate these new requirements, under the guidance of DWR's 2020 UWMPs Guidebook for Urban Water Suppliers. A checklist to document compliance of this 2020 UWMP with the Act and the CWC is provided in **Appendix A**.

This 2020 UWMP includes all required DWR standardized tables for **Chapters 1 to 10** compiled in **Appendix B** and all required SBx7-7 tables in **Appendix C**. A selection of these tables is also provided in the body of this Plan, as necessary to present supporting data.

1.2 UWMP Organization

This 2020 UWMP is organized into the following chapters.

- **Chapter 1 - Introduction and Overview:** This chapter provides a discussion of the purpose and content of the 2020 UWMP and the extent of the City's water management planning efforts.
- **Chapter 2 - Plan Preparation:** This chapter provides information on the City's development of the 2020 UWMP, including the basis for plan preparation, planning type, data format, and coordination and outreach to nearby agencies.
- **Chapter 3 - System Description:** This chapter provides a description of the City's water system, including service area maps, climate information, service population and demographic information, and an overview of the City's organizational structure and history.
- **Chapter 4 - Customer Water Use:** This chapter describes the City's historic, current, and projected water uses, system losses, water savings, and water use by lower income households.
- **Chapter 5 - Conservation Target Compliance:** This chapter includes a description of the City's chosen method for calculating baseline per capita water use, the City's calculated baseline, 2015 interim and 2020 per capita demand targets, and compliance with the 2020 target.
- **Chapter 6 - System Supplies:** This chapter includes a discussion of the City's water system supplies, including groundwater, surface water, wastewater, and recycled water, the City's future water projects, and a summary of existing and future water sources.
- **Chapter 7 - Water Supply Reliability Assessment:** This chapter describes the reliability of the City's water supply through a 20-year planning horizon, including a supply and demand assessment and regional reliability evaluation. Supply reliability is presented for a normal, single dry year and five consecutive dry years.
- **Chapter 8 - Water Shortage Contingency Planning:** This chapter provides a description of the City's WSCP, including stages of action, prohibitions, penalties, reduction methods, and catastrophic supply interruption.
- **Chapter 9 - Demand Management Measures:** This chapter explains the City's existing and historic efforts to promote water conservation and the City's plans to use Demand Management Measures to achieve its 2025 water use targets.
- **Chapter 10 - Plan Adoption, Submittal, and Implementation:** This chapter details the steps taken by the City to adopt the 2020 UWMP in accordance with the CWC, make it available to the public, and implement it.

- **Appendices:** These include any additional information to support and clarify any information presented within the 2020 UWMP content.

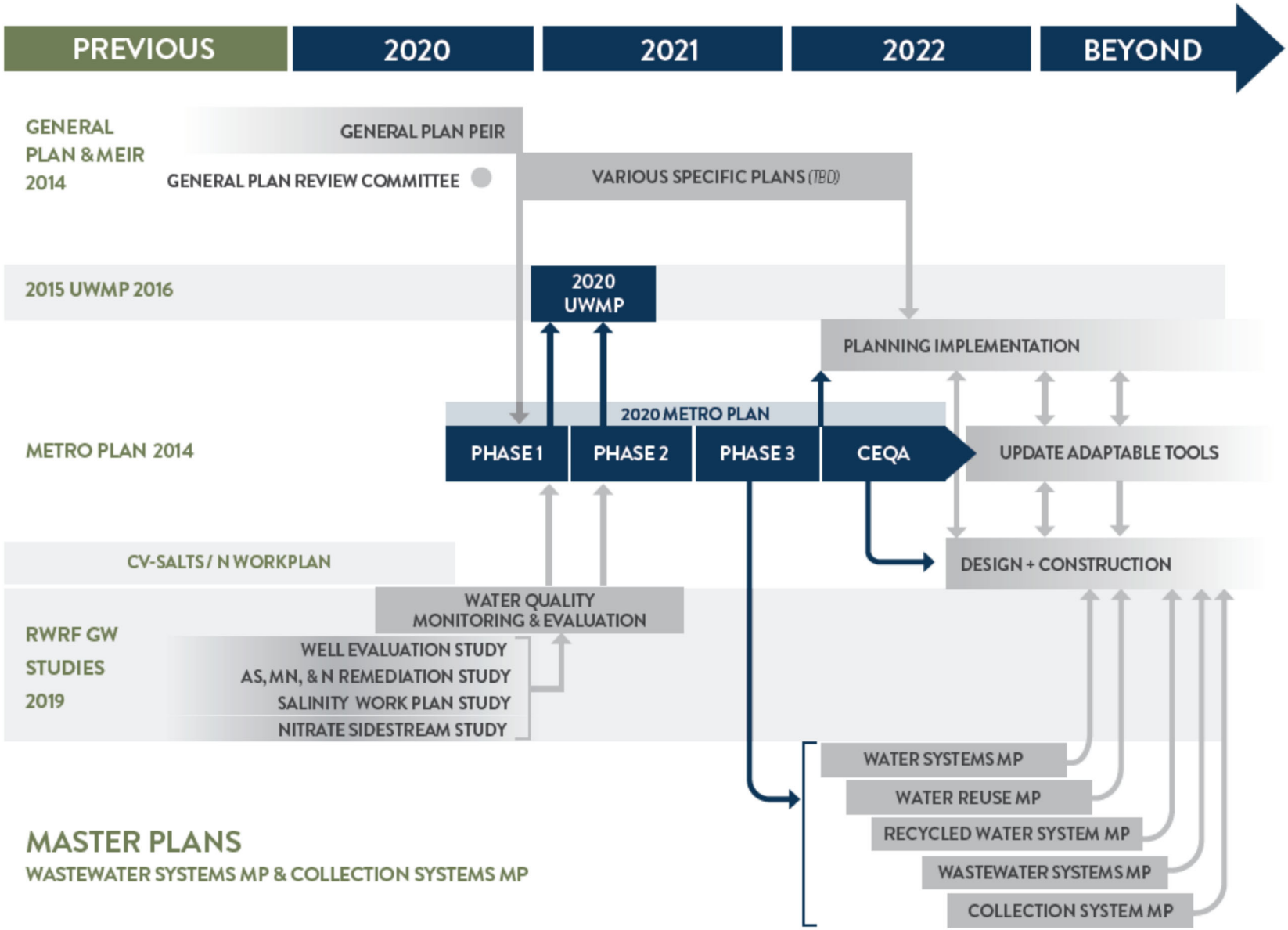
1.3 UWMPs in Relation to Other Efforts

The City previously prepared a 2005 UWMP, 2010 UWMP, and 2015 UWMP. This 2020 UWMP serves as an update to the 2015 UWMP and complies with new requirements and regulations. In addition to completing the 2020 UWMP, the City is presently updating its Fresno Metropolitan Water Resource Management Plan (Metro Plan). The last Metro Plan was completed in 2014, and the current Metro Plan update will prepare a fresh look at the City's water resources and consider new conditions and strategies for planning through 2070. **Figure 1-1** shows the City's ongoing and additional future water resources planning efforts.

1.4 Demonstration of Consistency with the Delta Plan

A new requirement for the 2020 UWMP is that agencies that anticipate participating in, or receiving water from, a proposed project utilizing Sacramento-San Joaquin Delta (Delta) Water or within the Jurisdiction of the Delta Stewardship Council (covered action) should demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta. Covered actions include, but are not limited to, projects such as multiyear water transfers, conveyance facilities, or new diversions that involve transferring water through, exporting water from, or using water in the Delta, per California Code of Regulations, Title 23, Section 5003. The City of Fresno contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 AF of Class 1 water. Although the Friant Division of the CVP does not directly divert or convey water from the Delta, the project was developed through an exchange with the Delta-Mendota supply. As restrictions on Delta exports have hindered USBR from making deliveries to the Delta-Mendota Canal, the Friant Division Class 1 allocations are reduced, and the water is transferred back to the users that would typically receive water from the Delta-Mendota Canal. As such, the City is required to demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta. **Appendix D** includes the reporting and calculations that demonstrate Fresno's reduced reliance on supply from their USBR CVP water supply.

Figure 1-1. Previous and Ongoing Water Resources Planning Efforts



2 CITY OF FRESNO
Plan Preparation

The City has coordinated the preparation of its 2020 UWMP with its water suppliers, the County, the City of Clovis, nearby water agencies, and community members to develop a UWMP that adheres to the requirements of the CWC and plans for a resilient water future.

IN THIS SECTION

- Coordination and Outreach

The City of Fresno provides water service to a variety of customer sector types within the City limits, inclusive of several historic County Waterworks Districts (county islands) which have been incorporated into the City's water system.

The City has approximately 139,500 service connections and produced just under 122,000 AF of potable water in 2020. The City meets the threshold identified in the CWC to be classified as an urban water supplier and in the California Health and Safety Code as a public water system. The City provides water directly to its customers and does not wholesale water to any other agencies for potable uses (defined as sales greater than 3,000 acre-feet per year). Therefore, the City is required to prepare and update a Retail UWMP every five years. This report was prepared on a calendar year basis.

2.1 Coordination and Outreach

The City has water supply contracts with USBR and Fresno Irrigation District (FID). Each of these water suppliers has been notified of the plan update and provided water supply projections for the time period covered by this plan. Additionally, the preparation of this 2020 UWMP was coordinated with other appropriate agencies to ensure regional stakeholders had the opportunity to provide input to this plan. The City has coordinated preparation of the 2020 UWMP and solicited participation and comments with the agencies indicated in **Table 2-1**. The City has also published notices in local newspaper and encouraged the active involvement of the population within the water service area to provide feedback on the UWMP and the WSCP during the public review period, as discussed in **Section 10.1**.

Table 2-1. Agency Coordination and Outreach

AGENCY	NOTIFIED 60 DAYS PRIOR TO PUBLIC HEARING	NOTIFIED OF PUBLIC DRAFT 14 DAYS PRIOR TO PUBLIC HEARING
Bakman Water Company	✓	✓
City of Clovis	✓	✓
County of Fresno	✓	✓
Fresno Irrigation District	✓	✓
Fresno Metropolitan Flood Control District	✓	✓
Friant Water Authority	✓	✓
Garfield Water District	✓	✓
Malaga County Water District	✓	✓
Pinedale County Water District	✓	✓
North Kings Groundwater Sustainability Agency	✓	✓
US Bureau of Reclamation	✓	✓

3 CITY OF FRESNO System Description

This chapter describes the history of the City's water system, its current service area, climate, population, and demographics.

IN THIS SECTION

- Service Area
- Land Uses
- Water System
- Population and Demographics

The original Fresno water system began operations in 1876 as a non-profit organization inaugurated by a group of public-minded citizens. Initially, the water system consisted of one pumping station composed of small pumps and two storage tanks located above the second floor of one of the early store buildings. This building was located on Fresno Street between "J" and "K" Streets, presently known as Broadway and Fulton.

By 1888, the town had grown to a small city, which demanded an improved water distribution system. This was necessary because of several large fires, including the destruction of the first permanent courthouse. In 1888, the first pumping station and water tower were constructed at Fresno and "O" Street. These facilities were designed to be an integral part of a larger and continually expanding water system. This No. 1 station was in continuous use until 1959, when it was retired having served its useful purpose. Today, this building is known as the "Water Tower" and has been declared a historic structure.

Between the years of 1887 and 1890, 4-inch and 2½-inch cast iron pipe, as well as 4-inch wrought iron water mains were laid out. Most of these original “permanent pipes” have since been replaced in the present water supply system. The owner and operator of the system in 1888 was the Fresno Water Company. In 1904, the Fresno Water Company was purchased by Balch, Kerckhoff & Wishon, and was reorganized as the Fresno City Water Company. In 1926, the facilities were purchased by the California Water Service Company. This company then sold the water system to the City of Fresno in 1931, which operated as a municipal utility. It was first managed under an appointed water board, but currently is a division of the Department of Public Utilities.

Historically, the City’s supply of water consisted of direct pumping from wells drilled into the underground aquifer. Today, groundwater remains one of the City’s primary water supply sources, including 202 active and 56 inactive groundwater wells. The production capacity from the active wells is approximately 403 million gallons per day (mgd) and the total production capacity is 487 mgd, including inactive wells. The wells are located around the City to provide equitable distribution throughout the City’s water system, as described below. Most wells are connected directly into the transmission grid main system (14- to 20-inch diameter pipelines) to convey water throughout the system.

In the 1960s, the City secured a surface water contract made available from the United States Bureau of Reclamation (USBR). The City contracted with USBR for 60,000 acre-feet of water per year from the Friant Division (Millerton Lake) and developed a system to recharge the groundwater basin by “intentional recharge,” percolating the imported surface water supplies in constructed recharge basins. The City’s USBR supplies are conveyed to the City via FID canals. In 1976, the City signed a contract with FID for delivery of surface water supplies from the Kings River based on the City’s pro rata share of FID’s water entitlements. The Kings River water is used for groundwater recharge and treated for potable use.

In 2004, the City also began treating surface water supplies for direct potable use at its first surface water treatment facility located in northeast Fresno (NESWTF). For the period of 2005–2014, this 30 mgd-rated facility provided 10–15% of the City’s potable water supplies. From 2016–2020, this facility produced 15% of the City’s potable water supply, an increase largely attributed to transmission system improvements, which permitted conveying water further into the City’s distribution system, and the City’s lower overall system demands. Also, in 2015, the City commenced operations of its new T-3 Water Storage and modular Surface Water Treatment Facility (T-3 SWTF) in southeast Fresno. In January 2013, the City completed the installation of meters on all single-family residences.

In 2018, the City completed construction of its new 54 mgd surface water treatment facility in southeast Fresno (SESWTF) and large diameter water mains that serve nearly one-half of the City. Production from this facility may ultimately be 80 mgd with the City demonstrating to the Division of Drinking Water (DDW) that the facility is capable of safely running at higher filter loading rates. With the SESWTF operational, along with the NESWTF and T-3 SWTF, the City provided greater than 50% of its potable supply through using surface water for the first time in 2019 and 2020. The City expects to provide half or more of its potable demand using its surface water supply sources going forward.

3.1 Service Area

The City of Fresno presently covers approximately 115 square miles (sq mi) (73,500 acres) consisting largely of single-family residential, commercial, public, and industrial development. It also includes several areas not within the City limits (e.g., County islands), as shown in **Figure 3-1**. With the exception of the Bakman Water Company (Bakman), Pinedale County Water District (Pinedale), Park Van Ness Mutual Water Company (Park Van Ness), California State University Fresno (CSUF), and private groundwater users located within County islands, the City currently serves water to the entire area encompassed by its City limits and will eventually serve out to the Sphere of Influence (SOI) boundary. The SOI is coincident with the City of Fresno General Plan Land Use and Circulation Map, which was adopted in the 2014 General Plan and therefore, includes all lands planned to be annexed by the City at the projected 2056 buildout of the General Plan (City of Fresno Development and Resource Management Department, 2014).

3.1.1 Land Uses within Service Area

According to the General Plan and the City's Planning and Development Department, the City's planning area covers approximately 106,000 acres (165.6 sq mi) comprised of approximately 73,500 acres (115 sq mi) of incorporated land and 32,500 acres (50.8 sq mi) of unincorporated land based on the City's current shapefiles. The total 106,000-acre planning area includes approximately 84,300 acres of developed or planned to be developed land, approximately 18,500 acres of roads, highways, and railroads with no corresponding water demand, and about 2,500 acres outside of the SOI north of the City's most northwesterly portion referred to as the North Area and shown on **Figure 3-1**.

Of the 106,000 acres within the City's planning area, the City's water service area covers 70,400 acres (110 sq mi) of land within the SOI, which includes most of the 73,500 acres of incorporated area and the unincorporated County Islands not within the City limits. As shown in **Table 3-1**, approximately 59,100 acres of the 70,400 acres within the water service area are developed and served water by the City. The remainder consists of vacant land that will be served by the City when it is developed. Residential units make up the largest portion of water demand served by the City, consisting of over 40% of the total served area and almost 90% of the total service connections.

The remaining areas within the City's SOI are served by other systems or are unserved by a water system, consisting of open space and agricultural land, land used by roads, highways, and railroads, as well as the North Area.

Table 3-1. Current Service Area Characteristics

LAND USE TYPE	AREA (ACRES)	% OF TOTAL AREA	SERVICE CONNECTIONS	% OF TOTAL CONNECTIONS
Single-Family Residential	27,700	39.3%	118,775	85.1%
Multifamily Residential	3,700	5.3%	6,087	4.4%
Commercial	4,500	6.4%	11,982	8.6%
Public	5,600	8.0%	2,504	1.8%
Industrial	4,500	6.4%	175	0.1%
Open Space/ Landscape Irrigation	13,100	18.6%	Note 1	
Total	**59,100**		**139,523[2]**	**100%**
Vacant / Partially Vacant[3]	11,300	15.9%	N/A	
Total	**70,400**	**100%**		

Source: Acreage from City of Fresno Geographic Information System Shapefile of Land Uses provided 8/12/20. Number of connections provided by the City for 2020.

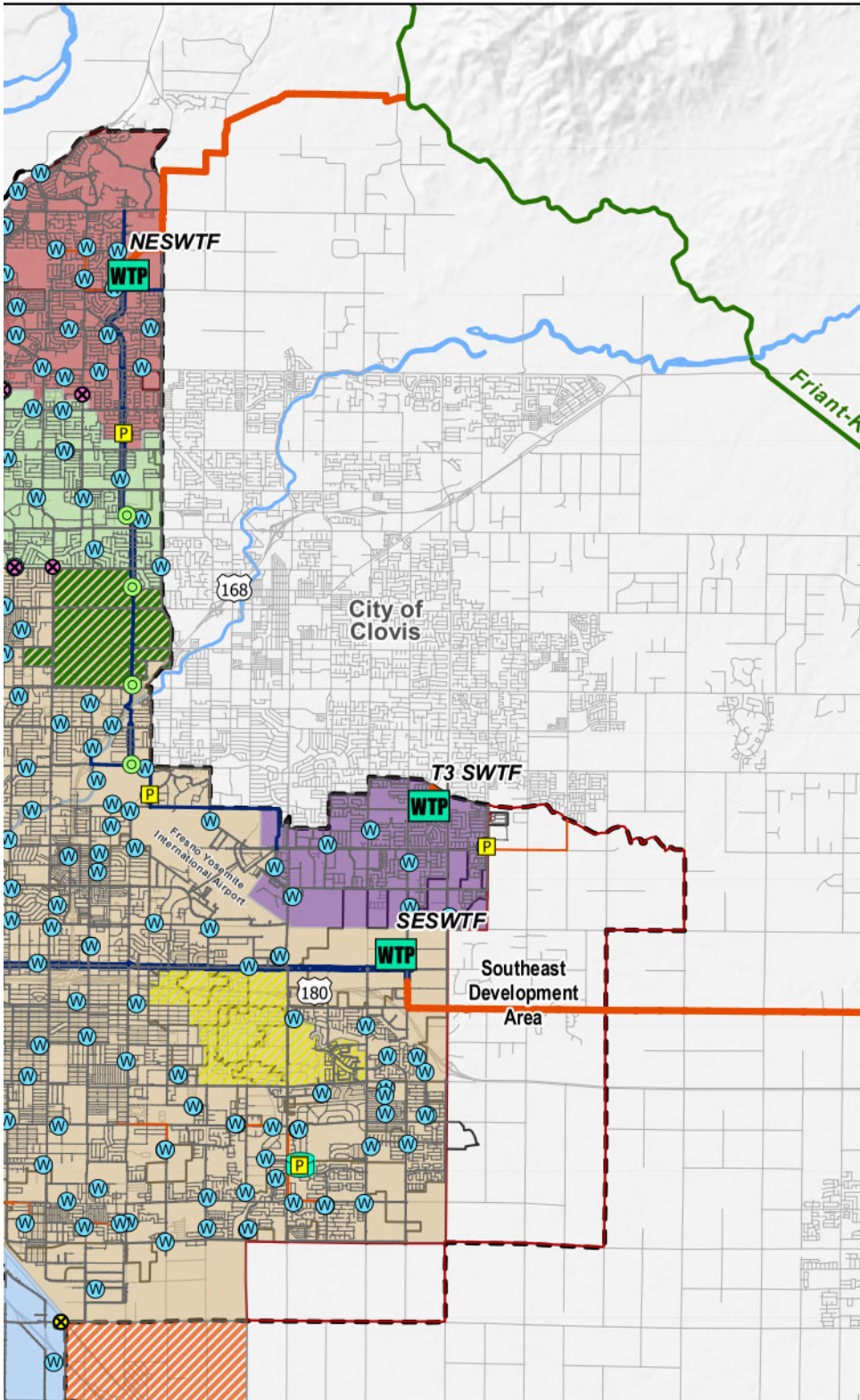
Notes:

1. Dedicated irrigation meters are included in commercial and public meter total.
2. Approximately 3,633 dedicated fire service connections are included in the total services connections, most of which are included in the commercial and public meter total.
3. For partially vacant land, half of the area is included in the zoned land use type and the other half is assumed vacant.

3.1.2 Water System

The City's water system consists of about 1,860 miles of distribution and transmission mains, 202 active municipal groundwater wells, three surface water treatment facilities (SWTFs) with current rated capacities ranging from 4 to 54 mgd, five water storage facilities with pump stations, including one at each of the SWTFs plus two in the distribution system, and three booster pump facilities.

The City's service area spans an approximate 120 feet of elevation difference, declining from northeast to southwest. To help regulate pressure throughout the water distribution system, the City utilizes five pressure zones, as shown on **Figure 3-2**: Highway 41, Shepherd, Sierra, Southwest, and Booster Pump 4 (BP04). The pressure zones are separated by a series of closed or partially closed valves between each zone to prevent or impede flow from one zone to the next, referred to as gate systems. There are four gate systems — Shepherd, Sierra, Southwest, and BP04 — separating the five pressures zones. The Highway 41 Pressure Zone was previously split into two pressure zones divided by a series of 26 gate valves closely following the alignment along Highway 41. However, these zones were combined into a single zone in 2015 by fully opening the Highway 41 gate valves, and as a result are not shown on **Figure 3-2**.


NESWTF
WTP
168
City of
Clovis
T3 SWTF
WTP
Fresno Yosemite
International Airport
SESWTF
WTP
180
Southeast
Development
Area

3.2 Service Area Climate

The City's service area is in California's San Joaquin Valley in Fresno County along Highway 99. The climate of the area is best described as Mediterranean, characterized by hot dry summers and cool winters. Precipitation in the area averages around 11 inches per year, as shown in **Table 3-2**. However, rainfall can significantly vary year to year, with over 18 inches received in 2011 and less than 4 inches received in 2014. The recent drought was marked by four consecutive years (2012 to 2015) of less than 10 inches of rainfall. As shown by the average evapotranspiration (ET_o) and temperature values in **Table 3-2**, the City's water use in the summer months is significantly higher than in the winter, reflecting increased water use for irrigation purposes during the hot, dry summers.

Table 3-2. Average Climate Characteristics

MONTH	ET_o (INCHES)	RAINFALL (INCHES)	TEMP-HIGH (°F)	TEMP-LOW (°F)
Jan	1.17	2.33	56.9	37.4
Feb	1.98	1.8	62.6	39.8
Mar	3.73	1.99	68.4	43.6
Apr	5.43	0.99	73.7	46.9
May	7.33	0.54	81.3	53.2
Jun	8.41	0.19	89.6	59.1
Jul	8.8	0.02	95.7	63.8
Aug	7.82	0.01	94.6	62.5
Sep	5.69	0.07	89.6	57.9
Oct	3.68	0.59	79.3	49.3
Nov	1.85	0.98	66.2	40.6
Dec	1.10	1.83	56.5	36.1
Total/ Average	**56.99**	**11.34**	**76.2**	**49.2**

Source: CIMIS Website: http://www.cimis.water.ca.gov, Station 80 Fresno State (1988 to 2020) Monthly Average Report, October 2020 (downloaded November 30, 2020)

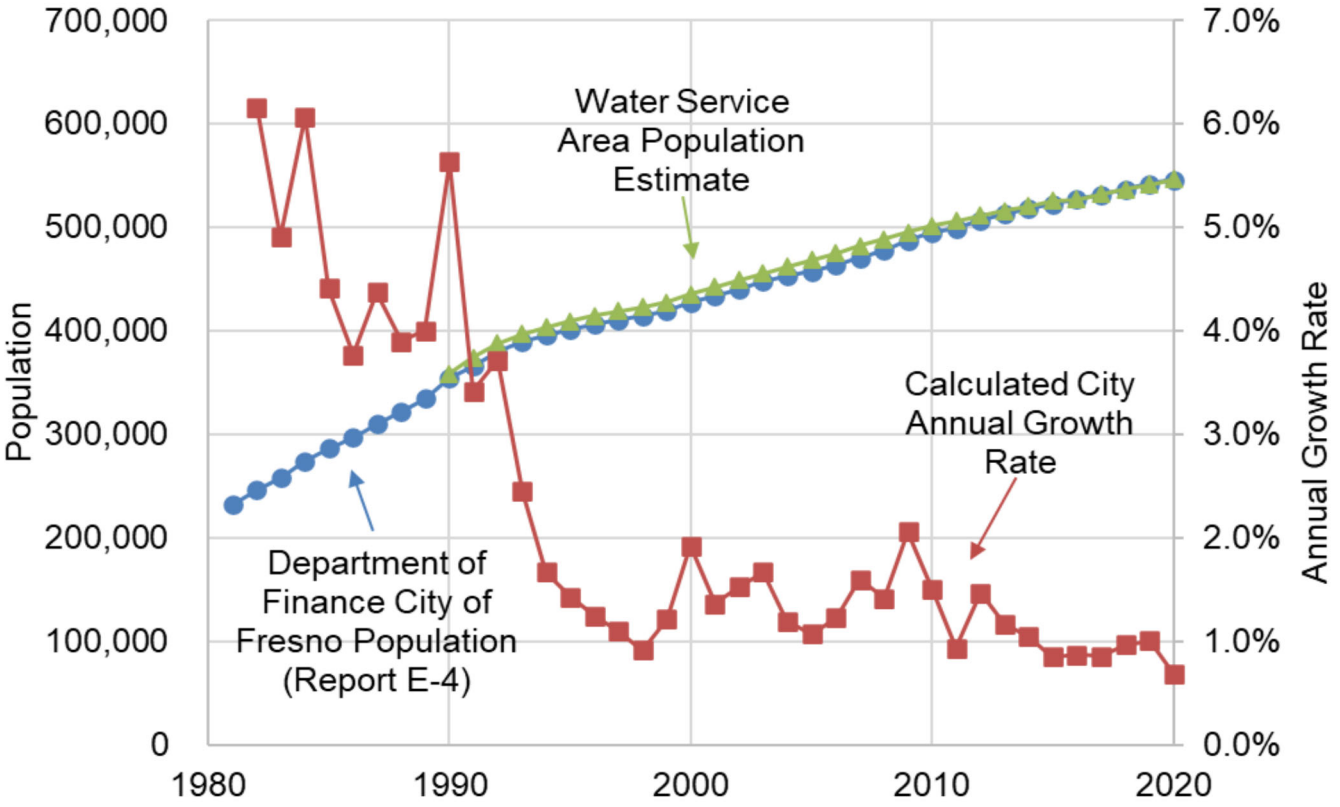
3.3 Service Area Population and Demographics

The City experienced rapid growth since it was founded by the Central Pacific Railroad in 1872 up through the mid-1990s, when the City's annual growth rate was typically greater than 2%. From 1995 to 2015, the annual growth rate has decreased to an average of 1.3%, and since 2015, the rate has not surpassed 1.0%.

The population served by the City Water Division is slightly higher than the City's population after adding unincorporated areas served by the City and removing areas within the City limits served by private water companies, special districts, or private wells. The City acquired County service areas and facilities in 1989, which increased the service area population to slightly greater than the City population since 1990.

Figure 3-3 compares the historic City population to the water service area population since 1990. Water service area population estimates prior to 1990 were unavailable for comparison to the City's population. The City Water Division's methodology for calculating the population of the City's water service area involves summing all the Census tract data for the City's overall service area and subtracting out tracts not served by the City. These tracts included areas served by Pinedale, Bakman, and CSUF, as well as areas outside the City service area, unserved areas within County areas, unserved areas within City areas, and areas with only partial service (i.e., straddling City service areas). Based on the City's methodology, the water service area population was estimated to be 546,502 in 2020, compared to 545,769 for the total City population in January 2020 (California Department of Finance, 2020). For comparison, in the 2015 UWMP, the City Water Division population served was 525,575 compared to the total City population of 522,369 (California Department of Finance, 2020). The City's water service area population in 2020 using the DWR Population Tool is 550,217 and is similar to the population estimate using the City's methodology.

Figure 3-3. City of Fresno and Water Service Area Historic Population



The City's General Plan is the City's primary growth planning document from which the baseline water service area population projection for this UWMP was developed. The General Plan includes population estimates for the City planning area, which includes all areas within City limits and unincorporated areas outside of City limits within the City's SOI, based on projections developed by the Fresno Council of Governments and estimates a buildout population of 921,057 in 2056. In 2017 the Fresno Council of Governments developed population projections in 5-year increments through 2050 for all cities within Fresno County (Applied Development Economics, Inc. and Mintier Harnish Associates, 2017). The Fresno Council of Governments' 2017 report projects the City's population will grow at an annual growth rate ranging from 0.92–1.44%, with an average annual growth rate between 2020 and 2056 (buildout) of 1.03% per year. These population projections and growth rate have been incorporated in the City's General Plan population projections.

According to the City's Planning and Development Department, the City's water service area population is anticipated to continue to grow along with the City, with some slightly higher growth years anticipated within the next 10 years due to multiple large developments planned for completion in the near term. For planning purposes, this UWMP assumes the City will slowly incorporate areas served by others within the City's SOI by buildout in year 2056. As such, the long-term water service area population annual growth rate is expected to be 1.44% between 2020 and 2056 to account for absorbing these areas into the City's water system.

The baseline population projection starts with the 2020 water service area population determined using the DWR Population Tool and grows based on areas expected to be developed by 2030,

as provided by the City's Planning Department, and then linearly beyond 2030 to meet the buildout population in 2056. The City's 2020 population estimate includes the entire City planning area, including areas not served water by the City and areas currently outside the City limits but within the SOI, and is higher than the current water service area population. The water service area population projection assumes the City will incorporate all areas currently served by others and grow to provide water service to all areas within the SOI by buildout. Because the water service area has more growth potential than the City planning area, the annual average growth rate as calculated ranges from 1.1–2.1% between 2020 and 2056, with an average annual growth rate of approximately 1.56% between 2020 and 2045 that continues to slow through the buildout. **Table 3-3** shows the water service area population projections through 2045 in five-year increments.

Table 3-3. Current and Projected Population (DWR 3-1R)

POPULATION SERVED	2020	2025	2030	2035	2040	2045
TOTAL	**550,217**	**609,433**	**674,677**	**719,327**	**765,278**	**812,529**

3.3.1 Other Social, Economic, and Demographic Factors

Most recently, the City is experiencing significant impacts due to the global pandemic caused by COVID-19 (SARS-CoV-2) virus. In March 2020, the State issued a stay-at-home order that forced many businesses to close and other businesses to require residents to continue work only from their home to slow the spread of the virus. Additionally, the forced closure of several businesses caused a historic increase in unemployment across the US and a resulting economic recession. While all the impacts of COVID-19 are not entirely known at this time, it has caused a shift in water use by customer class. In 2020, residential demands increased by over 8% from 2019 demand, while commercial and industrial water use decreased by over 5%. This shift is expected to be temporary with an anticipated return to previous levels once all stay at home orders are lifted and businesses can reopen. However, the economic recession could have longer term impacts to the region.

4 CITY OF FRESNO
Water Use Characterization

This chapter describes and quantifies 2020 water use and projected water use through 2045 within the City's service area.

Water consumption in the City is characterized by the typical demand sectors of residential, commercial, institutional, industrial, and irrigational. The difference between production and consumption is losses, which may be attributed to system leaks, meter inaccuracies, fire flows, theft, unmetered use, or other factors.

IN THIS SECTION

- Distribution System Water Losses
- Past and Current Water Use
- Projected Water Use

4.1 Non-Potable Versus Potable Water Use

The City serves its customers potable water for residential, commercial, institutional, industrial, and landscape irrigational demands through its potable water distribution system.

The City also diverts raw surface water obtained from the United States Bureau of Reclamation (USBR) and Fresno Irrigation District (FID) to recharge basins throughout the service area. The City coordinates with FID for the delivery of the recharge water, utilizing FID's existing system of channels and pipelines to convey the raw water, and with Fresno Metropolitan Flood Control District (FMFCD) to deliver water to FMFCD's stormwater retention and recharge basins or its own recharge basins. The raw surface water recharges the groundwater basin to sustain the groundwater supply for the City. The groundwater recharge volume can vary based on surface water supply availability and is represented as an addition to annual groundwater supplies as discussed in **Chapter 6**. In addition, the City serves a limited number of customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively. The recycled water demands are discussed in **Section 6.4**.

4.2 Past, Current, and Projected Water Use by Sector

The following sections document the past and current water use for each sector, and the projected water use through 2045.

4.2.1 Water Use Sectors

Records of historical water consumption serve as the basis for developing water demands by water use sector. Water consumption is the volume of water measured at each metered service.

The City tracks water consumption across different water use sectors listed in the California Water Code (CWC), including:

- Single-Family Residential
- Multifamily Residential
- Commercial and Institutional / Governmental
- Industrial
- Landscape
- Distribution System Losses

In addition to the water uses listed in the CWC, the City participates in exchanges and transfers, provides temporary travel meters for temporary water use, and diverts non-potable surface supplies for groundwater recharge, described below. The City does not provide water for sales to other agencies, saline water intrusion barriers, or agricultural use.

4.2.1.1 Exchanges

Since 1976, the City has had a water exchange agreement with FID for delivery of the City's percolated wastewater effluent — considered equivalent to tertiary treatment — to FID canals. This is not counted as a water use in this chapter and is discussed as a water supply in **Section 6.6.1.2**.

4.2.1.2 Other

A small, quantified water demand has been classified as “other” to account for temporary travel or construction meters for water used for dust control. This use type typically accounts for less than one percent of total water use.

4.2.2 Distribution System Water Losses

Real losses, as defined in the American Water Works Association (AWWA) Water Audit tool are:

“Physical water losses from the pressurized system (water mains and customer service connections) and the utility’s storage tanks, up to the point of customer consumption. In metered systems, this is the customer meter; in unmetered situations, this is the first point of consumption (stop tap/tap) within the property. The annual volume lost through all types of leaks, breaks, and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks, and overflows.”

The past five years of distribution system losses are listed in **Table 4-1**, and the results of the 2016-2019 AWWA Water Audit Tool are provided in **Appendix E**. The AWWA Audit Worksheet was not completed for 2020 prior to the submittal of this plan, and the volume of water loss is estimated as the difference between water produced and metered water consumed for each calendar year period.

The overall consumption of water in the system is placed into four different categories:

- Billed Metered Usage
- Billed Unmetered Usage
- Unbilled Metered Usage
- Unbilled Unmetered Usage

The water losses for the system were found by determining the difference between the overall amount of water supplied to the community and the apparent system losses. The City’s system losses have many different possible causes such as hydrant flushing/testing, construction, firefighting, system leaks, water main breaks, and meter error. The estimated loss in 2020 is 9,568 acre-feet (AF), which is the difference between metered production and metered consumption and is approximately 8% of the overall system production. Based on the previous four years of audits, the City has not had to apply meter adjustments in the AWWA Water Audit Tool, and the water losses report is the difference between water produced and metered water consumed each year. It is anticipated that the estimated 2020 water loss volume in **Table 4-1** will be the water losses reported on the 2020 AWWA Audit when it is certified.

Currently, the City does not have a water loss standard but intends to evaluate programs to reduce water losses in their Metro Plan that is currently being updated. The City is also tracking forthcoming water use standards, which will include a water loss standard that is planned to be adopted by the Water Board within the next few years.

Table 4-1. DWR 4-4R 12 Month Water Loss Audit Reporting

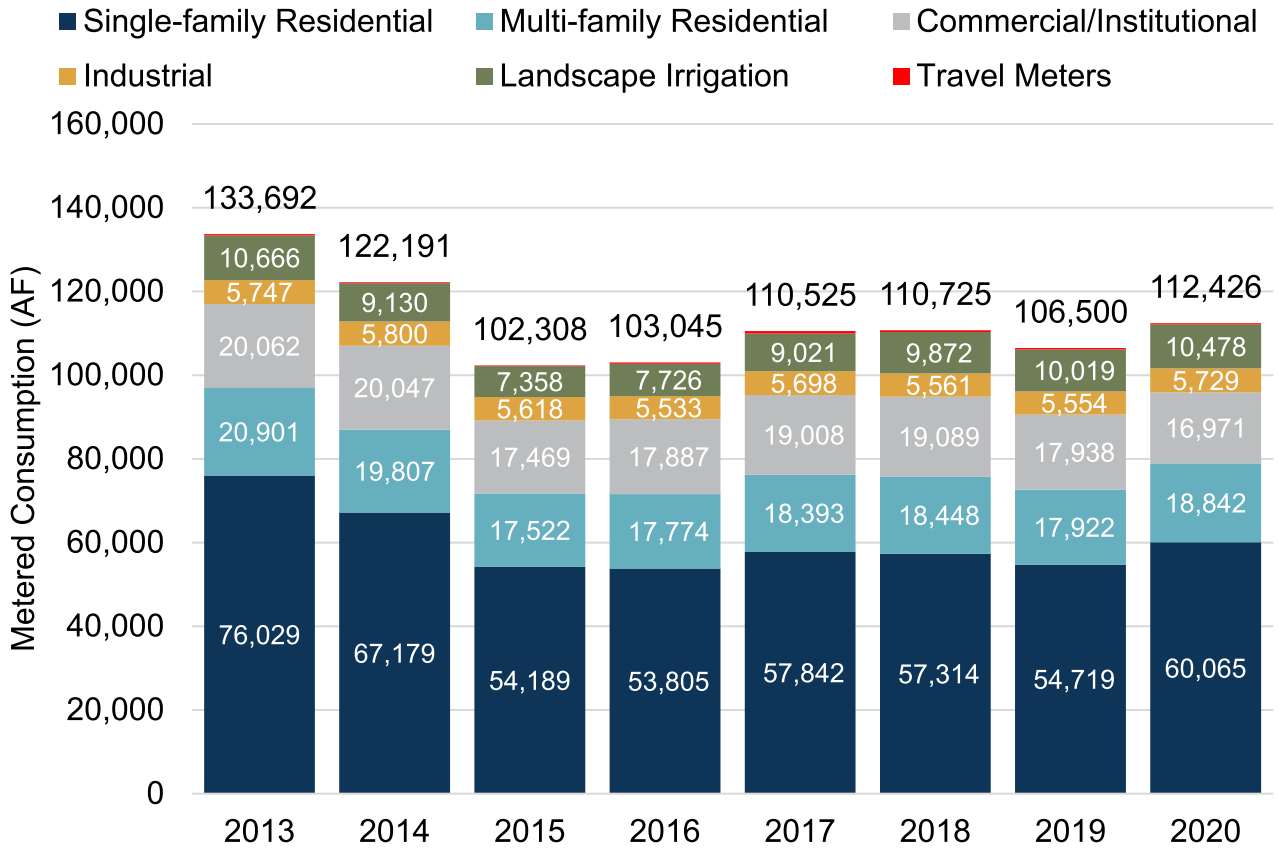
REPORT PERIOD START DATE		VOLUME OF WATER LOSS, AFY	PERCENT LOSS OF PRODUCTION
MM	YYYY		
1	2016	9,036	8.0%
1	2017	10,235	8.5%
1	2018	9,028	7.5%
1	2019	9,059	7.8%
1	2020	9,568	7.8%

For 2016 through 2019, volume of water loss is taken from the AWWA Water Audit Tool. For 2020, the volume of water loss is the difference in metered production and metered consumption.

4.2.3 Past and Current Water Use

Since 2013, all water services in the City's water service area have been metered. Prior to 2013, the City estimated single-family residential water use, since these services were not equipped with meters, by subtracting all other metered uses (commercial, institutional, industrial, and irrigational), plus 10% assumed losses, from production data. Water consumption for the City's water service area by customer type for 2013–2020 is shown on **Figure 4-1**.

Figure 4-1. Historical Consumption by Customer Type (2013–2020)



As shown in the figure, single-family residential water use has decreased more than 20,000 AFY since the Single-Family Metering Program was completed in 2013. Multifamily residential, commercial, and institutional services have historically been metered, and consumption has also decreased since 2013, with industrial users and landscape irrigation consumption at similar levels to 2013 consumption, even as new customers are connected to the City's water system. Landscape irrigation demands did decrease in 2015 and 2016, likely due to the drought restrictions, and continue to recover after the drought ended in 2017.

Table 4-2 provides the breakdown of actual water use by sector type in calendar year 2020. As shown in **Table 4-2**, single-family residential water use is the largest use type in the City and accounted for almost 50% of potable water use in 2020. Multifamily residential use was the second largest, accounting for approximately 15% of water sales in 2020. Together, residential water use accounts for about 65% of all potable water uses in the City's service area. The remaining potable water uses consist of mainly commercial and institutional water use, which are tracked together and included only on the commercial use row on **Table 4-2**, followed by landscape irrigation and industrial usage. Distribution losses accounted for approximately 8% of potable water used in 2020 (per **Section 4.2.2**).

Table 4-2. Actual Demands for Water: Potable (DWR 4-1R)

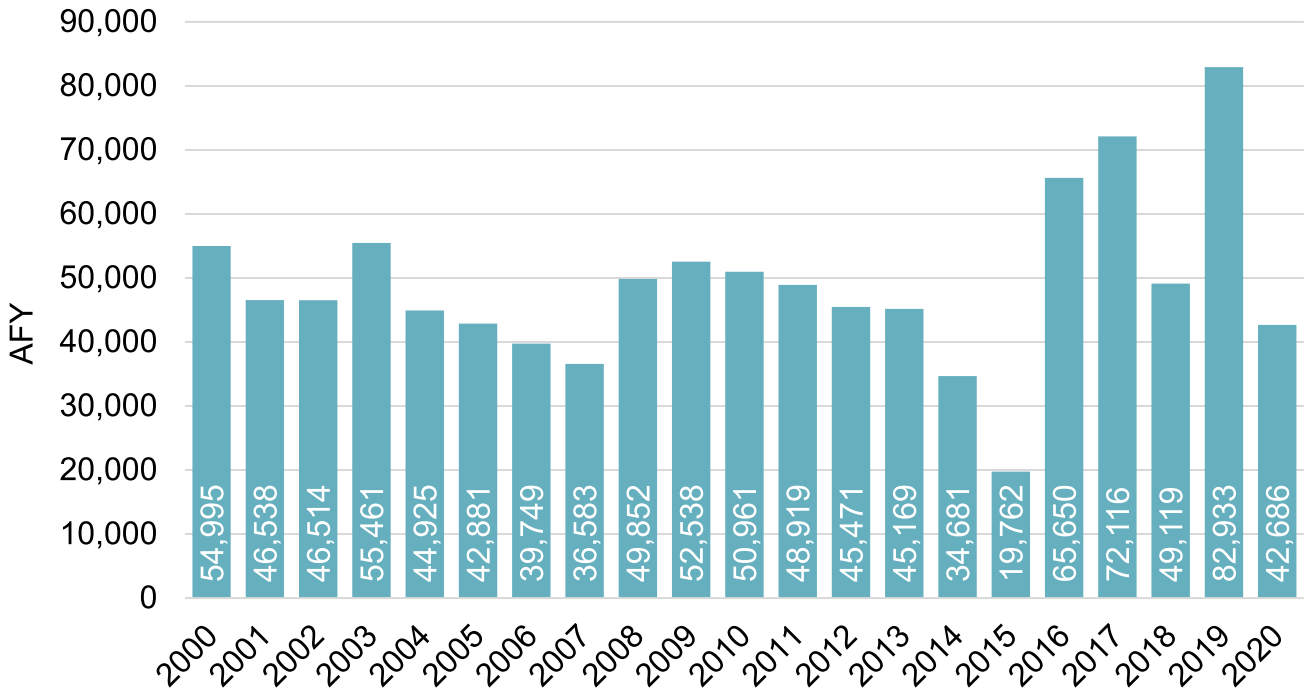
USE TYPE	ADDITIONAL DESCRIPTION	LEVEL OF TREATMENT WHEN DELIVERED	2020 VOLUME	PERCENT OF TOTAL
Single Family		Drinking Water	60,065	49.2%
Multi-Family		Drinking Water	18,842	15.4%
Commercial		Drinking Water	16,971	13.9%
Industrial		Drinking Water	5,729	4.7%
Institutional/ Governmental	See Note 1	Drinking Water	---	---
Landscape		Drinking Water	10,478	8.6%
Other	Travel Meters	Drinking Water	340	0.3%
Losses		Drinking Water	9,568	7.8%
Total:			**121,993**	**100%**

Note:

1. Institutional and Governmental water usage is included in the Commercial use type.

Figure 4-2 shows the historic volume of the City's raw surface water used for groundwater recharge since 2000. Over the last 20 years (2000–2020), the average annual intentional recharge of surface water was 49,240 AFY. Total recharge has ranged from a high of 82,900 AF in 2019 and a low of 19,700 AF in 2015. Also, total recharge volumes in 2016, 2017, and 2019 were three of the highest volumes in the last 20 years. The increases were due to over 30% increase in recharge at City basins from the addition of several basins (Nielsen, Fancher) and proactive maintenance of basins to maximize percolation capacity. The annual variability between years is caused by several factors, including basin availability, water delivery season, pond maintenance, or length of wet seasons.

Figure 4-2. Historic Recharge of City Surface Water



4.2.4 Projected Water Use

4.2.4.1 Land Use Projections

The potable demand projections through 2045 for normal water use follow the methodology for land use-based projections described in Appendix K of the 2020 Urban Water Management Plan (UWMP) Guidebook. Under this methodology, existing land use and demand is accounted separately from future land use and demand. This allows different demand factors to be applied to current land use areas and future land use areas. Future land use areas represent future customers and developments that are expected to be more water efficient than existing land uses and buildings due to the California Plumbing Code (CPC) and use of higher efficiency appliances and landscapes.

The existing and future land use acreage was sourced from the City's Geographic Information System (GIS) database and the City's General Plan. The existing land use shapefile and associated acreage for each land use classification were used to represent 2020 land use data. Areas not served by the City were excluded from the existing land use shapefile. The future land use shapefile corresponds with the planned land use at buildout as described in the City's General Plan representing the year 2056. Although the City does not have any plans to serve areas currently served by others within the City limits, all areas within the City Sphere of Influence (SOI) were assumed to be served by the City by buildout for conservative planning purposes. **Table 4-3** lists the land use acreage by land use category for the 2020 and buildout 2056 water service areas.

The land use acreage between 2020 and 2056 was estimated in 5-year increments based on areas planned to be developed by 2030 from the City's Planning Department, and by linearly interpolating the remainder of the change in acreage for each land use category between 2030 and 2056. **Figure 4-3** shows the existing and projected land use by customer class used to develop the projections.

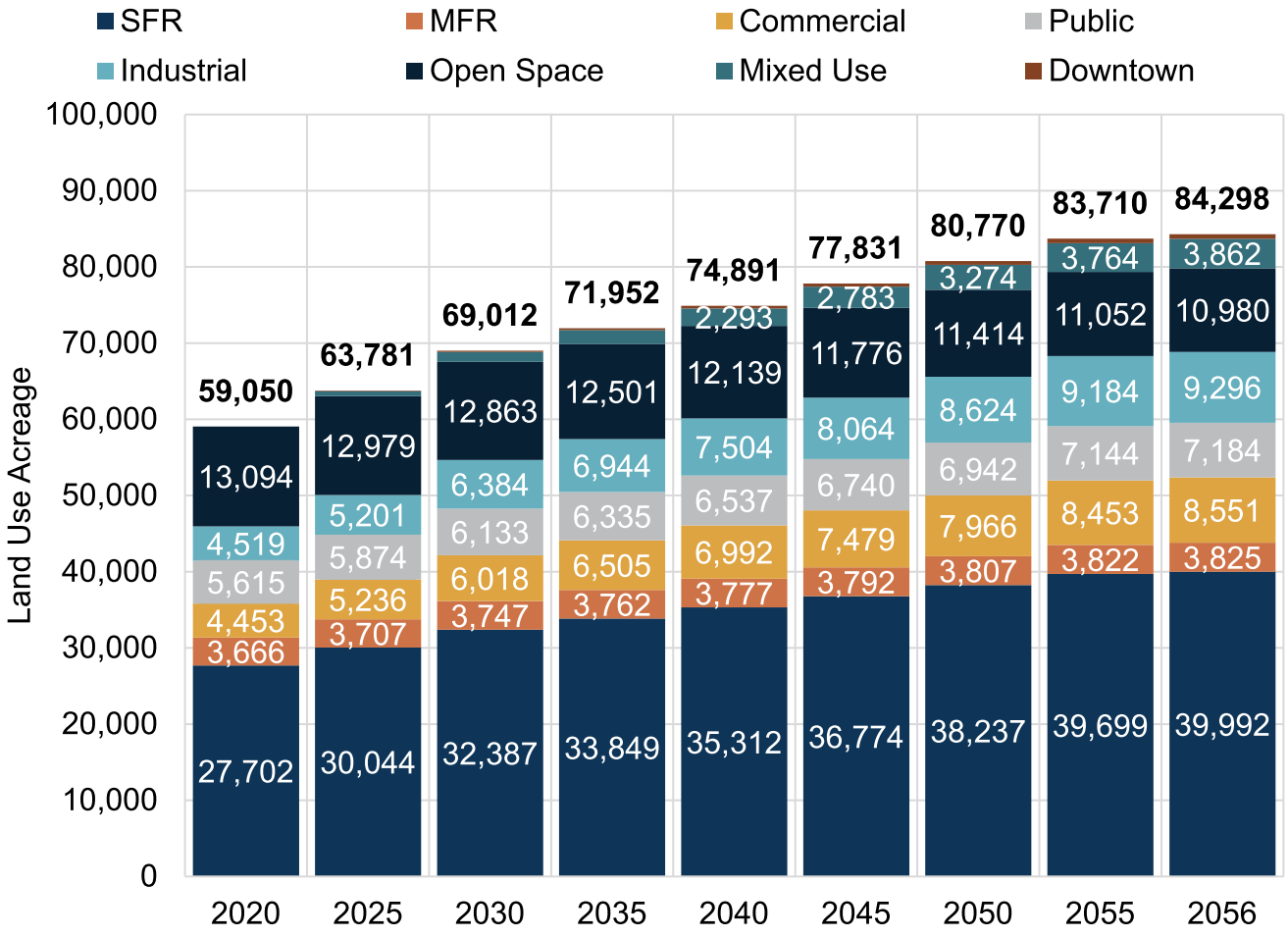
Table 4-3. Existing and Future Water Service Area Acreage

LAND USE CATEGORY	2020 WATER SERVICE AREA[1, 3, 4]		2056 WATER SERVICE AREA[2]	
	ACRES	PERCENT	ACRES	PERCENT
Single-Family Residential	27,700	47%	40,000	47%
Multifamily Residential	3,700	6%	3,800	5%
Commercial	4,500	8%	8,600	10%
Public Facility	5,600	9%	7,200	9%
Industrial	4,500	8%	9,300	11%
Open Space/ Landscape Irrigation	13,100	22%	11,000	13%
Mixed Use[3]	0	0%	3,900	5%
Downtown[3]	0	0%	600	1%
TOTAL	**59,100**	**100%**	**84,300**	**100%**

Notes:

1. Acreage from City of Fresno GIS Shapefile of Land Uses provided 8/12/20 and reduced to the City's water service area (excludes Pinedale, Bakman, and California State University Fresno and unserved areas outside the City limit and SOI).
2. Future Land Use Shapefile provided by the City on 8/12/20 and aligns with the General Plan for buildout in year 2056. The buildout service area acreage listed excludes the Fresno-Clovis Regional Wastewater Reclamation Facility, land used for road, highways, and railroads, and the north area outside of the SOI.
3. Mixed use and downtown land use categories are not in the existing land use shapefile. They are described in the General Plan as new designations for redevelopment of existing areas that contain a mix of land uses.
4. Approximately 11,300 acres of non-water demanding vacant/partially vacant land is excluded from the 2020 water service area acreage.

Figure 4-3. Existing and Projected Land Use



Note: Acreage for Mixed-use and Downtown land use types are not shown every year for clarity, but are included in the total acreage value.

4.2.4.2 Demand Factors and Future Savings

Land use-based water demand factors were developed using 2018 metered consumption data matched to 72 categories of land use data. These demand factors were applied to the 2020 land use acreage by category to develop the demand projection beginning in 2020. Demand factors for land uses that grow over time and represent new developments were assigned a lower demand factor than the demand factors for existing development. Additionally, demand factors were assumed to slowly reduce over time due to passive conservation, which includes the replacement of older water fixtures and appliances with more efficient types now required as part of the CPC. The passive conservation savings are projected to be greater for existing customers than future customers because future customers are already assumed to have a lower water demand factor and meet the plumbing code.

Future savings due to passive conservation were developed using the Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool. The Tracking Tool is an Excel tool that can

incorporate water service area-specific data to estimate natural replacement rates of fixtures and future savings based on the CPC.

Table 4-4 lists the passive conservation savings assumption incorporated in the potable demand projections. Existing unit demand factors are reduced by the percentages listed to develop the future development unit demand factors. As shown in the table, this assumes future residential and non-residential dwelling units are 10% and 5% more water efficient, respectively, than existing dwelling units due to changes in the plumbing code and ever-increasing new water efficient technology. **Table 4-5** compares the total potable demand projections without the estimated savings due to passive conservation from 2025–2045.

Table 4-4. Passive Conservation Savings Assumptions

LAND USE TYPE	FUTURE DEVELOPMENT UNIT DEMAND FACTOR REDUCTION[1]	EXISTING DEVELOPMENT ANNUAL PASSIVE CONSERVATION SAVINGS[2]	FUTURE DEVELOPMENT ANNUAL PASSIVE CONSERVATION SAVINGS[3]
Residential/Mixed Use	10%	0.20% per year	0.04% per year
Commercial/Downtown	5%	0.05% per year	0.01% per year
Public	5%	0.05% per year	0.01% per year
Industrial	5%	0.05% per year	0.01% per year
Open Space/ Landscape Irrigation	0%	0% per year	0% per year

Notes:

1. Existing (2020) unit demand factors are reduced by the percentages listed to develop the future development unit demand factors.
2. Existing development annual passive conservation savings were developed using the AWE Water Conservation Tracking Tool.
3. Future development passive conservation savings are assumed to be one-fifth the rate of existing development passive conservation savings.

Table 4-5. Projected Future Savings for Potable Demands, AF

	2025	2030	2035	2040	2045
Total Potable Demand with no conservation	137,521	149,361	157,204	165,047	173,160
Estimated Passive Conservation	1,017	2,005	2,994	3,973	5,213
TOTAL POTABLE DEMAND WITH PASSIVE CONSERVATION	**136,504**	**147,356**	**154,210**	**161,074**	**167,947**

4.2.4.3 Demand Projections

Table 4-6 provides the projected demands by use type based on the methodology described above. **Table 4-7** includes the projected raw surface water used for groundwater recharge through the planning period for normal years. The City intends to recharge an average of 60,000 AFY beyond 2020, corresponding with the average recharge volume from 2016 through 2020, and gradually increase recharge by about 540 AFY each year. In 2025, the normal year groundwater recharge is projected to be 62,700 AFY and will continue to increase to 73,500 AFY by 2045. The actual volume recharged is based on the available surface water supplies each year, as well as available basin capacity and other factors, and may be lower in dry years or higher in wet years.

Table 4-6. Projected Demands for Water: Potable (DWR 4-2R)

USE TYPE	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
		2025	2030	2035	2040	2045
Single Family		76,255	80,429	82,934	85,437	87,936
Multi-Family		19,000	20,654	21,737	22,831	23,935
Commercial		19,052	21,135	22,587	24,041	25,496
Industrial		7,410	9,003	9,922	10,841	11,758
Institutional/ Governmental	See Note 1					
Landscape		4,490	5,035	5,422	5,809	6,196
Other	Travel Meters	200	200	200	200	200
Losses		10,097	10,900	11,408	11,917	12,426
TOTAL:		**136,504**	**147,356**	**154,210**	**161,076**	**167,947**

Note 1: Institutional and Governmental water usage is included in the Commercial use type.

Table 4-7. Projected Demands for Water: Non-Potable (DWR 4-2R)

USE TYPE	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
		2025	2030	2035	2040	2045
Groundwater Recharge	Raw-Water	62,700	65,400	68,100	70,800	73,500
TOTAL:		**62,700**	**65,400**	**68,100**	**70,800**	**73,500**

4.2.4.4 Future Conservation

In 2018, following the unprecedented drought, California Legislature established a framework centered on "Making Water Conservation a California Way of Life." The goal was to help the State better prepare for droughts and climate change by establishing statewide water efficiency standards and incentivizing recycled water (California Department of Water Resources, State Water Resources Control Board, November 2018). The resulting legislation of Senate Bill 606 and Assembly Bill 1668, along with future regulations, will have impacts on water providers over the coming years, requiring indoor, outdoor, and commercial, industrial, and institutional water use goals, water loss standards, annual water budgets, and documented preparation for long-term water shortages. All the water use goals together will form a total urban water use objective specific for each water agency. The Department of Water Resources (DWR) has provided recommended standards for indoor residential water use, and other urban water use goals are currently being developed and are expected to be released in late 2021. The State Water Resources Control Board is anticipated to adopt the element that includes the total water use objective in 2022, and agencies will begin reporting their water use in accordance with their urban water use objective beginning in 2024, with compliance anticipated by 2027. Because most of the water use goals are unknown, and none has been adopted by the State, the City's total urban water use objective is unknown and was not incorporated into the demand projections herein. However, the City is tracking the water use efficiency standards and goals and is aware it may need to implement additional conservation above what is presented in these projections to meet its total urban water use objective as mandated by the State in the future. The City is considering these higher conservation demand projections within a demand envelope in the current Metro Plan update.

4.2.5 Characteristic Five-Year Water Use

A new component of the UWMP is to prepare a five-year drought risk assessment (DRA) to evaluate water service reliability for a drought lasting five years from 2021–2025. The five-year DRA assumes potable water demand is unconstrained, and the City will continue to meet all projected potable demands. The raw water demand varies based on the availability of surface water supplies for groundwater recharge. The recycled water supply is not impacted by the drought, and recycled water demands are at normal year projections for the five-year drought. Projected water demands for years 2021–2025 for the DRA are included in **Section 7.2**.

4.3 Water Use for Lower Income Households

The Fresno Council of Governments (COG) prepared an update to the Regional Housing Needs Allocation (RHNA) to cover the period of January 1, 2015–December 31, 2023. The City subsequently developed its own Housing Element based on the COG RHNA for the planning period of December 31, 2015–December 31, 2023. The City's current Housing Element was adopted on April 13, 2017.

The City's Housing Element specifies the City will develop 8,955 new housing units through 2023 for extremely low, very low, and low income levels (City of Fresno Development and Resource Management Department, 2017). The City's Planning and Development Department prepares Housing Element Annual Progress Reports to report the progress of the RHNA and housing goals. The City of Fresno 2019 Housing Element Annual Progress Report details that 909 lower income units are approved or permitted (City of Fresno Planning and Development Department,

2020). The remaining number of lower income units needed over the RHNA 2013–2023 period, when subtracting the approved and permitted units, is 8,046.

Table 4-8 includes the Housing Element identified available single-family and multifamily acres to be developed and dwelling units for Extremely Low, Very Low, Low, Moderate, and Above Moderate income levels (City of Fresno Development and Resource Management Department, 2017). This data was used to determine the number of acres of both single-family and multifamily land use that needs to be developed by 2023 to meet the remaining 8,046 lower income units target for RHNA. The identified acres needed for low-income development by 2023 was applied to the average water demand factor for single-family and multifamily land uses to project the lower income water demands through 2023 to meet RHNA, shown in **Table 4-8**.

Table 4-8. Lower Income Dwelling Units and Acres to be Developed through 2023 and Estimated Water Demand

FRESNO HOUSING ELEMENT	SINGLE-FAMILY RESIDENTIAL	MULTIFAMILY RESIDENTIAL	TOTAL
Acres Available for Low-Income Development	3,163.6	1,310.9	4,474.5
Total Dwelling Units	13,457	21,526	34,983
Dwelling Unit per Acre	4.25	16.42	
Dwelling Unit Needed to Meet RHNA	3,095	4,951	8,046
Acres to be developed to Meet RHNA	727.6	301.5	1,029.1
Average Water Demand Factor (AF/ Acre)	2.54	5.13	
Low-Income Demand to meet RHNA from years 2020 – 2023 (AF)	1,847	1,545	3,392
Annual Low-Income Demand to meet RHNA (AFY)	**462**	**386**	**848**

Based on the estimated low-income water demand to meet the RHNA requirements by 2023, the annual projected low-income households demand is 462 AFY for single-family residential and 386 AFY for multifamily residential. For the purposes of this plan, the current RHNA projected low-income growth and water demands was applied through the UWMP planning period of 2045 and is presented in **Table 4-9**. However, lower income demands beyond 2023 will be based on the next Housing Element and RHNA Update expected in 2023 and may change in the future. All housing units and associated population are included in the adopted General Plan, and the demands for these units that occur within the water service area boundaries are included in the future water demands presented in this plan.

Table 4-9. Lower Income Household Projected Water Demands

LOW INCOME DEMAND	2025	2030	2035	2040	2045
Single-Family Residential Demand	2,308	2,308	2,308	2,308	2,308
Multifamily Residential Demand	1,932	1,932	1,932	1,932	1,932
TOTAL (AF)	**4,240**	**4,240**	**4,240**	**4,240**	**4,240**

4.4 Climate Change Considerations

Climate change impacts were considered in the North Kings Groundwater Sustainability Plan (NKGSP) based on DWR's Guidance for Climate Change Data Use during Groundwater Sustainability Plan (Department of Water Resources, 2018) and the related Sustainable Groundwater Management Act climate change website.[1] As documented in the NKGSP, the DWR climate change datasets were developed for the California Water Commission's Water Storage Investment Program (WSIP), are consistent with other DWR programs, are based on the best available science, build on previous efforts, incorporate the latest advances in projections, and follow the Climate Change Technical Advisory Group guidance (Provost & Pritchard, November 2019).

Changing precipitation and evapotranspiration (ETo) rates are expected to have the greatest impact on future demands, especially for outdoor water use. The WSIP climate change data sets estimate minimal changes to precipitation due to climate change from the historic period. The same datasets predict the ETo rate estimates with climate change will increase 3% by 2030 and up to 8% by 2070. More specifically, the ETo rate is predicted to increase the most in typically low ETo months (winter) and when irrigation is limited. The ETo rate is also predicted to be only slightly higher than historic in warmer months during the irrigation season. While higher ETo rates would increase irrigation demands, they are not anticipated to substantially impact the City's urban water use. The climate change impacts to supply sources are discussed in the supply chapter of **Section 6.8.2.1**.

[1] https://data.cnra.ca.gov/dataset/sgma-climate-change-resources

CITY OF FRESNO

5 SBX7-7 Baseline, Targets and 2020 Compliance

Senate Bill x 7-7 (SBx7-7) was signed into law in 2009 and requires the State to achieve a 20% reduction in per capita water use by December 31, 2020, with an interim target of 10% reduction by December 31, 2015.

IN THIS SECTION

- Baselines & Targets
- 2020 Compliance

The legislation requires each urban water supplier to develop and include in its Urban Water Management Plans (UWMPs) estimates of: 1) *baseline* daily per capita water use; 2) daily per capita water use *target*; 3) daily per capita water use *interim target*; and 4) *compliance* daily per capita water use. The UWMP must also include the basis for determining the estimates, with references to supporting data.

The Department of Water Resources (DWR) developed the Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use Guidebook (GPCD Methodologies Guidebook) to provide appropriate methodologies and criteria guidance (California Department of Water Resources, Feb 2016).

The baseline and 2020 per capita water use targets were calculated in the 2015 UWMP and are provided in **Appendix C**. There have not been significant changes in the City's service area since 2015, thus the calculations included in the 2015 Plan are still valid for compliance in this 2020 UWMP.

5.1 General Requirements for Baseline and Target

Methodologies consistent with those described in the GPCD Methodologies Guidebook were used to develop baselines and targets. The selected procedure used to develop the required SBx7-7 estimates includes the following basic steps:

1. Calculate baseline water use, which is the average gross daily water use per capita, reported in gallons per capita per day (GPCD), based on gross water use and service area population for a continuous 10-year period ending no earlier than December 31, 2004.
2. Calculate urban water use target using one of the four methods described below.
3. Check and confirm the urban water use target using the five-year running average.
4. Calculate the interim urban water use target (equal to the average of the baseline and confirmed urban water use target).
5. Calculate the compliance daily per capita water use (equal to the gross daily water use per capita during the final year of the reporting period).

DWR allows the urban water supplier to choose one of four different methods to calculate the urban water use target in Step 2 above.

- **Method 1** involves calculating the target based on 80% of baseline daily per capita water use and the interim target based on 90% of the baseline daily per capita water use.
- **Method 2** involves calculating the per capita daily water use by using the sum of performance standards applied to indoor residential use, landscaped area water use, and commercial, industrial, and institutional uses.
- **Method 3** calculates the water use target as 95% of the applicable state hydrologic region target as stated in the draft 20x2020 Water Conservation Plan.
- **Method 4** is an approach developed by DWR that uses a spreadsheet to calculate estimated water savings factors to estimate targets.

The City selected Method 1 for determining its 2015 Interim and 2020 Final urban water use targets during the preparation of its 2010 UWMP. This selection was made after reviewing the four alternative methods available. Rather than duplicating the evaluation for this plan update, the reader is directed to Appendix I of the City's 2010 UWMP for details, as the previous City adopted evaluation is still applicable and results in the same target method selection.

5.2 Service Area Population

The City's 2020 service area population was estimated using the DWR Population Tool consistent with DWR Methodology 3 (Service Area Population) and the 2015 UWMP. Shapefiles of the City's water service area were loaded into the DWR Population Tool along with available residential service connection numbers to develop service area populations for the corresponding census years. The DWR Population Tool, provided in **Appendix F**, estimated the City's water service area population is 550,217. The DWR Population Tool provides a population based on the 2000 and 2010 census data and, published effective as of April 1 of the census year, the water service area during each census year and the number of water service connections. For the 2020 population, the number of services from December 31, 2020, was used, and the 550,217 population is estimated as of the end of 2020.

5.3 Gross Water Use

The City's gross water use is comprised of surface water contracted for delivery of allocated supplies from USBR and FID and groundwater produced by its municipal wells. The basis of gross water use are the meters installed at the City's North Fresno Wastewater Reclamation Facility, Southeast Surface Water Treatment Facility, and T-3 Water Storage and modular Surface Water Treatment Facility, and each of its municipal groundwater wells, which are equipped with flow meters. DWR Methodology 1 (gross water use) provides the opportunity to make adjustments and deductions in the reported gross water use for factors such as: meter errors, changes in distribution storage, indirect recycled water use, agricultural water use, and process water use. The City's gross water use has not been adjusted for any of these factors. Therefore, the total water use shown in **Table 4-2** is the City's gross water use.

5.4 Baselines and Target Summary

The City's 2015 UWMP reviewed and updated the 10-year and five-year Baseline Daily Per Capita Water Use and 2020 Target, included in **Table 5-1**. The continuous time period used in the 2015 UWMP for the 10-year baseline period is 1999–2008 and has an associated average daily per capita water use of 309 GPCD. The continuous time period that was used in the 2015 UWMP for the five-year target confirmation baseline period was 2003–2007, which has an associated average daily per capita water use of 304 GPCD. The confirmed 2020 target was established as a 20% reduction from the 10-year baseline per capita use and is 247 GPCD. Refer to **Chapter 5** of the City's 2015 UWMP for more information on how the baselines and targets were developed.

Table 5-1. Per Capita Water Use Baseline and 2020 Target

BASELINE PERIOD	TIME PERIOD	AVERAGE BASELINE GPCD (GPCD)	CONFIRMED 2020 TARGET (GPCD)
10 Year	1999 – 2008	309	247
5 Year	2003 – 2007	304	

5.5 2020 Compliance Daily Per-Capita Water Use (GPCD)

This section presents the procedure used to meet the requirements of SBx7-7 as defined in the Water Conservation Act of 2009 as incorporated into Division 6 of the California Water Code, commencing with Section 10608 of Part 2.55.

5.5.1 Meeting the 2020 Target

The determination of 2020 target compliance is based on gross water use for the 2020 calendar year, which was 121,993 acre-feet (see **Table 4-2**), and a service area population of 550,217 as of December 31, 2020 (see **Table 3-1**). The resultant actual per capita water use for the City in 2020 was 198 GPCD. As such, the City has met and exceeded the 2020 target of 247 GPCD.

The overall water usage patterns of the City have been greatly reduced due to its conservation measures and metering of all services. Prior to January 2013, nearly all of the City's single-family residential water customers had been billed on a monthly flat rate structure; they were unaware of the water they actually used and had no real incentive to conserve water. As of January 2013, the City has completed its residential water meter program, which installed approximately

113,000 water meters for single-family homes. With the completion of this program, all the City's water service connections are now metered, and the City and its customers can work more closely together to optimize water use. Since completion of the project, residential water demands have dramatically decreased. Attainment of the 2020 target has been influenced by the City's investments in metering and the proactive conservation education and outreach to customers. These factors have played a significant role in the City's ability to meet and surpass the 2020 target. In the future, the City will need to remain diligent in monitoring water use and continuing incentive programs to further reduce water consumption. These efforts are necessary so when the current strict reduction requirements are lifted, all water users remain diligent in avoiding unnecessary use of water and upgrade fixtures to eliminate water wasting.

5.5.2 2020 Adjustments to 2020 Gross Water Use

No extraordinary events or economic adjustments have taken place that would cause any adverse effects with regards to overall water usage. As was previously mentioned, the City did not make any adjustments to the 2020 gross water use as is permissible with Water Code 10608.24 cited above.

CITY OF FRESNO

6 Water Supply Characterization

This chapter identifies and quantifies, to the extent practicable, the existing and planned sources of water supplies for the City through 2045.

The City relies on groundwater from the North Kings Subbasin; surface water from Central Valley Project (CVP), through a contract with the United States Bureau of Reclamation (USBR); Kings River water, through a contract with Fresno Irrigation District (FID); and recycled water. This chapter also provides a discussion of supply availability and reliability under normal supply conditions (normal water year), during a single dry year, and for a drought lasting five years.

IN THIS SECTION

- Groundwater
- Surface Water
- Recycled Water
- Projected Water Supply

Water production in the City has consisted of 100% groundwater prior to the commissioning of the City's first surface water treatment facility (SWTF) in 2004. Since 2004, the City has invested in expanding its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demands in the service area.

6.1 Groundwater

The City overlies the Kings Subbasin, which is part of the greater San Joaquin Valley Groundwater Basin. The City is one of many water purveyors that use groundwater from the Kings Subbasin. The City has a network of over 270 municipal wells and currently operates approximately 202 municipal supply wells within the Kings Subbasin. Until late 2004, the City relied solely on groundwater to meet the water demands. The City's desire is to continue to use groundwater within a larger conjunctive use program that maximizes its existing water rights and surface water supply sources.

6.1.1 Basin Description

The Department of Water Resources (DWR) has partitioned the State into 10 major hydrologic regions (also referred to as "basins") and then further divided each basin into subbasins. The City is located in the Kings Subbasin (DWR Groundwater Subbasin Number 5-22.08) and lies within the larger San Joaquin Valley Groundwater Basin in the Central Valley of California. The Kings Subbasin covers approximately 1,530 square miles (sq mi).

6.1.1.1 Basin Location

The San Joaquin Valley Groundwater Basin is bounded to the north by the Sacramento-San Joaquin Delta and Sacramento Valley, to the east by the Sierra Nevada Mountains, to the south by the San Emigdio and Tehachapi Mountains, and to the west by the Coast Ranges. The Kings Subbasin, located within the southern half of the San Joaquin Valley Groundwater Basin, is bounded to the north by the San Joaquin River, to the east by the alluvium-granite rock interface of the Sierra Nevada foothills, to the south by the southern fork of the Kings River, and to the west by the Delta-Mendota and Westside Subbasins (California Department of Water Resources, January 2006). The Kings Subbasin is split into seven Groundwater Sustainability Agency (GSA) management areas, with Fresno located in the North Kings GSA. **Figure 6-1** illustrates the location of the City within the Kings Subbasin.

6.1.1.2 Area Geology

The upper several hundred feet of geology within the Kings Subbasin generally consists of highly permeable, coarse-grained deposits, which are termed older alluvium. **Figure 6-2** presents an idealized hydrogeologic cross-section that illustrates the general depth of various lithologic features within the Kings Subbasin, near the City.

Coarse-grained stream channel deposits, associated with deposits by the ancestral San Joaquin and Kings Rivers, underlie much of northwest Fresno (Layer 3 and 4 in **Figure 6-2**). There is a laterally extensive clay layer, at an average depth of approximately 250 feet below the ground surface, beneath most of the south and southeastern portions of the City.

Below the older alluvium, to depths ranging about 600–1,200 feet below ground surface, the finer-grained sediments of the tertiary-quaternary continental deposits are typically encountered (Layer 5 in **Figure 6-2**). Substantial groundwater has been produced and utilized from these depths by the City. However, deeper deposits located in the southeastern and northern portions of the City have produced less groundwater.

There are also reduced deposits in the northern and eastern portions of the City, at depths generally below 700 or 800 feet, which are associated with high concentrations of iron, manganese, arsenic, hydrogen sulfide, and methane gas. Groundwater at these depths does not generally provide a significant source for municipal supply wells.

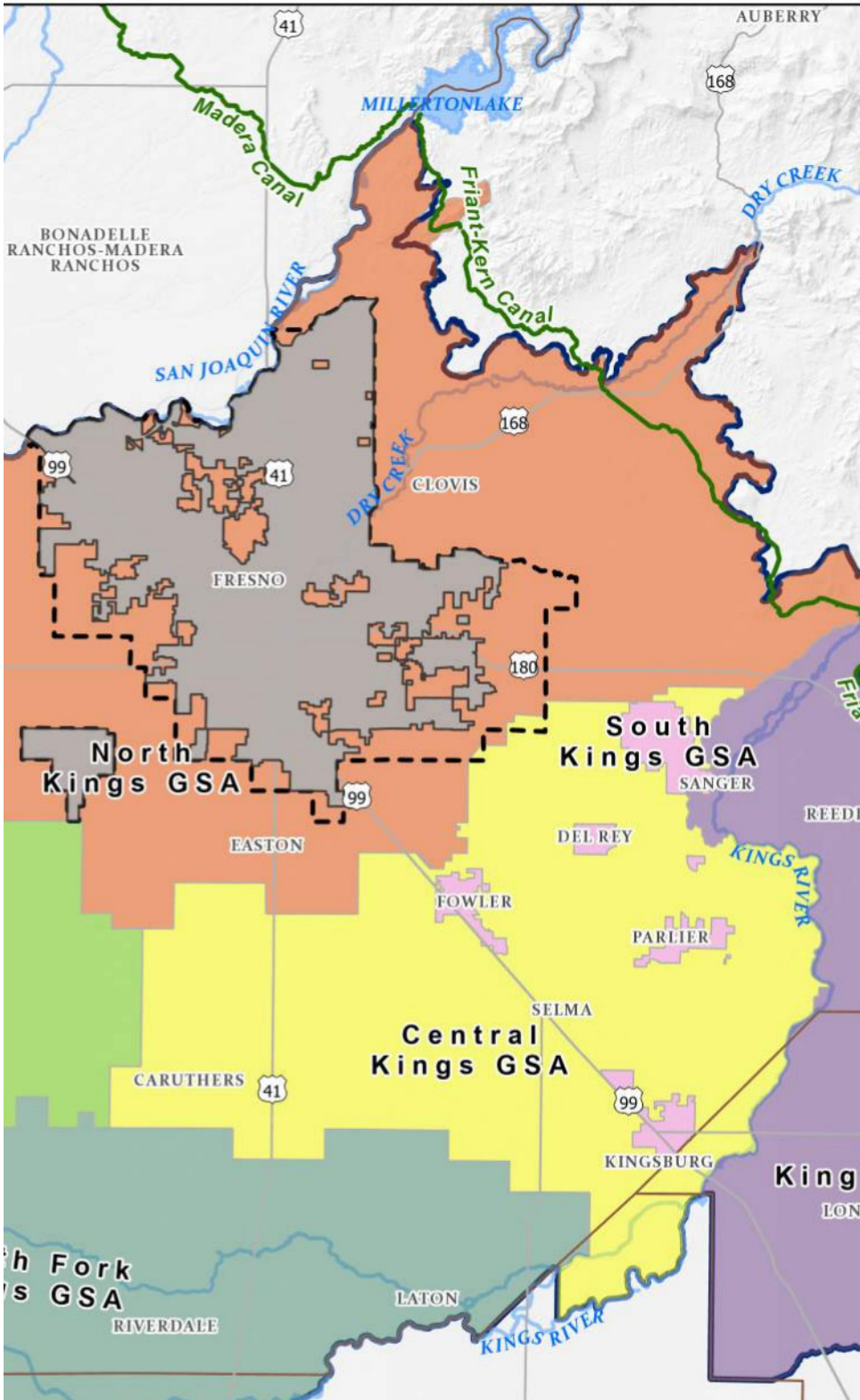
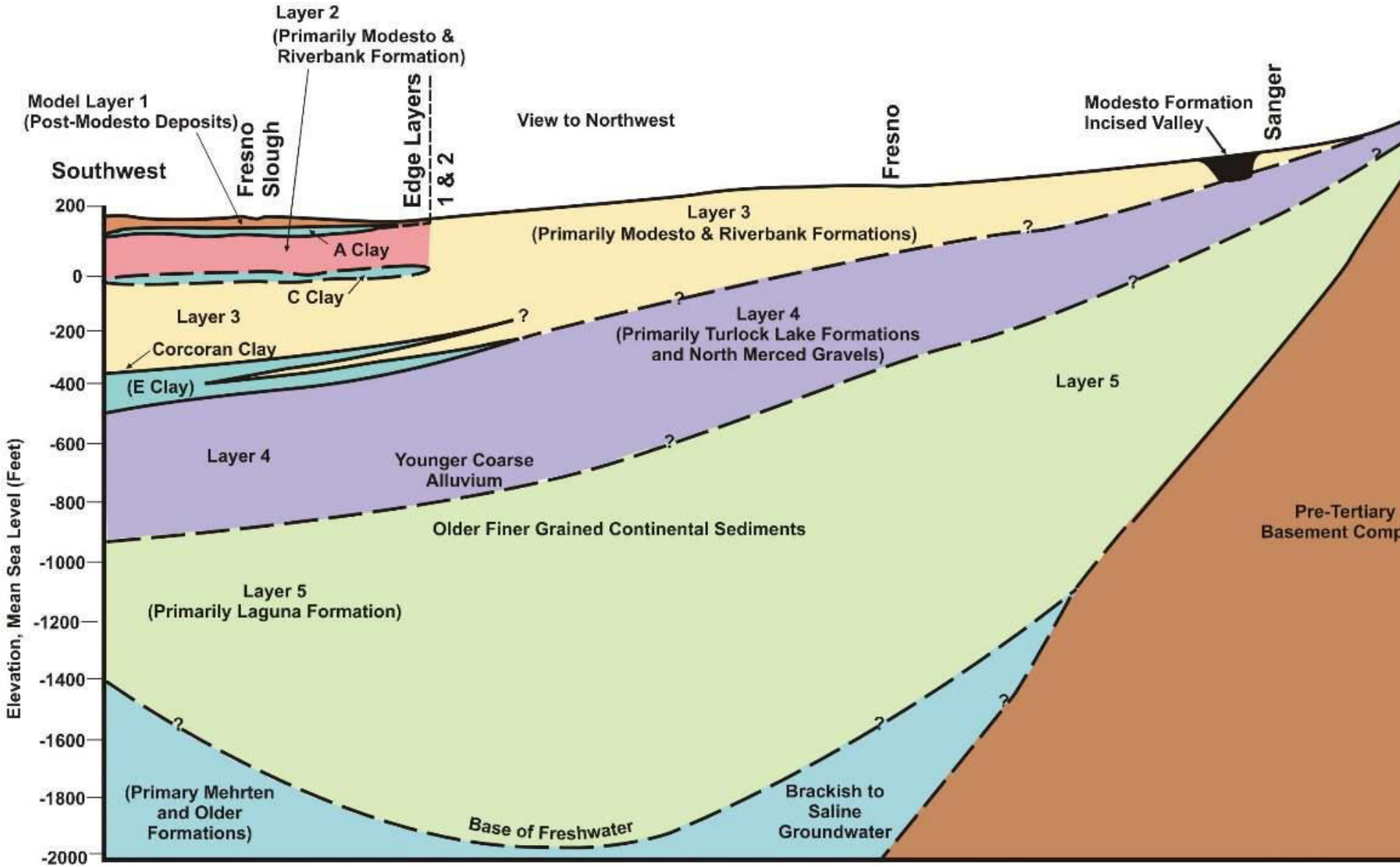

41
AUBERRY
168
MILLERTONLAKE
Madera Canal
Friant-Kern Canal
DRY CREEK
BONADELLE
RANCHOS-MADERA
RANCHOS
SAN JOAQUIN RIVER
168
99
41
CLOVIS
DRY CREEK
FRESNO
180
South
Kings GSA
North
Kings GSA
SANGER
99
DEL REY
EASTON
KINGS RIVER
FOWLER
PARLIER
SELMA
Central
Kings GSA
CARUTHERS
41
99
KINGSBURG
King
LON
h Fork
s GSA
LATON
RIVERDALE
KINGS RIVER

Figure 6-2. Kings Groundwater Subbasin Conceptual Hydrogeologic Cross-Section, Southwest-Northeast



6.1.1.3 Aquifer Characteristics

The aquifer beneath the City was characterized using data compiled during aquifer tests performed at the City's production wells. As part of updating the detailed hydrogeologic evaluation, aquifer test data (pump tests) were reviewed to update the hydrogeologic analysis and evaluate the specific capacity data. The specific capacity indicates the ability of a particular well to produce water. **Figure 6-3** presents the estimated specific capacity of each active well from early 2020 pump test data. As shown in the figure, the northwestern and southwestern portions of the City have wells with higher specific capacities.

6.1.2 Groundwater Management

In 2014, a three-bill legislative package was signed into law, composed of Assembly Bill 1739, Senate Bill (SB) 1168, and SB 1319, collectively known as the Sustainable Groundwater Management Act (SGMA) of 2014, which is codified in Section 10720 et seq. of the California Water Code. This legislation created a statutory framework for groundwater management in California that can be sustained during the planning and implementation horizon without causing undesirable results. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040. The Kings Subbasin was designated a critically overdrafted basin in the DWR's Bulletin 118. The North Kings GSA is working within the SGMA framework to reach groundwater sustainability.

The City was a founding member of the North Kings GSA, which consists of the following public agencies and participating agencies:

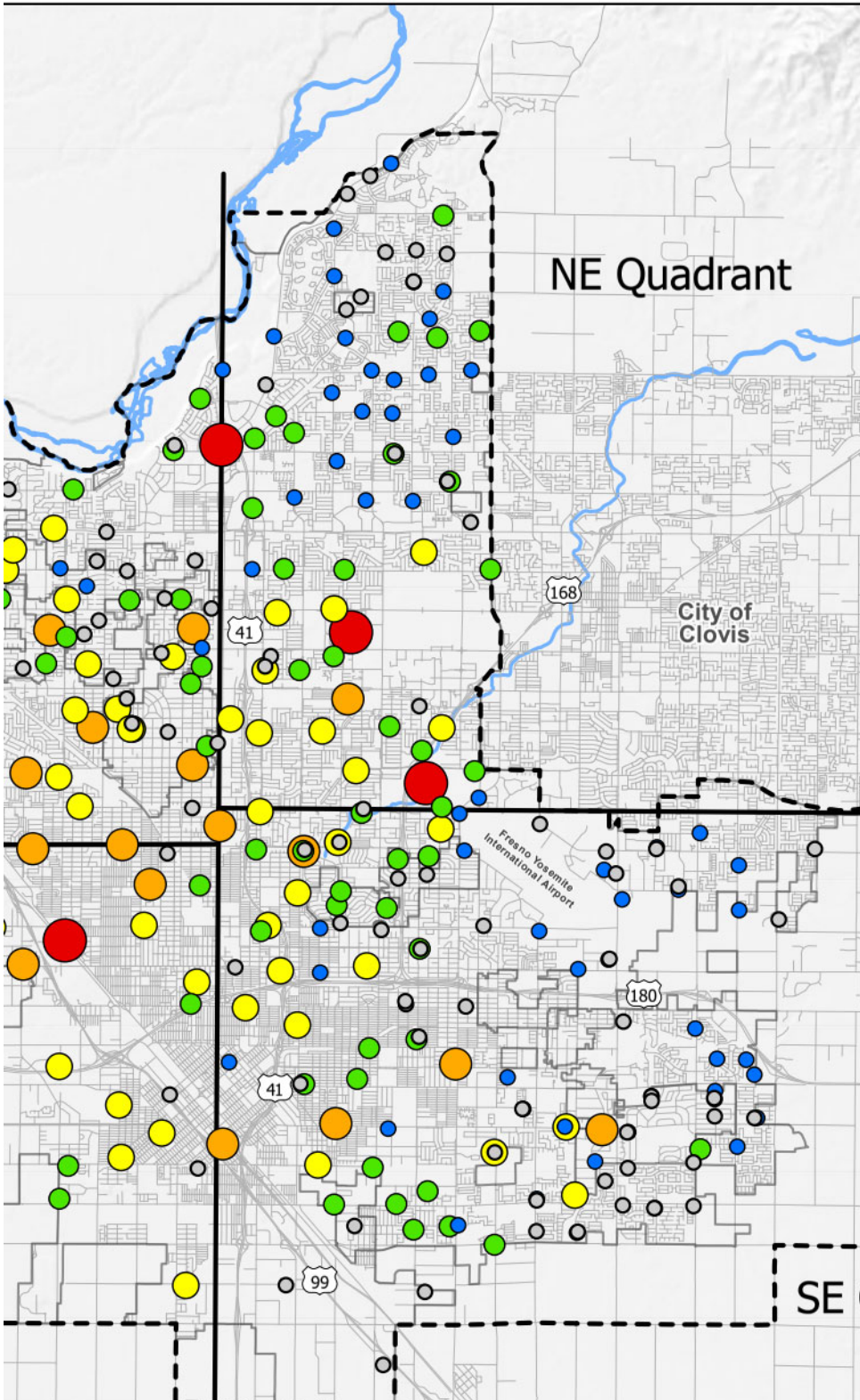
- Fresno Irrigation District (member)
- City of Fresno (member)
- City of Clovis (member)
- City of Kerman (member)
- County of Fresno (member)
- Bakman Water Company (participating agency)
- Biola Community Services District (member)
- Garfield Water District (member)
- International Water District (member)
- Fresno Metropolitan Flood Control District (participating agency)

The Kings Subbasin contains seven GSAs, including the North Kings GSA, as listed below and shown in Figure 6-1:

- Central Kings GSA
- James Irrigation District GSA
- Kings River East GSA
- McMullin Area GSA
- North Kings GSA
- North Fork Kings GSA
- South Kings GSA

The seven GSAs operate cooperatively across the basin via a coordination agreement that ensures common approaches to sustainability items such as similarity of data usage and methodologies, consistent interpretations of the basin setting, and common assumptions and development of water budgets, monitoring networks, sustainable management criteria and data management systems.

The North Kings GSA prepared and submitted its GSP in January 2020 (Provost & Pritchard, November 2019) and is awaiting DWR review by January 2022.


NE Quadrant
City of Clovis
Fresno Yosemite International Airport
168
41
180
41
99
SE

As required by SGMA, the North Kings considers six sustainability indicators:

- Chronic lowering of groundwater levels indicating significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Each indicator has an identified undesirable result, measurable objective, and minimum threshold. The measurable objective and minimum threshold allow the North Kings GSA to evaluate their progress for the subject indicator and determine if conditions are improving, remaining stable or degrading. The sustainability indicators of primary concern within the City are groundwater levels, groundwater storage, and groundwater quality. The methodology for the water quality indicators has been developed and the methodology is still being developed for the groundwater levels and groundwater storage indicators. A copy of the GSP is provided in **Appendix G** of this UWMP[1].

6.1.3 Overdraft Conditions

SGMA directs DWR to identify groundwater basins and subbasins in conditions of critical overdraft. As defined by SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." As mentioned, DWR classifies the Kings Basin as being in a state of critical overdraft in its Bulletin 118, and the future of the groundwater basin has been projected to see continued overdraft conditions.

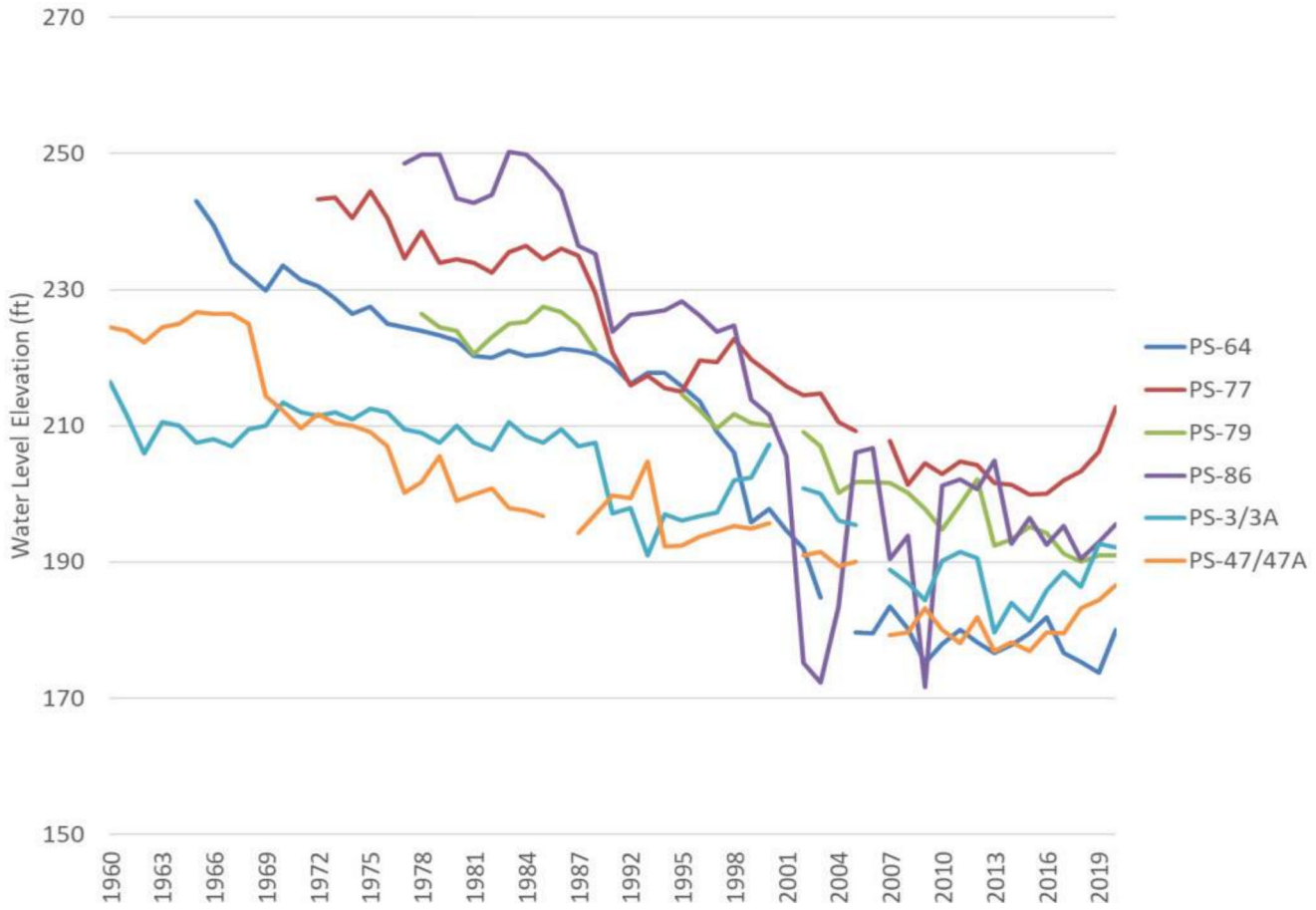
The Kings Subbasin groundwater aquifer supplies the City, other municipalities, agriculture, and rural residential areas with a consistent source of water. Like much of the Kings Subbasin, groundwater levels beneath the City were relatively shallow at 25 feet below ground surface in 1940, prior to the start of World War II (Fresno City Water, Engineering Department, 1940). After the war, the State, including the City, began growing at a rapid rate. For the period from 1959 to 1968 it was reported groundwater levels declined at a rate of 2.8 feet per year (John Carollo Engineers, 1969). The City continued to rely on the groundwater aquifer for decades, monitoring groundwater levels continuously. Groundwater levels since 1990 have declined at a lower rate than previously. Rates of decline slowed further starting in 2004 when the Northeast Surface Water Treatment Facility (NESWTF) started operations and the City renewed focus on increasing groundwater recharge. In 2019 and 2020, surface water accounted for more than half of the total water supply in the City. With the reduced pumping due to higher reliance of surface water, the groundwater levels have begun to increase in certain areas of the City in the last few years. **Figure 6-4** provides a depiction of the City's depth to groundwater for six representative wells across the Sphere of Influence (SOI) since 1960.

The City expects to continue to operate its three SWTFs and pump groundwater at a lower rate than historically so that the groundwater basin can recover. One of the primary objectives for the City as described in its current Metro Plan is to maximize the use of available surface water

[1] Available at https://www.northkingsgsa.org/groundwater-sustainability-plan/

treatment supplies to reduce overall reliance on groundwater. Additionally, as described in **Chapter 4**, the City plans to continue their groundwater recharge program to protect the groundwater basin. **Figure 6-5** shows the active and proposed recharge basins and FID Canals the City utilizes as part of groundwater recharge program.

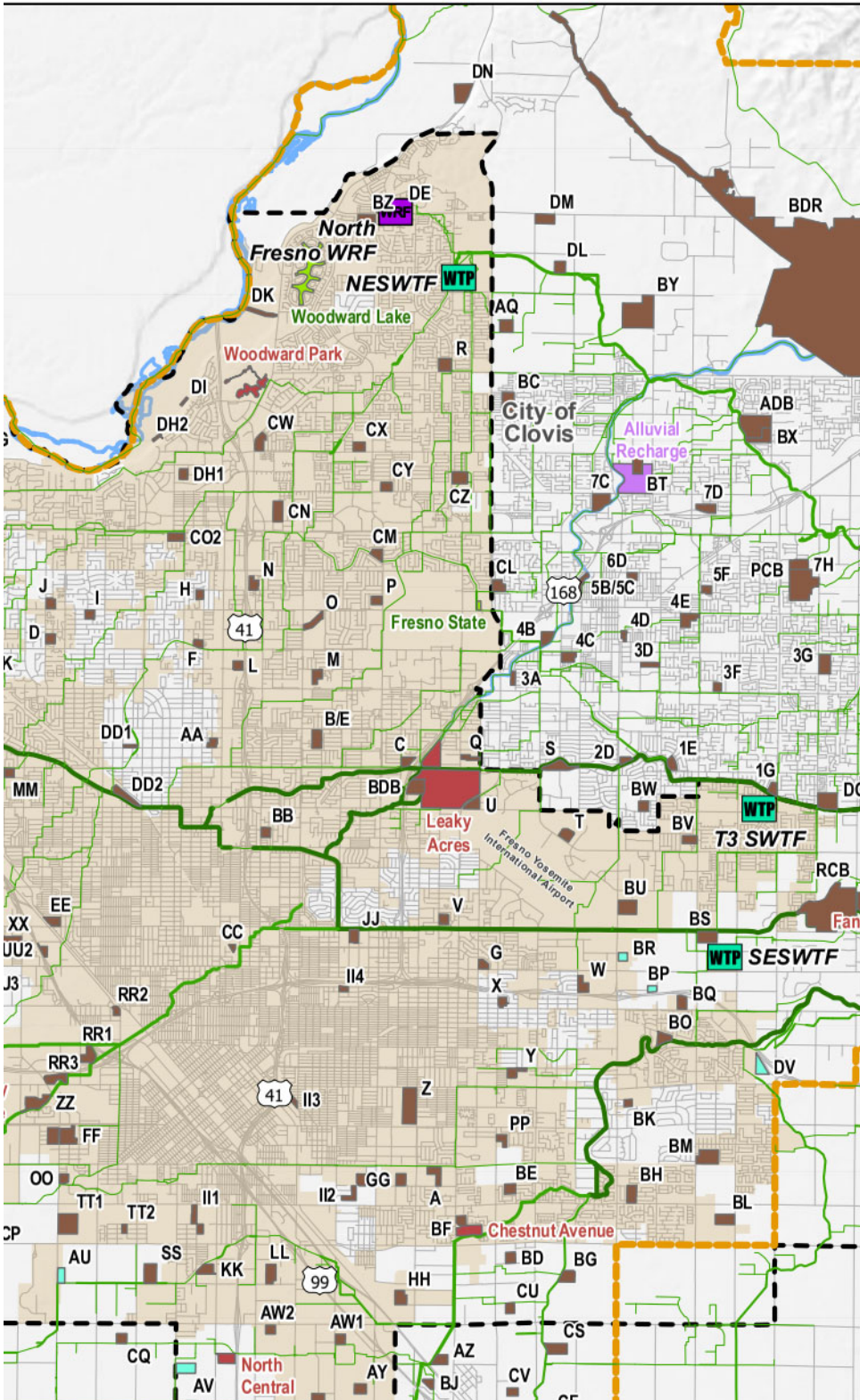
Figure 6-4. Time Series of Groundwater Levels at Representative Wells

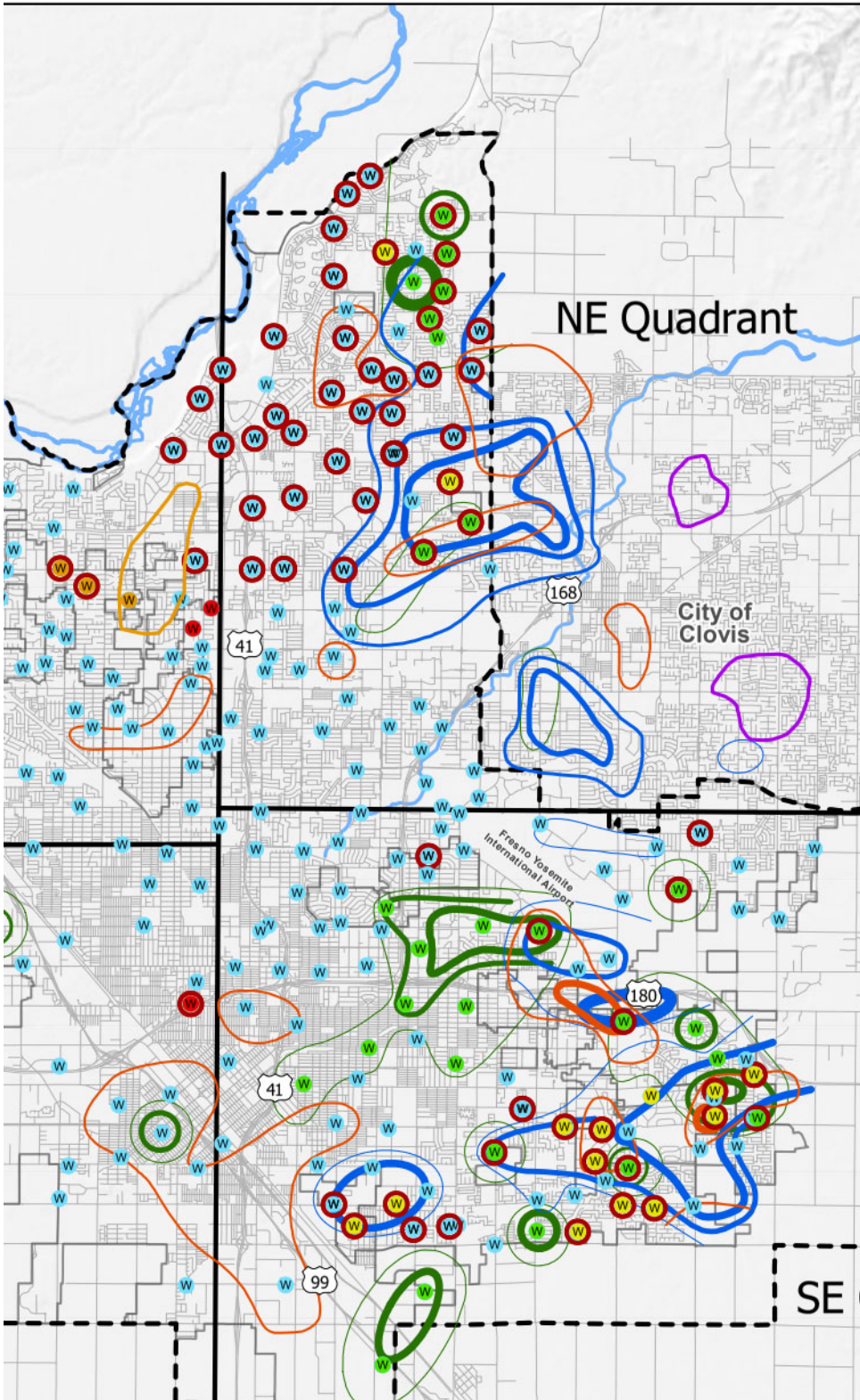


6.1.4 Groundwater Quality

Groundwater within the North Kings Subbasin generally meets primary and secondary drinking water standards for municipal water use and is described as being bicarbonate type water, including calcium, magnesium, and sodium as the dominant ions (California Department of Water Resources, January 2006). Total dissolved solids (TDS) concentrations rarely exceed 600 mg/L and range from 200 to 700 mg/L (California Department of Water Resources, January 2006). However, the groundwater basin has been impacted by multiple chemical contaminants that affect the City's ability to fully utilize the groundwater basin resources without some type of wellhead treatment in certain areas.

Figure 6-6 presents the general location of regional plumes and major point sources within the City. The primary contaminants are nitrate, 1,2-dibromo-3-chloropropane (DBCP), 1,2,3-trichloropropane (1,2,3-TCP), and other volatile organic compounds like trichloroethylene (TCE) and and perchloroethylene (PCE). The City has received settlements in a number of lawsuits related to these contaminants and has constructed wellhead treatment systems and implemented blending plans for a number of wells.


North Fresno WRF
NESWTF
WTP
Woodward Lake
Woodward Park
City of Clovis
Alluvial Recharge
Fresno State
Leaky Acres
Fresno Yosemite International Airport
T3 SWTF
SESWTF
Chestnut Avenue
North Central
DN
DE
DM
BDR
DL
BY
AQ
R
BC
ADB
BX
DI
DH2
CW
CX
DH1
CY
CZ
7C
BT
7D
CN
CM
CO2
CL
6D
7H
PCB
5F
168
5B/5C
4E
4D
4B
4C
3D
3G
3F
3A
41
B/E
DD1
AA
C
Q
S
2D
1E
1G
DD2
BDB
U
BW
BV
MM
BB
T
RCB
EE
V
BU
XX
CC
JJ
BS
G
BR
W
BP
BQ
RR2
II4
X
BO
RR1
RR3
Y
DV
Z
ZZ
II3
PP
BK
FF
BM
OO
BE
BH
TT1
TT2
II1
II2
GG
A
BL
BF
AU
SS
LL
KK
99
HH
BD
BG
CU
AW2
AW1
CS
CQ
AZ
AV
AY
BJ
CV


NE Quadrant
City of Clovis
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Approximately 40 City wells are being treated for contaminants such as PCE, DBCP, TCE, 1,2,3-TCP, perfluorooctanoic acid, perfluorooctanesulfonic acid, ethylene dibromide, and nitrate, and an additional 20 wells include treatment for iron, manganese, and hydrogen sulfide removal or corrosion control.

As shown in the figure, extensive groundwater contamination nearly covers the City's entire water service area; only areas located in the northwest appear to be relatively unaffected by regional groundwater contamination. Also, many of the City's wells are impacted by one or more of the contaminant plumes (indicated by the presence of overlapping plumes on the figure). The figure also shows the approximately 93 existing active wells that are impacted by at least one contaminant plume and the 60 existing wells with wellhead treatment. The City is also managing contamination from spreading by pumping specific wells to control the plumes.

6.1.5 Estimated Groundwater Yield

As part of the ongoing Metro Plan update, the City is developing a storage accounting framework to estimate groundwater yield. The storage framework will track the City's groundwater recharge, pumping, and flows into and out of the City's SOI and incorporate bi-annual monitoring well water level readings on a grid basis. This work is ongoing, and the City reserves the right to update this analysis with more recent data when available.

Currently, the best available information on the City's groundwater yield is from a hydrologic groundwater and surface water model that was prepared for the Upper Kings Basin Integrated Regional Water Management Authority. The City contributed additional funding to the effort so the model would be more refined for its service area and capable of assisting in the development of the City's previous Metro Plan. The Kings Basin Integrated Groundwater and Surface Water Model (IGSM) was completed in 2007 and provided outputs specific to the City SOI (WRIME, 2007). The IGSM was developed and calibrated utilizing data for the period of 1964–2004. Building off the calibrated IGSM, additional modeling was conducted in 2008 to evaluate the City's proposed water supply plan and its ability to attain the balanced use of groundwater by the buildout year of 2025. The estimated groundwater yield within the City's SOI presented in this section is based on the modeling efforts to establish the various natural elements of the underlying aquifer.

6.1.5.1 Natural Recharge

As a result of the IGSM effort, the long-term average deep percolation from rainfall and irrigation-applied water for the period of 1964–2004 was found to be 42,700 acre-feet per year (AFY) for the entire SOI (West Yost Associates, January 2014). However, as urbanization continues within the SOI, the amount of deep percolation will decline because of increased runoff and less open land for natural recharge. For 2005, it was estimated deep percolation would be about 37,000 AFY and would reduce annually, ultimately declining to and remaining at 27,000 AFY by buildout in 2025. The new General Plan now anticipates SOI buildout will occur in 2056. Holding the 2005 value of 37,000 AFY and extending the 27,000 AFY to 2056, intermediate values were straight-line interpolated. Additionally, the City currently covers 73,500 acres of the 100,277 acres within its SOI, representing 73% urbanization, which would approximate the City's water system service area. **Table 6-1** shows estimated natural recharge through 2045.

6.1.5.2 Net Subsurface Inflow

Again, utilizing information developed from the IGSM, average net subsurface inflow into the SOI was characterized as being 64,800 AF annually for the period of 1964–2004. Applying the

previously described 73% proportioning factor of the developed SOI area to overall SOI area, approximately 47,510 AFY would be attributed to the City's water service area in 2020. This value will increase in future years as the City annexes more land until the SOI is built out. **Table 6-1** shows the estimated subsurface inflows for future years based on the land use growth presented in **Figure 4-3**. The City has historically benefitted from the net subsurface inflows and requires these flows for replenishment necessary to maintain the sustainable yield of the groundwater aquifer system.

6.1.5.3 Intentional Groundwater Recharge

The City has long made efforts toward offsetting the decline of groundwater levels and minimizing overdraft conditions through an active intentional recharge program that started in 1971 (CH2MHill, 1992). Through cooperative agreements with Fresno Metropolitan Flood Control District (FMFCD) and FID, the City has access to not only City-owned basins, but also those of these two agencies. Utilizing available surface water supplies, the City recharged on average approximately 60,000 AFY from 2000–2019; however, with the reduction in available surface water supplies, intentional recharge declined to 34,700 AF in 2014 and 19,800 AF in 2015, followed by an increase in recharge in years 2016, 2017, and 2019 to help replenish the aquifer. In 2019, City recharge of 82,993 AF was the maximum annual recharge attained during this period. The City has averaged over 60,000 AFY the previous five years and plans to gradually increase recharge by about 540 AFY each year. However, during wet years the City will recharge more water when it is available to allow to the City to draw on additional groundwater during dry years when surface water is not available. Intentional recharge is included in the non-potable demand projections as well as contributing to the estimated groundwater yield presented in **Table 6-1**.

Table 6-1. Components to Groundwater Yield for Normal Years

	QUANTITY (AFY)					
GROUNDWATER COMPONENT	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Natural Recharge[1]	24,970	25,480	25,910	26,280	26,570	26,790
Net Subsurface Inflow[1]	47,510	49,910	52,320	54,720	57,120	59,530
SUSTAINABLE YIELD	**72,480**	**75,390**	**78,230**	**81,000**	**83,690**	**86,320**
Intentional Recharge[2]	60,000	62,700	65,400	68,100	70,800	73,500
TOTAL ESTIMATED GROUNDWATER YIELD	**132,480**	**138,090**	**143,630**	**149,100**	**154,490**	**159,820**

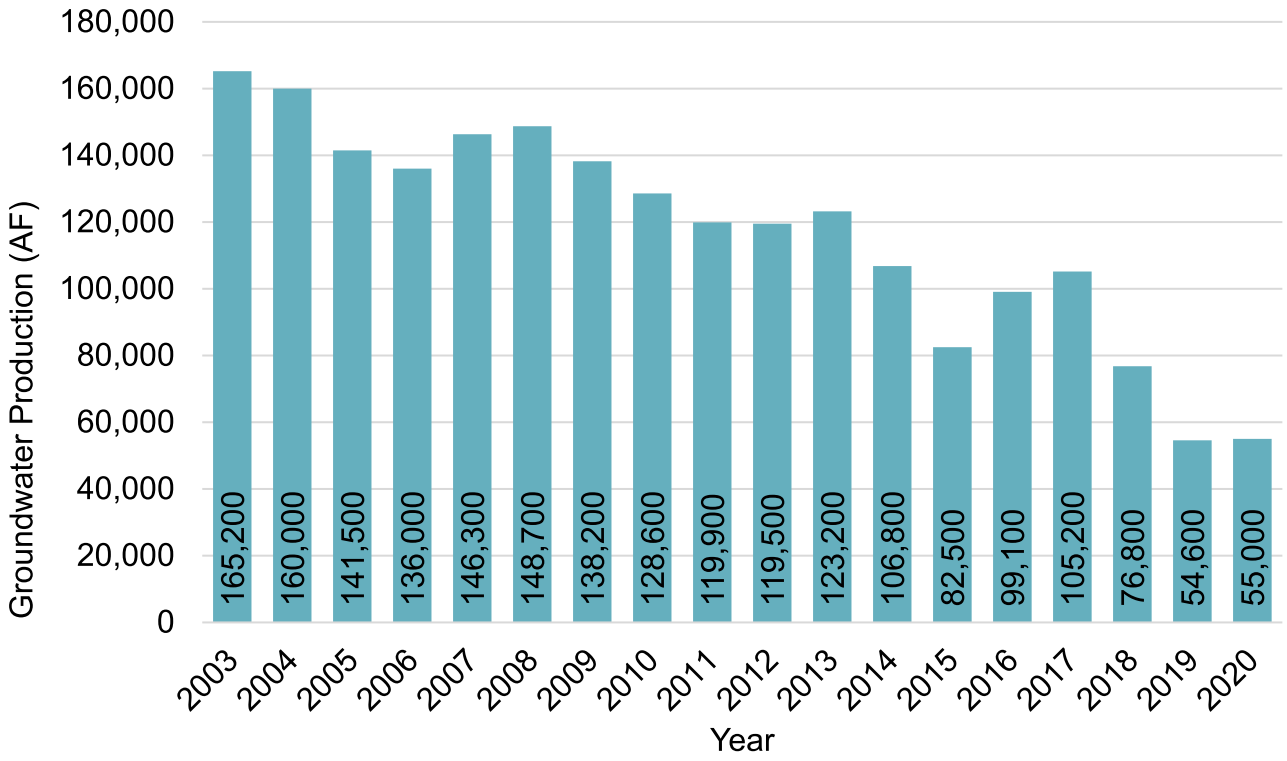
Notes:

1. Based on the Kings Basin IGSM and projected City land growth from **Figure 4-3** as discussed in **Section 3.1.1.**
2. Projected normal year intentional recharge from **Table 4-7**.

6.1.6 Historic Groundwater Pumping

The City has historically relied on groundwater as its main supply source prior to the construction of its SWTFs. With the recent investments in surface water infrastructure, the City has been able to drastically reduce its groundwater pumping. **Figure 6-7** shows the historic groundwater pumping since 2003. As shown, pumping has dropped significantly since 2003, the City's peak year for groundwater production.

Figure 6-7. Historic Groundwater Production



6.2 Surface Water

With the completion and operation of the Southeast Surface Water Treatment Facility (SESWTF), surface water is now a primary water supply used to meet potable demands within the City. The City contracts with FID for Kings River water and with the USBR for CVP water from the Friant-Kern Canal. The surface water supply is used either for potable uses through treatment and distribution or delivery to recharge basins for groundwater recharge.

The Kings River water year (WY) is October through September while USBR uses a WY of March through February. The City has historically used a calendar year (CY) for its analysis, so monthly water supply information was compiled in CY format for this report.

6.2.1 USBR Friant Division Contract Supply

The City, through an agreement originally executed in January 1961, secured a surface water supply from USBR CVP Friant Division. This agreement, for an annual water supply of 60,000 AF of Class 1 water, was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. A copy of the renewed contract is provided in

Appendix H of this UWMP. The USBR CVP Friant Division facilities generally include: Friant Dam (Millerton Reservoir), the Friant-Kern Canal, and the Madera Canal. The Friant-Kern Canal is maintained and operated by the Friant Water Authority. The USBR water supply is a wholesale supply.

Construction of Friant Dam was completed in 1947 and began making diversions to the Friant-Kern Canal in 1949. Full operations of the CVP Friant Division did not commence until the Madera Canal was completed in 1951. Class 1 water was intended to be a supply that would be dependable in practically every year, regardless of the type of hydrologic WY. Class 2 water is essentially excess water available as determined by USBR and less reliable than Class 1 water.

Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement between the Department of the Interior and Commerce, the Natural Resources Defense Council, and the Friant Water Users Authority (which is now the Friant Water Authority). The City is a member of the Friant Water Authority. The Settlement ended an 18-year legal dispute over the operation of Friant Dam brought by a coalition of conservation and fishing groups. The agreement characterized Class 1 deliveries by six hydrologic year types based on a recurrence over an 82-year simulation (1922–2003): wet, normal-wet, normal-dry, dry, critical-high, critical-low. The projected surface water available for the City from USBR during each hydrologic year defined by the 2006 Settlement Agreement is summarized in **Table 6-2**. As shown in the table, the average simulated delivery is 53,680 AFY and the median simulated delivery, which is similar to normal year delivery, is 60,000 AFY. The median value is higher than the average value because 100% allocation of 60,000 AF is simulated in 50 of 82 years but the dry and critical years result in substantial reductions, which bring down the average allocation.

The Settlement Agreement estimates the reduced supply available to the City compared to historic supplies, most evident in dry years. Restrictions on exports from the Delta have hindered the USBR from making deliveries to the Exchange Contractors via the Delta-Mendota Canal. The Exchange Contractors allowed the formation of the CVP Friant Division by agreeing to not exercise their historic pre-1914 water rights to the San Joaquin and Kings Rivers if guaranteed water deliveries continued through the Delta-Mendota Canal or other facilities. If USBR is unable to deliver water to the Exchange Contractors, they have the right to receive their water from the San Joaquin River, which reduces the Class 1 water availability (History of SJRECWA Exchange Contractors, n.d.).

Reduced deliveries from the Delta to the Exchange Contractors resulted in the CVP Friant Division contractors with zero allocations of Class 1 water in USBR WY 2014 and 2015, though the City received USBR deliveries in CY 2014 (prior to the USBR WY starting in March). Annual USBR deliveries since 2007 are shown in **Figure 6-8** for CY. The availability and reliability of the City's surface water supplies through its USBR contract are discussed further in **Chapter 7**.

Table 6-2. Available USBR Simulated Allocation (1922–2003)

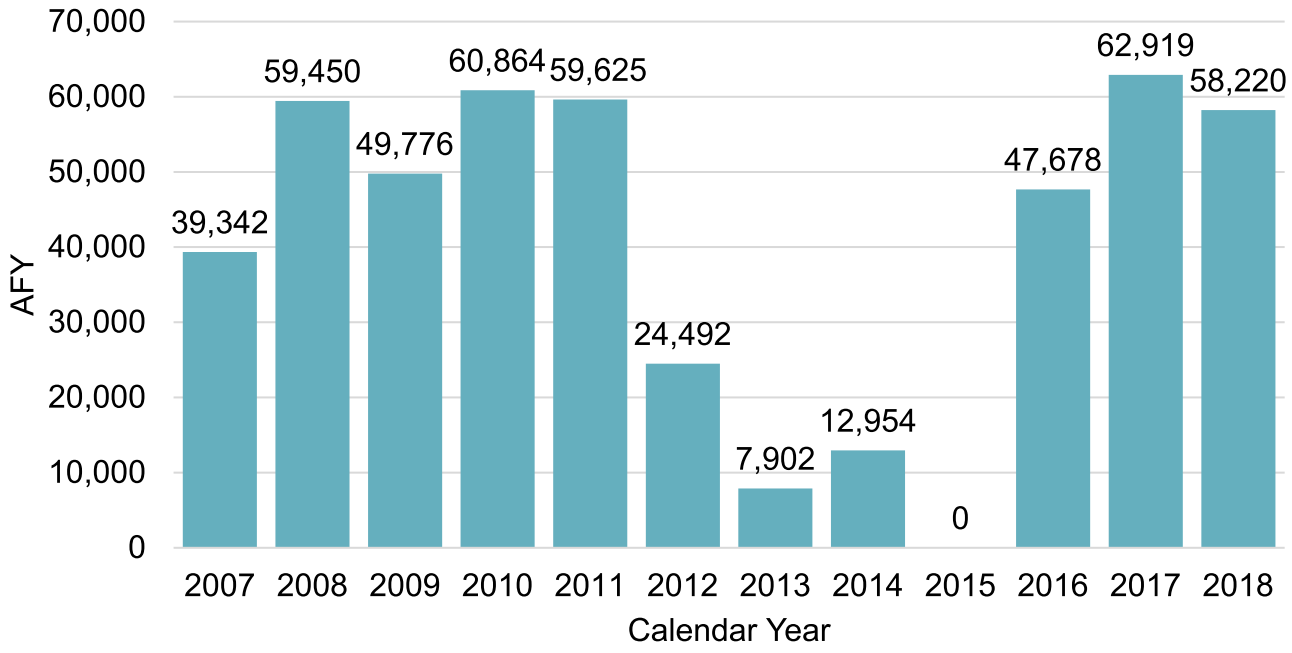
WATER YEAR TYPE	% OF YEARS OVER SIMULATION PERIOD OF DELIVERIES [1]	NUMBER OF YEARS IN THAT YEAR TYPE	RANGE OF ALLOCATION TO CITY (AF)	AVERAGE ALLOCATION TO CITY (AF)
Wet	Highest 20%	16	60,000	60,000
Normal-Wet	50% to 80%	25	60,000	60,000
Normal-Dry	20% to 50%	25	47,500 to 60,000	57,060
Dry	5% to 20%	12	28,100 to 46,800	36,575
Critical[2]	Lowest 5%	4	13,900 to 24,700	19,025
	TOTAL	**82**	**AVERAGE**	**53,680**
			MEDIAN	**60,000**

Source: 2006 Settlement Agreement

Notes:

1. As defined in 2006 Settlement Agreement
2. Includes both critical-high and critical-low, which are differentiated by the amount of unimpaired runoff. The simulation uses deliveries through 2006 and does not include the zero allocation years in 2014 and 2015.

Figure 6-8. USBR Deliveries to City Since 2007



In addition to the Class 1 water available to the City, the USBR contract also makes available water classified as: recovered water account water; Section 215 water; and unreleased restoration flows, unreleased recirculation flows, and uncontrolled season flows. The complexities of each water type are beyond the scope of this report but are mentioned here to reflect the other water acquisition opportunities afforded to the City through this contract.

The San Joaquin River water supply has excellent water quality as it originates from snowmelt from the high Sierras and has not been detrimentally impacted.

6.2.2 Fresno Irrigation District Supply

FID is one of 28 agencies that receives an entitlement of water from the Kings River through the Kings River Water Association. Water entitlements for Kings River Water Association contract members is determined based on a methodology that was initially developed in 1917–1919 to established entitlements for early claimed rights holders. The methodology was based on historic mean daily natural flow conditions at Piedra, which is approximately three miles downstream from the then yet to be built Pine Flat Dam and "at the heart of Kings River uses, regulation, and stream control and storage." (Kings River Water Association and Kings River Conservation District, June 2003)

On December 20, 2016, the Revised, Amended, and Restated Cooperative Agreement was executed between FID and the City for Water Utilization and Conveyance (2016 FID Agreement) (**Appendix I**). The 2016 FID Agreement replaces the 1976 Cooperative Agreement and ends in 2035. The Agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly every year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID (roughly 200,000 acres). As the City incorporates new land area into its service area, the percentage of FID supply increases. However, the 2016 FID Agreement sets the maximum percentage as 29.0%, although the City's service area is anticipated to expand and encompass more than 29.0% of FID's service area between 2025 and 2030. In 2020, the City's percentage of overall FID Kings deliveries was 25.79%. The FID Agreement identifies that the 29.0% maximum was based on moderate growth in Growth Area 1 of the City's SOI (shown in Exhibit C in the 2016 Agreement). As such, the supply projections in this plan limit the City's FID supply with the 29.0% cap, but if the agreement were revised in the future the City's FID allocation percentage could grow beyond 29.0% as the water service area expands.

The City has historically not used all of its available allocation in any given year, although it pays a flat rate for its total allocation regardless of use. Water unused by the City is reallocated by FID to its other customers.

The City's potential supply from FID was summarized using actual Kings River deliveries for CYs 1964–2019, then categorized by the same WY types used for the USBR Friant supply. The range and average FID deliveries by WY type is shown in **Table 6-3**. The average of all 56 CY delivery totals of FID Kings River deliveries is 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29.0% City supply percentage. **Table 6-4** lists the historic and projected allocation of FID's Kings River water for the City in normal (average) CYs. The City percentage of FID supplies was estimated assuming the City's water service area will grow from 59,100 acres to 84,300 acres by buildout at the rate shown in **Figure 4-3**.

Table 6-3. FID Diversions by Water Year Type (1964 to 2019)

WATER YEAR TYPE	% OF YEARS[1]	NUMBER OF YEARS BETWEEN 1964 AND 2019	TOTAL FID DELIVERIES (AF)[2]		EXAMPLE AVERAGE AVAILABLE TO CITY[3]
			RANGE	AVERAGE	
Wet	Highest 20%	11	563,500 to 644,600	590,700	171,300
Normal-Wet	50% to 80%	17	452,800 to 563,300	513,700	149,000
Normal-Dry	20% to 50%	17	362,600 to 448,000	415,000	120,400
Dry	5% to 20%	8	253,700 to 362,000	315,700	91,600
Critical	Lowest 5%	3	158,100 to 253,300	210,200	61,000
		56	**AVERAGE**	**453,800**	**131,600**

Notes:

1. As defined in 2006 Settlement Agreement
2. Assigns water year type defined in defined in 2006 Settlement Agreement to FID deliveries from 1964 to 2019
3. Based on maximum 29.0% City supply percentage to provide an example City supply amount

Table 6-4. Projected FID Kings River Allocation for City, Normal Years

YEAR	PROJECTED TOTAL FID ALLOCATION, AFY	PROJECTED ALLOCATION TO CITY, AFY[1]
2025	27.55%	125,030
2030	29.00%	131,600
2035	29.00%	131,600
2040	29.00%	131,600
2045	29.00%	131,600

[1]Projected City Allocation (%) x 453,800 AFY (estimated normal year diversion by FID, per **Table 6-3**)

6.3 Stormwater

The Fresno-Clovis Metropolitan Area and surrounding rural vicinities are within the service area boundaries of the FMFCD, which has primary responsibility for managing the local stormwater flows. Most stormwater in the City drains to urban stormwater basins, where the water is retained to attenuate peak flow runoff and recharge stormwater, or is pumped to local irrigation canals for conveyance away from the municipal areas. FMFCD's operation of stormwater basins is predicated on maintaining storage capacity for rain events, which limits accessibility for recharge activities during the rainy season. FMFCD estimates the amount of stormwater that is recharged each wet season. However, recharge attained with the FMFCD basins largely occurs in May

through October when limited storage capacity is required. Dry-season recharge is accomplished by diverting surface waters, from the Kings River and Millerton Reservoir, using City-allocated surface water. It is difficult to estimate stormwater recharge volumes as there is no physical measurement of stormwater flows into the basins, and infiltration rates can vary with water elevation and degree of siltation in the basin. However, FMFCD estimates that stormwater recharge in urban basins during the winter months may range from 7,000 AF/yr to 22,200 AF/yr. Stormwater capture and infiltration are considered an integral component of natural groundwater recharge discussed in **Section 6.1.5.1**.

6.4 Wastewater and Recycled Water

6.4.1 Recycled Water Coordination

The City is currently expanding its recycled water supplies to increase offset use of potable water for landscape irrigation. In 2010, the City completed a Recycled Water Master Plan (adopted by the City Council in 2013) to evaluate and plan for increased recycled water use in the City. The City's last Metro Plan, adopted in 2014, also outlined projects to increase the use of recycled water to offset potable demands (Carollo, 2010). The City is currently updating the Metro Plan and will reevaluate recommendations and projects to increase recycled water use.

The City owns and operates two water reclamation facilities: 1) the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and 2) the North Fresno Wastewater Reclamation Facility (NFWRF), both of which can produce Title 22 recycled water for use within the City's service area. They are described further in **Section 6.4.3**.

Coordination with other water agencies and potential consumers within the planning area is inherently within the purview of the City's Department of Public Utilities (DPU) as this department provides both water and wastewater services. DPU has been on the forefront of numerous water supply preservation, enhancement, and development projects and programs for decades. The concept of multiagency coordination is fully embraced by the department as is evident with the previously discussed joint agency agreements and the commitment to construct new infrastructure to further develop new resources. The endeavor to develop recycled water as a resource was a requirement of a development in north Fresno, where the developer was conditioned to have a net zero impact on water resources. The fundamental component of this development was the construction and dedication of the NFWRF to the City.

There are only a few agencies, besides the City, that have wastewater collection and treatment facilities within and immediately adjacent to the plan area. These agencies include:

	Collection	Treatment
City of Clovis	X	X
Malaga County Water District	X	X
Pinedale County Water District	X	-
Pinedale Public Utility District	X	-

As the City is the primary responsible agency for wastewater collection and treatment for its annexed areas and certain County islands, it has taken the lead role of developing and implementing recycled water facilities to serve the same area.

6.4.1.1 City of Clovis

The RWRF was developed under a Joint Powers Authority agreement executed in 1977 among the City of Fresno, the City of Clovis, and the County of Fresno. Both of the cities contribute to the cost of operations and maintenances and capital expenditures for the RWRF based on formulas in the agreement. This facility provides service for most of Clovis' sewer flows.

The City of Clovis recently constructed its own wastewater treatment facility that produces tertiary level effluent and is distributed in a dedicated purple pipe system within portions of its service area.

6.4.1.2 County of Fresno

The County of Fresno, like the City of Clovis, is a party to the RWRF Joint Powers Authority for treatment of flows from unincorporated areas encompassed by the City's service area.

6.4.1.3 Malaga County Water District

Malaga County Water District provides water and sewer service to an unincorporated county area of about 2.25 sq mi, which covers a small portion of the City's SOI. The district provides wastewater collection and treatment for residential and non-residential customers.

6.4.1.4 Pinedale County Water District

Pinedale County Water District provides water, sewer, and solid waste service to an area of about 2 sq mi, which service area covers an unincorporated County island and a portion of the City. The district provides wastewater collection to an area of 699 acres and diverts the flow to the City's collection system for treatment at the RWRF.

6.4.1.5 Pinedale Public Utility District

Pinedale Public Utility District provides wastewater, street lighting, street sweeping, and landscape maintenance. The district services an area of 362 acres in the northern portion of the City, serving both an unincorporated County island and portions of the City. The collected wastewater is diverted to the City's collection system for treatment at the RWRF.

6.4.2 Wastewater Collection, Treatment, and Disposal

The City's wastewater collection system was originally developed in 1891 with the installation of a 24-inch outfall sewer that discharged to a 40-acre sewer farm located southwest of town. The amount of land and facilities at this location continued to be expanded as the City grew over the years. Today, the City's wastewater collection system consists of about 1,630 miles of pipes ranging in size from 4 inches in diameter to 84 inches in diameter. This collection system also utilizes 15 lift stations throughout the City, ranging in pumping capacity from 0.25 mgd to 2.2 mgd.

6.4.2.1 Wastewater Treatment and Discharge Within Service Area

The City is served by two wastewater treatment plants, briefly described below.

Fresno-Clovis Regional Wastewater Reclamation Facility

The RWRF has developed from what was once a sewer farm to what is now a state-of-the-art wastewater treatment facility. In 1966, the City of Fresno was appointed the sewering agency

for the local metropolitan region and shortly after began long-range planning and construction of new facilities to handle increasing flows and regulatory requirements. The RWRF treats flows from not only the City, but also sewered County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District.

Flows received at this facility peaked at 81,100 AF in 2006 and have been steadily decreasing since, with the average influent flow about 63,000 AF over the last five years. The RWRF includes preliminary, primary, secondary, and tertiary treatment units with disinfection. Secondary treatment consists of three treatment trains with an annual average capacity of 87 mgd, consisting of 30 mgd for Train A and 57 mgd for Trains B and C combined. In 2017, a 5-mgd tertiary treatment system — the Tertiary Treatment and Disinfection Facility (TTDF) — was completed. The system can be expanded to 15 mgd and ultimately to 30 mgd.

The City has three primary means of effluent disposal:

1. Undisinfected secondary effluent to on-site and off-site farmland for restricted irrigation
2. Undisinfected secondary effluent to percolation ponds
3. Disinfected tertiary effluent to the recycled water distribution system

The percolated effluent has been deemed equivalent to Title 22 tertiary treated water by the State Water Resources Control Board Department of Drinking Water (DDW). The City has been extracting this water for reuse in areas within and surrounding the RWRF, as well as to FID's canals, through an exchange agreement for delivery to FID agricultural customers.

The discharged effluent is within the City boundaries and located just southwest of the metropolitan area. The treated effluent percolation ponds are within the City's SOI and hydrologic sphere that benefit the City's overall regional water budget. See **Figure 3-1** for a depiction of the facility's location relative to the metropolitan area.

North Fresno Wastewater Reclamation Facility

The NFWRF was constructed as part of a residential, commercial, and golf course master planned development located in the northern portion of the City. As a condition of the planned community, the developer was required to construct a wastewater treatment facility that would produce tertiary level effluent for use within the development to ensure the overall project had a net zero impact on water resources. This facility is presently rated at 0.71 mgd (average monthly flow) and 1.07 mgd (maximum daily flow). However, the ultraviolet (UV) light disinfection system was only validated for 300 gpm (0.43 mgd), which is the current flow limit until the DDW approves a higher flow. This facility is expandable to 1.25 mgd (average monthly flow). The disinfected tertiary effluent from the plant is largely used to irrigate the Copper River Ranch Golf Course. Of the 325 AF of wastewater treated in 2020, 54 AF was used for irrigation of turf. Treated but unused effluent is diverted to the City's collection system to the RWRF.

6.4.3 Recycled Water System Description

The 2014 Metro Plan recommended expanding reuse by: 1) using the NFWRF effluent to irrigate Copper River Ranch Golf Course; and 2) up to 25,000 AFY of recycled water for landscape irrigation or other non-potable uses from the RWRF or new satellite WRFs. Since then, the City has irrigated the Copper River Ranch Golf Course with recycled water and has constructed much of the southwest recycled water distribution system. However, the City is currently updating the Metro Plan and reevaluating the target volume of reuse in the City beyond the southwest system

considering new conditions and regulations, including the potential for potable reuse in the future.

6.4.3.1 Fresno-Clovis Regional Wastewater Reclamation Facility

As mentioned above, the RWRF produces undisinfected secondary effluent for restricted irrigation to on-site and off-site farmlands and disinfected tertiary treated effluent for the recycled water distribution system.

The City's RWRF diverts a portion of the undisinfected secondary effluent to irrigate non-food crops grown adjacent to this facility. The practice of using the secondary effluent to irrigate non-food crops has been carried-out for decades and is expected to continue for the foreseeable future. The City owns nearly 3,300 acres of land for and around the RWRF, consisting of percolation ponds (1,750 acres) and other land available to farm non-food crops. **Table 6-5** provides the annual quantities of recycled water applied to these crops for the period from 2015–2019.

Additionally, the RWRF produces Title 22 disinfected tertiary treated effluent through the TTDF completed in 2017 and through tertiary equivalent soil aquifer treated recycled water recovered from the percolated secondary effluent. A series of 15 groundwater wells located at the RWRF are used to extract previously percolated effluent groundwater from beneath the facility. The extracted groundwater has the potential to be used for higher beneficial use if it can be demonstrated this water has attained a level of treatment satisfactory to meet disinfected tertiary levels. The City embarked on a joint project with the WateReuse Research Foundation to demonstrate to State regulatory agencies the soil aquifer treated recycled water met Title 22 levels. The culmination of this study is presented in a final report entitled "Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment," which was completed in 2013 (WateReuse Research Foundation, 2013). This study concluded that, based on the documented sampled water quality data, the extracted groundwater met requirements for classification as disinfected tertiary level recycled water. The SWRCB DDW stated that the percolated effluent water meets the tertiary treatment classification, and the City is making plans for its use as part of its recycled water production and distribution system (California Regional Water Qulaity Control Board, 2018). The combined rated production yield of the 15 wells, if run year-round, would be approximately 32,000 AFY. The City plans to blend the recycled extraction well water with the disinfected tertiary level recycled water produced from the 5 mgd TTDF to feed the southwest recycled water distribution system. As new sales grow for the recycled water, additional recycled extraction well water will be utilized to feed the City's southwest recycled water system.

The tertiary equivalent soil aquifer treated recycled water (recovered groundwater) is also used for on-site irrigation and transport to FID canals for delivery to customers during the irrigation season, as facilitated through an exchange agreement with FID. More information on the City's FID RWRF Exchange Agreement is discussed in **Section 6.6**.

Since the completion of the 2010 Recycled Water Master Plan (RWMP), the City has constructed most of the southwest recycled water system, shown in **Figure 6-9.** The southwest recycled water system consists of a 3.2 MG recycled water reservoir located at the RWRF, a 6,000 gpm (8.64 mgd) recycled water pump station located at the RWRF, a 640-gpm booster pump station (Roeding Park Booster), and 15.7 miles of 10-inch to 54-inch recycled water pipeline. Roughly 7.5 miles of pipeline remain to be constructed. The City also updated the demand and distribution system from the 2010 RWMP with the 2019 Citywide Recycled Water Demand and Southwest

Recycled Water System Analysis (Carollo, 2019) to identify potential recycled water customers. This recent analysis will be incorporated into the latest Metro Plan update.

6.4.3.2 North Fresno Water Reclamation Facility

As described earlier, the City has an existing recycled water plant in the northern portion of the City that receives and treats sewage from the residential, commercial, and golf course master planned community. The NFWRF was constructed in 2008 but was not fully operational until 2009 due to the inability to properly run at extremely low flow conditions. Subsequent modifications at the plant allowed it to run on a regular basis in 2010 and again in 2014 for UV approval. The amount of reuse has varied substantially since 2016 because the delivery system was offline in 2017 and 2018 for treated water basin slope repairs. City staff indicated that 2016 is representative of operations going forward. The disinfected tertiary effluent is conveyed in a dedicated pipeline to an adjacent golf course for irrigation purposes. The quantities used for irrigation purposes are shown in **Table 6-5** for the period of 2015–2019.

Table 6-5. Historic Recycled Water Used Within Service Area

	QUANTITY (AFY)					
RECYCLE WATER FACILITY	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
RWRF, Secondary Effluent (Non-Food Crop Irrigation)	8,688	7,329	4,540	7,031	3,652	3,845
RWRF, Tertiary Effluent	531	485	423	867	912	858
NFWRF	62	110	0	0	19	54
TOTAL	**9,281**	**7,924**	**4,963**	**7,898**	**4,583**	**4,757**

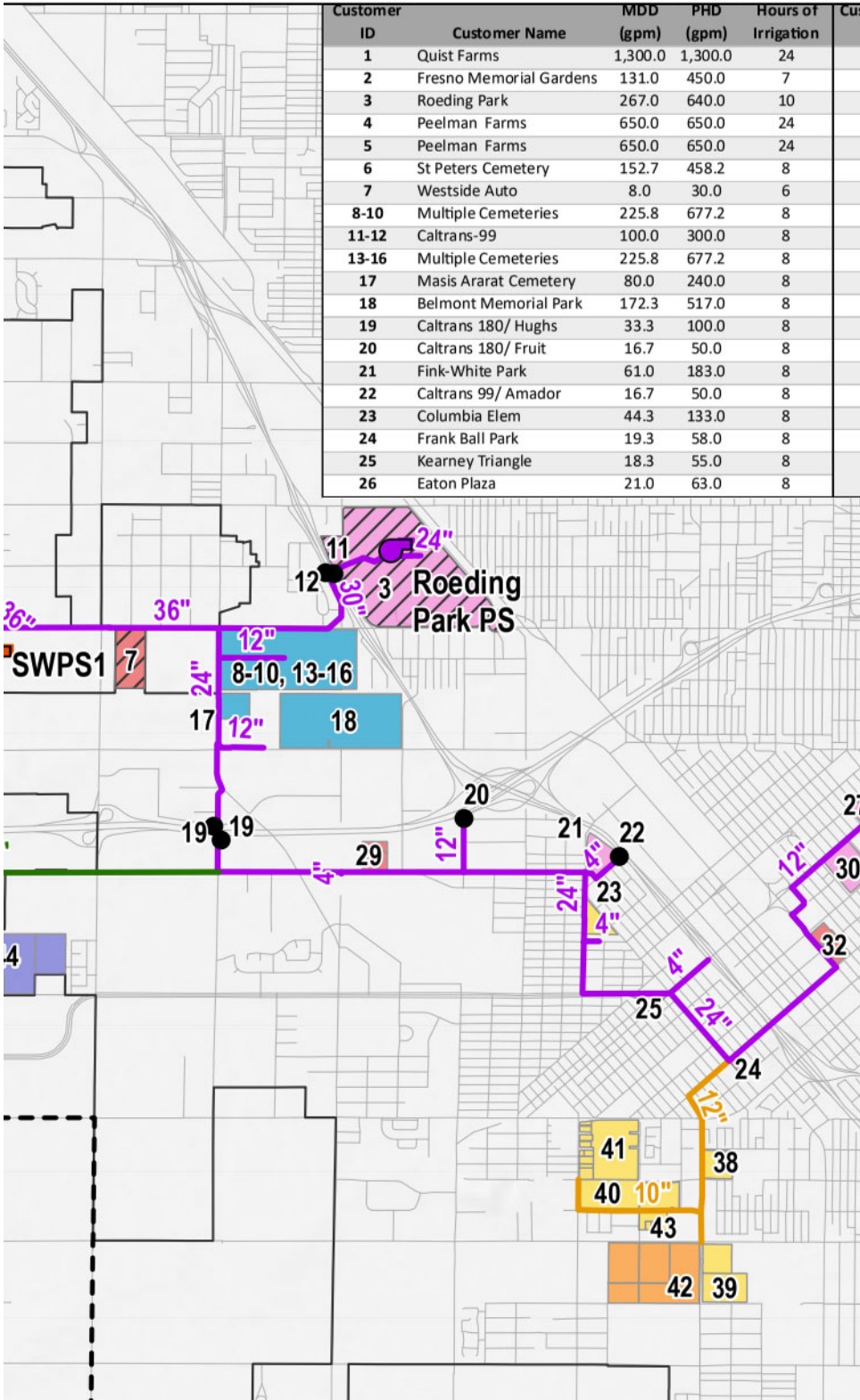
Note: Reuse at the NFWRF was zero in 2017 and 2018 because the recycled water delivery system was offline for system repairs.

6.4.4 Potential, Current, and Projected Recycled Water Uses

The 2020 actual recycled water use, and projected recycled water use in the City's service area is included in **Table 6-6**. Secondary undisinfected reuse is projected to continue to be used to irrigate non-food crops adjacent to the RWRF in the future. The projected secondary undisinfected use going forward is based on the average use from 2015 to 2020. Additionally, the amount of tertiary recycled water from the RWRF is projected to increase to provide 6,210 AF for landscape and agricultural irrigation as the southwest recycled water system is built out. Projected tertiary recycled water from the NFWRF for golf course irrigation is projected to be 110 AF annually through 2045.

The 2015 UWMP anticipated that 21,200 AFY of recycled water would be produced and utilized in 2020. The previous projected increases in recycled water were based on recommendations from the 2010 RWMP, which included projects to increase recycled water use for landscape irrigation, agricultural irrigation, industrial use, and blending with raw surface water for groundwater recharge. Since the 2010 RWMP, the City has focused on constructing the southwest recycled water system to increase landscape and agricultural irrigation in the southwest portion of the City. The City is also currently updating the Metro Plan that is evaluating recycled water alternatives in the City and is expected to update its RWMP following the Metro Plan update to serve as a new guiding planning document for recycled water use by the City.

Customer ID	Customer Name	MDD (gpm)	PHD (gpm)	Hours of Irrigation
1	Quist Farms	1,300.0	1,300.0	24
2	Fresno Memorial Gardens	131.0	450.0	7
3	Roeding Park	267.0	640.0	10
4	Peelman Farms	650.0	650.0	24
5	Peelman Farms	650.0	650.0	24
6	St Peters Cemetery	152.7	458.2	8
7	Westside Auto	8.0	30.0	6
8-10	Multiple Cemeteries	225.8	677.2	8
11-12	Caltrans-99	100.0	300.0	8
13-16	Multiple Cemeteries	225.8	677.2	8
17	Masis Ararat Cemetery	80.0	240.0	8
18	Belmont Memorial Park	172.3	517.0	8
19	Caltrans 180/ Hughs	33.3	100.0	8
20	Caltrans 180/ Fruit	16.7	50.0	8
21	Fink-White Park	61.0	183.0	8
22	Caltrans 99/ Amador	16.7	50.0	8
23	Columbia Elem	44.3	133.0	8
24	Frank Ball Park	19.3	58.0	8
25	Kearney Triangle	18.3	55.0	8
26	Eaton Plaza	21.0	63.0	8



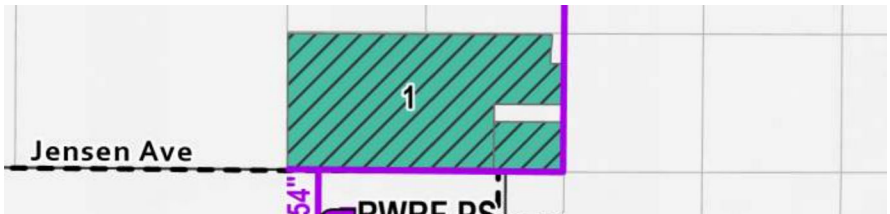


Table 6-6. Recycled Water within Service Area in 2020 (DWR 6-4R)

The supplier will complete the table.

Name of Supplier Producing (Treating) the Recycled Water:	City of Fresno
Name of Supplier Operating the Recycled Water Distribution System:	City of Fresno
Supplemental Volume of Water Added in 2020:	0%
Source of 2020 Supplemental Water:	N/A

BENEFICIAL USE TYPE	POTENTIAL BENEFICIAL USES OF RECYCLED WATER	AMOUNT OF POTENTIAL USES OF RECYCLED WATER	GENERAL DESCRIPTION OF 2020 USES	LEVEL OF TREATMENT	2
Agricultural Irrigation[1]	Non-foodcrop irrigation	7,900	Irrigate non-food crops	Secondary, Undisinfected	3
Landscape Irrigation (excludes golf courses)	Landscape Irrigation	5,800	Landscape irrigation, distributed through the southwest recycled water distribution system	Tertiary	8
Agricultural Irrigation[1]	Food crop irrigation	410	Irrigate limited food crops, distributed through the southwest recycled water distribution system	Tertiary	-
Golf Course Irrigation	Landscape Irrigation	110	Copper River Golf Course	Tertiary	5
-				Total:	4

Note:

1. Recycled water for agricultural irrigation does not offset the City's potable water demands, and as such, is excluded from projected recy

6.4.5 Actions to Encourage and Optimize Future Recycled Water Use

The 2010 RWMP identified the need for the City to adopt an ordinance to establish a recycled water policy and criteria for its use within the City's SOI. On July 14, 2014, the Recycled Water Ordinance was adopted by the City Council, laying the foundation for the expanded use of recycled water within the City.

The focus of the ordinance includes the following:

- Establish an Administrative Authority.
- Establish approved uses of recycled water.
- Define areas of potential eligibility for recycled water service.
- Specify voluntary uses of recycled water, depending on user classifications.
- Require installation of a transmission and distribution infrastructure.
- Encourage the use of voluntary retrofits for existing users that may not be addressed in the ordinance.
- Require the City of Fresno to prepare Rules and Regulations.
- Provide enforcement and severability clauses.
- Establishing a means for the City to provide recycled water at a negotiated price.

Efforts to further the use of recycled water include the requirement that new developments within planned major recycled water distribution mains must install purple pipe. Then, as the City's capital projects construct a distribution infrastructure, these segments will be in place to facilitate connections to new customers, reduce program costs by avoiding digging up new street improvements and reduce disruption to vehicular traffic.

Most of the southwest recycled water distribution system from the RWRF is completed or planned for construction in 2021. The City has identified potential customers to connect to the recycled water system once it is completed to offset potable demand and increase recycled water use in the City.

6.5 Desalinated Water Opportunities

The City is located in the central San Joaquin Valley; therefore, seawater desalination is not applicable to the City. Additionally, the groundwater that exists within the immediate area of the City is not brackish in nature and does not require desalination treatment.

6.6 Water Exchanges and Transfers

6.6.1 Exchanges and Transfer Opportunities

6.6.1.1 USBR Supply

The Central Valley Project Improvement Act (CVPIA) of 1992 authorized the transfer of all or a portion of a CVP contractor's water supply to any other California water users or water agencies. The CVPIA allows water transfers as long as they are consistent with federal and state water laws. The primary component of the CVPIA that specifies water transfer provisions for federal

water supplies is Section 3405(a), which includes provisions regarding maximum annual water transfer, beneficial use, and approvals.

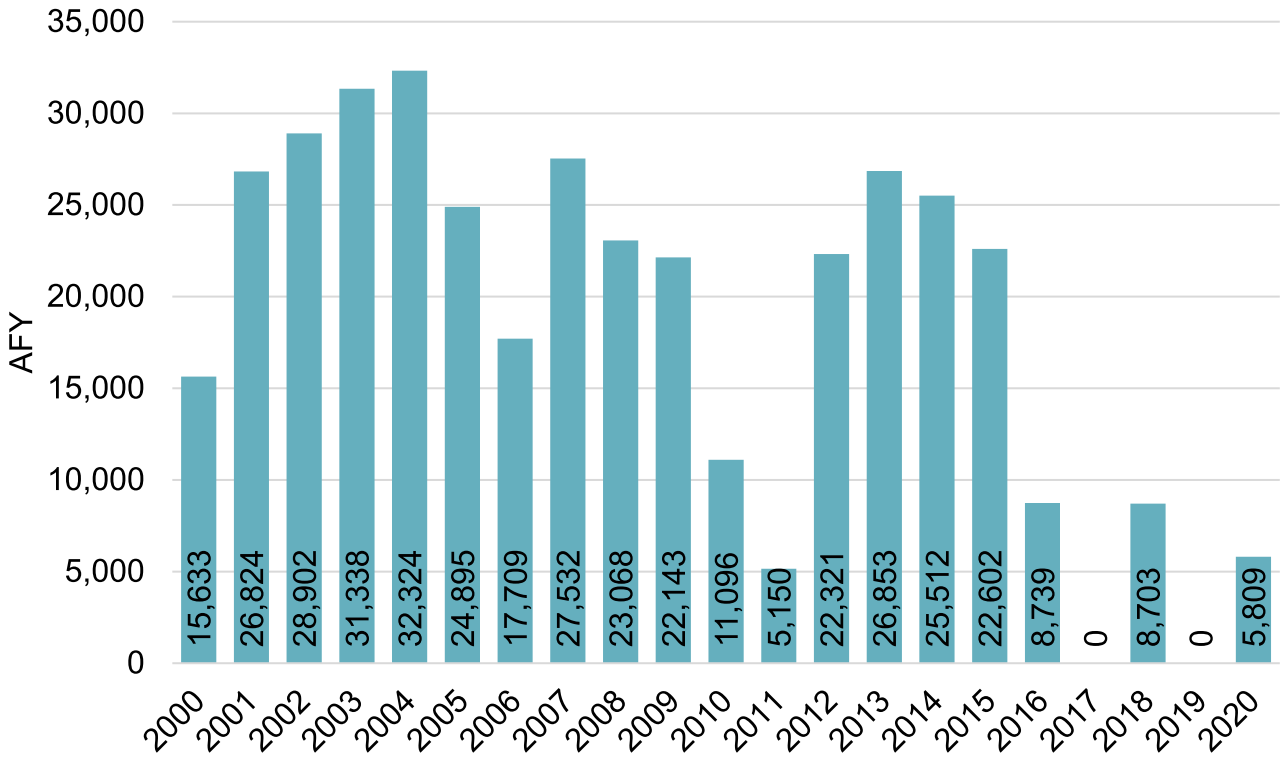
As part of the City's current Metro Plan update, the City is evaluating potential future water transfers and exchanges of its periodically available USBR water. Currently, the City does not have any plans to transfer its USBR water to other California water users.

6.6.1.2 FID / RWRF Groundwater Exchange Supply

Since 1974, the City has had an agreement with FID to exchange recycled water for the delivery of surface water east of the City (**Appendix I**). The Agreement between FID and the City for Exchange of Recycled Water allows for water pumped from beneath the RWRF to be conveyed to FID's Dry Creek and Houghton Canals for delivery to growers west of the City. In exchange for the water delivered to FID by the City, FID agreed to deliver 46% of the total from either its Kings River entitlement or USBR Class II supply to growers or basins in the eastern portion of FID "insofar as is feasible and practical." The water is to be considered additional to the water that would have been delivered to the eastern portion of FID, such that the additional delivered water used by growers is assumed to offset groundwater pumping in the area and, therefore, provide a groundwater basin benefit. This is an indirect benefit to the City.

The agreement includes a minimum of 100,000 AF delivered over a 10-year period and no more than 30,000 AF in any given year. As shown in **Figure 6-10**, the City exceeded the maximum yearly delivery in 2003 and 2004 and has maintained more than 100,000 AF of deliveries over a 10-year period. However, since 2016, the City has reduced RWRF groundwater exchange deliveries. The City is currently discussing an update to the agreement with FID, while the 2020 Metro Plan will identify and recommend other beneficial uses for the City's percolated effluent.

Figure 6-10. Historical RWRF Groundwater Exchange Deliveries



6.6.2 Emergency Interties

In 2007, the Cities of Fresno and Clovis executed an agreement for interconnection of their potable water systems to provide service during emergencies and other times of hardship in either community. The agreement covers interconnections, including apportionment of capital costs, at two locations: Leonard Avenue at the Gould Canal alignment and Behymer Avenue at Willow Avenue.

The agreement provided for temporary deliveries from Clovis to southeast Fresno through the Leonard connection through 2013. The Leonard interconnection was constructed and remains in place for emergency uses through manual operation.

The agreement also provided for temporary deliveries from Fresno to northern Clovis through the Behymer connection through 2015. However, the Behymer interconnection has yet to be constructed and, if constructed in the future, would serve only for emergency use.

6.7 Future Water Projects

The City is currently updating its Metro Plan, which will recommend programs and projects to improve the City's water supply portfolio and continue providing a safe, reliable, and sustainable water supply. While the outcomes of the Metro Plan update are currently being developed, the City's ongoing and future projects to improve its supply portfolio include:

- Expansion of recycled water distribution system
- Expansion of groundwater recharge program
- Expansion of surface water treatment capacity
- Beneficial transfers and exchanges

6.7.1 Expand Recycled Water Distribution System

As mentioned in **Section 6.4.5**, the City has made significant improvements to their recycled water system over the last five years and is currently expanding their recycled water distribution system. The City expects to implement construction on the final portion of the Southwest recycled water distribution system this year. The completed distribution system will allow an additional 5,000 AF of recycled water use in the City to offset potable demands that can be used in all hydrological year types. The expansion is projected to be completed by 2025.

6.7.2 Expand Groundwater Recharge Capacity

With the acknowledgement that the groundwater aquifer is and will remain an integral resource, the City is currently evaluating an expanded recharge program as part of the Metro Plan update. Expanding intentional recharge may include the development of new dedicated intentional recharge facilities and/or joint projects for basins with FMFCD and potentially FID. The target for recharge expansion is to maximize storage within the groundwater basin and optimize use of available surface water supplies in normal years. The stored water will be used more in the single-dry year and consecutive dry years when surface water supplies are less available.

The timing for groundwater recharge capacity expansion will be examined as part of the Metro Plan update and, for the UWMP, is assumed to increase to allow for an additional 540 AFY of recharge to occur on average each year.

6.7.3 Expand Surface Water Treatment Capacity

A key component to the success of the City's ability to reverse the long-time overreliance on groundwater is the construction of its surface water treatment facilities. These have allowed the City to optimize the use of available surface water supplies. The City's NESWTF currently has a 30 mgd capacity and the capability to expand up to 60 mgd. The SESWTF is currently permitted to produce up to 54 mgd but, with the subsequent rerating of the media filters, will be capable of operating at a rated capacity of 80 mgd.

The timing for the SWTF expansion will be examined as part of the Metro Plan update and determined based on need as the City grows and demands increase.

6.7.4 Beneficial Transfers and Exchanges

As mentioned in **Section 6.6.1**, the City is evaluating future beneficial transfers and exchanges of the City's USBR water in normal water years when available water supplies exceeds demands.

6.8 Summary of Existing and Planned Sources of Water

Summaries of the above discussed existing and planned sources of water are provided in **Table 6-7** and **Table 6-8** below.

6.8.1 Supply Management

The City currently balances its surface water supplies and groundwater based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes and prevent their spread. The minimum operation conditions typically occur in the low-demand winter months, and the City can increase surface water production during peak demand months when surface water is available. In normal and wet years, the City intends to rely on more surface water supply and recharge raw surface water to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will ramp up well production to meet demands. The City is expected to continue this supply management strategy in the future.

Table 6-7. Actual Water Supplies (DWR 6-8R)

	2020	
WATER SUPPLY	ACTUAL VOLUME	WATER QUALITY
Groundwater	55,028	Drinking Water
USBR CVP	37,447	Drinking Water
FID Kings River	71,292	Drinking Water
Recycled Water, RWRF	858	Recycled Water
Recycled Water, NFWRF	54	Recycled Water
TOTAL:	**164,679**	

Table 6-8. Projected Water Supplies (DWR 6-9R)

	REASONABLY AVAILABLE VOLUME, AFY				
WATER SUPPLY	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
USBR CVP	60,000	60,000	60,000	60,000	60,000
FID Kings River	125,030	131,600	131,600	131,600	131,600
Recycled Water, RWRF	5,800	5,800	5,800	5,800	5,800
Recycled Water, NFWRF	110	110	110	110	110
TOTAL:	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**

6.8.2 Special Conditions

This section details climate change and future regulatory conditions that impact the City's supply sources.

6.8.2.1 Climate Change Effects

Climate models disagree on average annual precipitation projections but agree on other hydrologic metrics relevant to water resources management, including:

- Snowpack declines
- Increased fraction of precipitation on extreme rainfall days
- Shorter, sharper rainy season
- Increased evapotranspiration
- Higher frequency of extremely wet and extremely dry years
- Higher incidence of extreme dry year followed by an extreme wet year or vice versa (Persad, 2020) (Partida, 2020)

As discussed in **Section 4.4**, climate change impacts were evaluated in the North Kings GSP using DWR climate change datasets, which were developed for the California Water Commission's Water Storage Investment Program (WSIP). The North Kings GSP analyzed WSIP water supply projections and found climate change will have no significant impact on the FID Kings River diversions. The North Kings GSP estimates the timing of the inflows to water reservoir and surface water supplies is anticipated to shift significantly due to warmer temperatures causing precipitation to arrive as rainfall instead of snowmelt. The warmer temperatures are also predicted to cause the snowmelt to turn to runoff earlier each spring. These climate impacts are estimated in the North Kings GSP to slightly increase inflows to the Kings River (0.6% in 2040 and 0.3% in 2070); however, it is not expected to impact the Kings River diversions significantly and the timing will have a greater impact on water management, including a possible greater need for additional storage. The North Kings GSP also estimated climate impacts to the San Joaquin River supplies available to the CVP Friant Division Contractors, including the City's USBR Class I supplies, and found the WSIP dataset estimates a slight reduction in future water supplies (Provost & Pritchard, November 2019). This plan

considers water supply during an extreme dry year or multi-dry year scenario, which may occur more often due to climate change, further in **Chapter 7**.

6.8.2.2 Regulatory Conditions

The City has existing contracts for its surface water supplies that are not facing any reduction due to forthcoming regulation. The City's groundwater supply is from an unadjudicated basin and is also considered reliable. The GSA is currently working toward determining a safe yield for the Kings Subbasin, which is the amount of water than can be pumped from the basin over a long-term period without producing undesirable results. The City is an active member of the GSA, working collaboratively to bring the basin to balance while protecting the City's groundwater supply.

Additionally, forthcoming California regulations for per- and polyfluoroalkyl substances (PFAS) may impact certain wells within the City. The City is currently monitoring and treating some groundwater wells for PFAS. These regulations are not expected to impact the City's ability to use its full groundwater supply.

6.9 Energy Intensity

Pursuant to CWC Section 10631.2(a), readily available information regarding energy intensity shall be reported in the 2020 UWMP. For the City, this includes the total energy usage at each production facility, including each well site and the three SWTFs. The electrical usage includes the energy to produce, treat, and pump the water into the distribution system. Because the City's distribution system includes over 200 groundwater wells, **Table 6-9** presents the total energy usage, water produced, and average energy intensity for all groundwater wells and for each SWTF following the methodology presented in Appendix O of the DWR 2020 UWMP Guidebook. The energy intensity varies significantly between groundwater wells depending on the depth to the groundwater table, if the well includes treatment beyond disinfection, and other local conditions. The total energy intensity for all production and treatment in the City's distribution system in 2020 was 384 kWh/ AF.

Table 6-9. Water System Energy Intensity in 2020

	WELLS	NESWTF	SESWTF	T-3 SWTF	TOTAL
Electricity (kWh)	27,667,366	5,848,314	13,416,000	454,470	47,386,150
Treated Water Deliveries (AF)	56,445	20,724	45,367	875	123,411
Energy Intensity (kWh/AF)	490	282	296	520	384

7

CITY OF FRESNO

Water Service Reliability and Drought Risk Assessment

This Section discusses the long-term reliability of surface and groundwater supplies for the City.

A comparison is made of anticipated supplies and demands through 2045 for a normal year, single dry year, and five-year drought. Shorter-term reliability planning that may require immediate action, such as drought or catastrophic supply interruption, is addressed in **Chapter 8**.

IN THIS SECTION

- Water Service Reliability Assessment
- Drought Risk Assessment

7.1 Water Service Reliability Assessment

This section describes the existing constraints on the City's supply sources and reliability in different hydrologic year types.

7.1.1 Constraints on Water Sources

7.1.1.1 Groundwater

Groundwater has long been the primary water supply source for the City. Before the City's investments to increase its use of surface water with the construction of its NESWTF, T-3 SWTF, and SESWTF, groundwater levels were declining, and the falling levels were a potential constraint. Groundwater levels in some areas of the City have actually been increasing over the last five years as a result of the City's using less groundwater and are expected to continue to increase as the City pumps less in the future.

The North Kings GSP is setting sustainability indicators for groundwater levels and groundwater storage. The current GSP does define a measurable objective and minimum threshold for the basin to allow the North Kings GSA to evaluate its progress for the subject indicator, as defined by SGMA, and determine whether conditions are improving, remaining stable, or degrading.

Another constraint to the use of groundwater stems from the negative impacts from contamination (see **Section 6.1.4**). To ensure the continued beneficial use of the groundwater supply, the City has set minimum pumping requirements for specific wells to prevent the spread of existing groundwater plumes to other areas in the City and to protect the basin. The City will remain proactive in pursuing responsible parties so the proper remediation is conducted to preserve the groundwater system as a viable and sustainable resource in perpetuity. Largely, the City has been able to rely on the relatively good quality of this resource.

7.1.1.2 USBR

The City has a contract for 60,000 AFY of Class 1 water with the USBR. Analysis supporting the 2006 San Joaquin River Settlement is the basis for USBR supply projections. The settlement is based on ensuring flows downstream of Millerton Dam for varying hydrologic conditions, which can constrain surface water supplies available to the CVP Friant Division contractors, such as the City.

Another constraint that affects the consistency of this supply are the restrictions that have been imposed on water diversions from the Delta (see **Section 6.2.1**). The resulting impacts associated with the restrictions from the Delta has been more detrimental to water supplies for the CVP Friant Division contractors than the above-discussed settlement, as the latter has resulted in two years of zero allocations for the CVP Friant Division contractors.

The construction of a raw water pipeline in 2018 to convey USBR water from the Friant-Kern Canal to the NESWTF, referred to as the Friant-Kern Canal Pipeline, has improved the reliability and water quality of deliveries to the NESWTF. The NESWTF is now capable of year-round operation, and the original connection from FID's Enterprise Canal still exists as a backup delivery system if needed.

Every three years, the Friant-Kern Canal is taken down for maintenance, and during these shutdowns the City has the flexibility to deliver its Kings River supply to the NESWTF to allow for its continued use.

7.1.1.3 FID

The City has an agreement with FID providing the City an allocation of approximately 115,000 AFY of Kings River water in normal-year conditions. Water supplied from the FID contract is most susceptible to annual hydrologic conditions. The City's annual FID supply allocation is dependent on annual precipitation, Sierra Nevada mountain snowpack, and natural river flow conditions. The annual variability of these sources results in variable allocations to the City. Based on the foregoing data, FID receives an annually adjusted entitlement, the delivery of which will fluctuate throughout the irrigation delivery season. The City in turn receives its pro rata allocation based on the foregoing entitlement determination.

Another factor that may constrain the availability of Kings River water supply is scheduled maintenance of FID's vast canal network. FID typically terminates water deliveries to the City's water treatment facilities in the months of November and/or December so they can perform necessary infrastructure repairs and maintenance. However, the City constructed a dedicated 13-mile, 72-inch-diameter raw water pipeline to deliver Kings River water to the SESWTF to allow for year-round operations and prevent shutdowns due to FID maintenance. Deliveries to intentional recharge facilities will continue to be supplied through the FID canal system.

7.1.1.4 Recycled Water

At present, the largest constraint for recycled water use is the lack of infrastructure to distribute the water to end users. The City has recently increased recycled water production capabilities and constructed much of the southwest recycled water system, as described in **Section 6.4**. The City plans to complete construction of the southwest recycled water distribution system in the near term and expand its recycled water delivery in the City.

7.1.2 Description of Management Tools and Options

The City currently manages its surface water and groundwater supply by maximizing surface water for potable use and intentional recharge during wet and normal years, while relying on groundwater during dry years. The City is currently updating its Metro Plan, which will recommend projects and programs to optimize the use of its supply portfolio and further improve supply resilience. Supply management tools are an expected outcome of the Metro Plan update; however, the City's ongoing supply management is intended to maximize local supplies and improve the groundwater basin storage. Current actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

7.1.3 Year Type Characterization

Normal-water-year, single-dry-water-year, and five-consecutive-year-drought-period supply projections were made based on historic water allocations for surface water supplies, historic municipal water well pumping for groundwater, and projected utilization for recycled water, as described below.

Kings River water supply data was obtained from the Kings River Water Association and FID. USBR CVP Friant Division data was obtained from the USBR website, the City of Fresno, and FID. Groundwater and recycled water supply data was obtained from the City of Fresno.

7.1.3.1 Normal Year

Data for the total water supply for the normal-year condition is provided in **Table 7-1** based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**.
- **USBR:** long-term average allocation from **Table 6-2**.
- **FID:** long-term average allocation from **Table 6-3**.
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

7.1.3.2 Single Dry Year

The single-dry-year supply availability is based on 2015, during the 2012-2017 drought, because the City had the lowest surface water supply available in 2015. Data for total water supply for the single-dry-year condition is provided in **Table 7-2** based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** actual allocation in 2015 (0 AF).
- **FID:** actual total FID allocation in 2015 (42,935 AF) but with the projected City percentage of FID supply for the future years considered (per **Table 6-3**).
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

7.1.3.3 Multiple Dry Years

Data for total water supply for the five-year drought condition is provided in

Table 7-3 based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** actual allocations in 2012 to 2016, which ranged from 0 to 45,000 AF.
- **FID:** actual total FID allocations in 2012 to 2016, which ranged from 42,935 to 110,824 but with the projected City percentage of FID supply for the future years considered (per **Table 6-3**).
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand**.**

Despite severe reductions of surface water supplies during dry years, sufficient good-quality water was available to permit the SWTFs to operate. As mentioned in the previous section, there is some seasonal vulnerability with surface water availability in dry years, which needs to be closely coordinated with surface water suppliers to minimize impacts to the City's SWTF operations. Groundwater supplies, with intentional recharge augmentation, remain reliable in all hydrologic conditions.

7.1.4 Water Service Reliability

This section compares projected supplies and demands for a normal year, single dry year, and five-year consecutive drought. As shown in **Table 7-1**, the City is projected to have greater than 100,000 AF of available supply after meeting demands in normal years. As shown in **Table 7-2**, the City's surface water supplies are reduced in a single dry year, but all potable demands are met and groundwater recharge of raw surface water is reduced. As shown in **Table 7-3**, the City is projected to meet all demands during a five-year drought with its existing supplies. Potable demands are unrestricted, and non-potable water used for groundwater recharge is reduced in years three and four of a five-year drought.

Table 7-1. Normal Year Supply and Demand Comparison (DWR 7-2R)

	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
Surface Water – USBR	60,000	60,000	60,000	60,000	60,000
Surface Water – FID	125,030	131,600	131,600	131,600	131,600
Recycled Water	5,910	5,910	5,910	5,910	5,910
SUPPLY TOTALS	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**
Potable Demand	136,504	147,356	154,210	161,076	167,947
Non-Potable (Groundwater Recharge) Demand	62,700	65,400	68,100	70,800	73,500
DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
DIFFERENCE:	**129,826**	**128,384**	**124,300**	**120,124**	**115,883**

Table 7-2. Single Dry Year Supply and Demand Comparison (DWR 7-3R)

	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
Surface Water – USBR	0	0	0	0	0
Surface Water – FID	45,852	45,852	45,852	45,852	45,852
Recycled Water	5,910	5,910	5,910	5,910	5,910
SUPPLY TOTALS	**189,852**	**195,392**	**200,862**	**206,252**	**211,582**
Potable Demand	136,504	147,356	154,210	161,076	167,947
Non-Potable (Groundwater Recharge) Demand	27,588	28,776	29,964	31,152	32,340
DEMAND TOTALS	**164,092**	**176,132**	**184,174**	**192,228**	**200,287**
DIFFERENCE:	**25,760**	**19,260**	**16,688**	**14,024**	**11,295**

Table 7-3. Multiple Dry Years Supply and Demand Comparison (DWR 7-4R)

		2025	2030	2035	2040	2045
FIRST YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	30,000	30,000	30,000	30,000	30,000
	Surface Water – FID	99,725	99,725	99,725	99,725	99,725
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**273,725**	**279,265**	**284,735**	**290,125**	**295,455**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**74,521**	**66,509**	**62,425**	**58,249**	**54,008**
SECOND YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	37,200	37,200	37,200	37,200	37,200
	Surface Water – FID	93,426	93,426	93,426	93,426	93,426
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**274,626**	**280,166**	**285,636**	**291,026**	**296,356**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**75,422**	**67,410**	**63,326**	**59,150**	**54,909**
THIRD YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	0	0	0	0	0
	Surface Water – FID	73,568	73,568	73,568	73,568	73,568
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**217,568**	**223,108**	**228,578**	**233,968**	**239,298**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	53,763	46,281	43,526	40,677	37,761
	DEMAND TOTALS	**190,267**	**193,637**	**197,736**	**201,753**	**205,708**
	DIFFERENCE:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**

		2025	2030	2035	2040	2045
FOURTH YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	0	0	0	0	0
	Surface Water – FID	45,852	45,852	45,852	45,852	45,852
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**189,852**	**195,392**	**200,862**	**206,252**	**211,582**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	26,047	18,564	15,810	12,960	10,045
	DEMAND TOTALS	**162,551**	**165,920**	**170,020**	**174,036**	**177,992**
	DIFFERENCE:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
FIFTH YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	45,000	45,000	45,000	45,000	45,000
	Surface Water – FID	125,840	125,840	125,840	125,840	125,840
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**314,840**	**320,380**	**325,850**	**331,240**	**336,570**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**115,636**	**107,624**	**103,540**	**99,364**	**95,123**

7.2 Drought Risk Assessment

A new provision of the Water Code directs Suppliers to prepare a DRA. The DRA considers a drought period lasting five consecutive years, starting from the year following the year when the assessment is conducted. For this plan, the DRA considers five consecutive dry years from 2021 through 2025. The City may conduct an interim update or updates to this DRA within the five-year cycle of its UWMP update. The DRA analysis allows the City to examine the management of its supplies during stressed hydrologic conditions and an opportunity to evaluate whether the City may need to enact its Water Shortage Contingency Plan (WSCP) during the next actual drought period lasting at least five years. The projected gross water use for the five-year DRA is based on unrestricted potable demand, a reduction in raw-water demand for intentional recharge in years three and four of the five-year drought, and unrestricted recycled water demand.

The reliability of supplies over a five-consecutive-year drought is described in **Section 7.1.4** and summarized below for 2021 through 2025:

- **Groundwater:** based on interpolating between the 2020 and 2025 values in **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** based on the actual supply allocations from these sources during the driest consecutive five-year drought (2012–2016).

- **FID:** based on the actual supply allocations from these sources during the driest consecutive five-year drought (2012–2016). For this DRA, the City's percentage of FID supplies are conservatively assumed to remain at the existing 25.79%.
- **Recycled Water:** based on interpolating between the 2020 and 2025 values in **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

Table 7-4 compares the total projected supply and demand for the five-year DRA for 2021 through 2025. As shown, the City does not expect to enact its WSCP for a five-consecutive-year drought based on the unrestricted potable demand projections and the current supply portfolio and reliability.

Table 7-4. Five-Year Drought Risk Assessment

WATER USE TYPE	2021	2022	2023	2024	2025
Groundwater	133,602	134,724	135,846	136,968	138,090
Surface Water – USBR	30,000	37,200	0	0	45,000
Surface Water – FID	93,354	83,085	65,425	40,776	111,911
Recycled Water	1,912	2,911	3,911	4,910	5,910
TOTAL SUPPLY	**258,868**	**257,920**	**205,181**	**182,655**	**300,911**
Potable Demand	124,910	127,827	130,745	133,662	136,504
Non-Potable Demand	60,000	60,000	48,287	22,260	60,000
TOTAL DEMAND	**184,910**	**187,827**	**179,032**	**155,922**	**196,504**
AVAILABLE SUPPLIES	**73,958**	**70,093**	**26,149**	**26,732**	**104,407**

8

CITY OF FRESNO

Water Shortage Contingency Plan

This WSCP is a detailed plan for how the City intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time.

The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

IN THIS SECTION

- WSCP Overview

The WSCP describes the following:

1. **Water Supply Reliability Analysis:** summarizes the City's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition
2. **Annual Water Supply and Demand Assessment Procedures:** describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions
3. **Six Standard Shortage Stages:** establishes water shortage levels to clearly identify and prepare for shortages
4. **Shortage Response Actions:** describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand as well as minimize social and economic impacts to the community
5. **Communication Protocols:** describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements
6. **Compliance and Enforcement:** defines compliance and enforcement actions available to administer demand reductions
7. **Legal Authority:** lists the legal documents that grant the City the authority to declare a water shortage and implement and enforce response actions
8. **Financial Consequences of WSCP Implementation:** describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens
9. **Monitoring and Reporting:** summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation, with results used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced
10. **WSCP Refinement Procedures:** describes the factors that may trigger updates to the WSCP and outlines how to complete an update
11. **Special Water Features Distinctions:** identifies exemptions for ponds, lakes, fountains, pools, and spas, etc.
12. **Plan Adoption, Submittal, and Availability:** describes the process for the WSCP adoption, submittal, and availability after each revision

The 2020 WSCP is a standalone document that can be modified as needed and is included as **Appendix J**.

9 CITY OF FRESNO
Demand Management Measures

This chapter discusses the City's demand management measures including its water waste prevention ordinances, metering program, public outreach, and water loss reduction measures.

The City employs several water conservation programs, in excess of State-mandated restrictions, to promote conservation and reduce the water supply demand. These measures help reduce overdraft of the groundwater aquifer that the City uses and have aided in the City's attainment of the urban water use reduction targets discussed in **Chapter 5**. The following sections provide a description of the Demand Management Measures (DMMs), including the nature and extent of each.

IN THIS SECTION

- Water Waste Prevention
- Metering
- Conservation Pricing
- Public Education and Outreach
- Water Loss Reduction Measures

9.1 Demand Management Measures for Retail

9.1.1 Water Waste Prevention Ordinances

The City prohibits water waste through implementation of the Urban Water Conservation and Excessive Water Use ordinance (see Section 6-520 of the Fresno Municipal Code). The ordinance includes such prohibitions as not washing hardscapes, using a nozzle-controlled hose, and using irrigation practices. The WSCP, included in **Appendix J**, Section 1.5, contains a more in-depth discussion of these prohibitions and consequences associated with them.

The City has a water waste hotline and a reporting form on the City website and keeps records of water waste violations. The City also employs fifteen staff persons year-round to manage and monitor the water conservation programs in place. Communication to the City's diverse customer base is always taken into consideration, so two of the positions require Spanish and Hmong languages. All Water Conservation Representatives use advanced metering infrastructure (AMI) to monitor and confirm excessive or negligent water waste incidents.

The Water Conservation staff can be reached at (559) 621-5300, (559) 621-5480, or (559) 621-CITY for after-hours emergencies. Online forms are also available to the public. Their office is located at 1910 E. University Avenue, Fresno, CA 93703. The Water Conservation Supervisor is Conrad Braganza.

9.1.2 Metering

In 2008, the City embarked on an aggressive project to install meters on all single-family residential service connections throughout its service area. The water meter project was completed at the end of 2012. The City already had water meters on all existing multifamily residential, commercial, industrial, landscape irrigation, and fire services.

With completion of the metering project, the City can now monitor water use more closely and provide its customers an understanding of water use (and its fiscal impacts), which has led to reducing water consumption by approximately 13% since 2013. The City will continue to monitor water use through the metering data and use the data to analyze demand trends and plan for future water shortages.

As part of the analysis of the meter data and through customer complaints or comments, the City is able to identify meters that are not working properly. Once identified, the City can have a maintenance crew visit the property and evaluate whether to repair or replace the meter.

The City also routinely tests and calibrates meters to ensure accuracy in reading and billing. Typically, meters are tested in place in the field or at a test bench in the meter shop. Field testing involves using calibrated flow meters to monitor the flow through a test port on or attached to the meter and comparing the measured flow to the meter reading. The majority of large meters, three inches and above, have a bypass valve that will be turned on during the meter test as not to disrupt water use to the property. In the case where a bypass valve is not in place, the customer is notified at least 48 hours before the test date. The City's service area has a total of approximately 135,000 meters, of which approximately 1,100 are three inches or larger. In 2018, of 157 of these large meters were tested, 10 were repaired, and 15 were replaced.

With the majority of meters being two inches or smaller, testing every single one is not logistically or economically feasible; therefore, a statistical sampling of each size is tested each year based on the following criteria:

- Meters six inches and above are tested annually.
- Meters three inches to four inches are tested at least once every two years.
- Meters three-fourths of an inch to two inches are sample tested as needed.

The City performs more frequent testing on larger meters on the basis that an error in their registration has a greater effect on customer equity and revenue issues. Meters registering larger volumes are given priority regardless of when they were last tested.

The City also shares meter data with the customers through its EyeOnWater tool available on its website or on a mobile app. This allows customers to monitor and better understand their hourly, daily, weekly, and monthly water usage, trends, and how they compare to average users.

9.1.3 Conservation Pricing

The City's customers are subject to the water rate structure adopted by the City Council through the Proposition 218 process. The approved rate structure has a base price designated by meter size and a volumetric rate for water usage. **Table 9-1** shows the rate structure.

The City will investigate the use of alternative rate structures in the future, which could have specific charges for usage to provide a fiscal incentive for customers to conserve water. This approach would permit customers to directly see the impact of water use reduction each month.

Table 9-1. Current Water Rate Structure

	BASE RATE		USAGE CHARGES	
METER SIZE	DOMESTIC	IRRIGATION	100 CUBIC FEET (HCF)	1,000 GALLONS
¾" or smaller	$13.50	$10.70	$1.74 (per each HCF)	$2.33 (per each 1,000 gallons)
1"	$17.90	$13.40		
1.5"	$20.80	$15.20		
2"	$35.30	$24.10		
3"	$52.80	$34.90		
4"	$79.00	$51.00		
6"	$152.00	$96.00		
8"	$705.00	$436.00		
10"	$1,113.00	$687.00		
12"	$1,462.00	$901.00		

9.1.4 Public Education and Outreach

The City has worked diligently to connect with and educate the community it serves. Those efforts include an emphasis on water conservation techniques and the importance of reducing overall water demand, both specifically to the resident (in terms of fiscal impacts) and to the overall water supply.

The City's varied programs to incentivize water savings are frequently discussed, including the following items:

- Water-wise landscape consultation
- EyeOnWater tool
- Irrigation efficiency audit
- Assistance with setting irrigation controllers
- Interior/exterior water leak surveys
- Water meter use information
- Water use rebates, coupons, and permits
- Lawn-to-garden rebates
- Water conservation hotlines

9.1.4.1 Education and Outreach

The City's water conservation public information program is managed in-house with the assistance of JP Marketing. The firm's services include strategic planning, creative concepts, public relations, marketing, promotion, research, advertising, media design, copywriting, event creation, and online services.

The City's public information program has many components, including multimedia campaigns (paid and public service advertising), customer billing inserts, literature, public outreach activities, a speaker's bureau, and inter-agency partnerships. Many of the City's water conservation materials are provided in three languages: English, Hmong, and Spanish.

The City is a member of the Central Valley Water Awareness Committee (CVWAC), which is composed of several cities, water utilities, irrigation districts, and other groups in the Central Valley. The CVWAC was created to increase the public's understanding of how water is treated, managed, and delivered to customers. The City participates in Water Awareness Month activities through its affiliation with the CVWAC.

The City conducted outreach to the community through approximately 50 events between 2015 and 2020, including:

- Setting up outreach booths providing water-saving info and rebate information at local festivals, parades, plant sales, home and garden shows, and fairs
- Participating in Annual Water Wise Plant Exchanges, a large community event to share water-wise plants and information and participate in hands-on activities
- Hosting Kids Water Camp, a large one-day event with hands-on activities for kids in third grade in all elementary schools in the service area
- Hosting workshops and speaker events about water-wise plants, gardening, and landscaping

A full list of specific education and outreach events over the past five years is included in **Appendix K**. The City also maintains a water conservation page on its website with links to many of the flyers and rebates mentioned above.

9.1.4.2 Water Surveys

The City conducted over 24,000 interior and exterior water leak surveys between 2015 and 2020. **Table 9-2** quantifies the number and types of surveys conducted.

Table 9-2. Interior and Exterior Surveys

DESCRIPTION/YEAR	2015	2016	2017	2018	2019	2020	TOTAL
EXTERIOR SURVEYS							
Exterior Audit	942	1,289	1,359	835	2,189	427	7,041
Landscape Consultation	605	382	193	139	149	48	1,516
Large Turf Survey	1	5	1	0	0	0	7
Timer Tutorial	1,644	1,967	1,873	2,170	1,346	518	9,518
INTERIOR SURVEYS							
Interior Audit	835	1,135	1,222	748	2,137	412	6,489
TOTALS	**4,027**	**4,778**	**4,648**	**3,892**	**5,821**	**1,405**	**24,571**

9.1.4.3 Rebate Programs

The City operates 14 rebate programs. Some of those that were active and used during the 2015–2020 reporting period are summarized in **Table 9-3**.

Table 9-3. Rebate Program Results (2015–2020)

	LAWN TO GARDEN		WASHING MACHINE		HIGH EFFIC. TOILET	
YEAR	NO.	REBATE	NO.	REBATE	NO.	REBATE
2015	122	$4,044	358	$46,144	301	$35,344
2016	160	$71,372	247	$27,600	233	$21,124
2017	103	$37,157	255	$19,682	495	$18,937
2018	43	$19,238	57	$5,502	145	$75,721
2019	42	$19,456	84	$8,000	115	$19,091
2020	25	$14,521	121	$6,950	106	$18,033
TOTALS	**495**	**$165,791**	**1,122**	**$113,880**	**1,395**	**$188,253**

9.1.5 Programs to Assess and Manage Distribution System Real Loss

As discussed in **Chapter 4**, the calculated loss was determined to be 8%, illustrating the City's conservative approach in the past. With completed system metering, the City is able to track losses more closely and understand where possible losses are occurring and correct them as necessary.

The AWWA Water Audit Tool suggested the areas the City could improve to reduce system losses, including calibration of source meters, unauthorized consumption, and data handling errors.

The following measures are in place or are being developed to improve the system losses:

- The City installed the remaining source meters on the few unmetered wells within the system in 2017, and now currently all wells and production facilities are fully metered.
- The City has a source meter calibration plan in place.
- The City has implemented meter testing frequency based on service size. This is discussed in more detail in **Section 9.1.2**.
- The City has an online tool as well as a telephone hotline available for the public to report water leaks, either on their property or within the public rights-of-way. This helps reduce detection time and limits the water loss from leaks.
- The City conducted a leak survey on 100 miles of the water system in January 2016. Eight total leaks were pinpointed, one on the main, two on hydrants, two on water service lines, and one at a water meter.
- The City uses meter data to identify any meters not functioning correctly or any leaks in the system so that they can be replaced or repaired. This helps reduce unaccounted for water consumption.

Unauthorized consumption can be determined, at times, through the meter data also. If a meter shows no usage, the City can note the address and schedule a site visit to determine any possible issues.

9.1.6 Other Demand Management Measures

In addition to the water conservation programs, the City has also enacted watering schedules for the community that specify days and times that customers are allowed to water, based on odd or even street addresses. The City has also created an automated courtesy notice program that informs customers when they exceed the excessive water use threshold during days and times when outdoor watering is not allowed.

9.2 Implementation to Achieve Water Use Targets

As discussed in **Chapter 5**, the City has met and exceeded its 2020 water use target. However, the City also realizes a portion of the observed conservation is due to the strict water use restrictions imposed during the drought. If those restrictions are lifted, the City will be diligent in continuing use of the above described DMMs.

The extensive metering program, replacement of turf, and replacement of over 10,000 high-water-use appliances (toilets and washing machines) over the last several years has helped the City maintain overall lower water consumption.

9.3 Water Use Objectives (Future Requirements)

As discussed in **Section 4.2.4.4**, the City is tracking the recommended water use efficiency standards and water use objectives developed due to Senate Bill 606 and Assembly Bill 1668. Currently no water use objectives have been adopted by the State, and are not anticipated to be adopted until 2022, but an indoor residential water use standard has been recommended by DWR, and additional standards are expected to be released in late 2021. The City is aware of the legislation and tracking the forthcoming water use objectives as they are available. The City is currently having ongoing discussions with DWR on clarifying the GIS-based approach for developing the overall water objective for residential customers. Alternatively, the City is also interested in using actual water use data (from the AMI system) to develop these objectives, following discussions and approval from DWR and SWRCB.

10 CITY OF FRESNO Plan Adoption, Submittal, and Implementation

This section provides guidance in the adoption, submittal, and implementation of the 2020 UWMP and WSCP, as well as processes for amending the adopted plans if needed.

This UWMP update has been prepared on a calendar-year basis and includes all water use and planning data for the 2020 calendar year. Additional details are provided in the preceding chapters.

IN THIS SECTION

- Public Hearing Notices
- Plan Adoption and Submittal

10.1 Notice of Public Hearing

The City has notified the County of Fresno, the only city or county in which the City provides water, of its intent to review the UWMP and consider changes to the plan. The City also notified the City of Clovis of plan preparation. Both of these governmental entities as well as a host of local water purveyors and agencies (**Table 2-1**) were notified of the preparation of the UWMP and public hearing and were encouraged to participate in the development of this plan update. Copies of the notification letters are included in **Appendix L**.

Consistent with the legislative requirements for public noticing, the City published two notices in the Fresno Bee, at least five days apart over a two-week period, providing the date and time of the public hearing. The notices were published on July 1, 2021, and July 8, 2021.

10.2 Public Hearing and Adoption

The City held a public hearing and adopted the 2020 UWMP on July 15, 2021. A copy of the adopting resolution is included in **Appendix M**. Before the public hearing, notices were published notifying the public of the date and time of the hearing.

10.3 Plan Submittal

Once the 2020 UWMP and WSCP have been adopted, a copy of the 2020 UWMP and WSCP and any subsequent amendments will be submitted to DWR, the State Library, and the County of Fresno.

10.4 Public Availability

Once the plan has been adopted, a hard copy will be made available for public reference at the City of Fresno Department of Public Utilities office at City Hall (located at 2600 Fresno Street) and the Water Division office (located at 1910 E. University Avenue). Additionally, an electronic copy will be uploaded to the City of Fresno website and made available for public reference.

11 CITY OF FRESNO References

Applied Development Economics, Inc. and Mintier Harnish Associates. (2017). *Fresno County 2050 Growth.*

California Department of Finance. (2020, May). *E-4 Population Estimates for Cities, Counties, and the State.* Retrieved from State of California Department of Finance: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-4/2010-20/

California Department of Water Resources. (Feb 2016). *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use.*

California Department of Water Resources. (January 2006). *Bulletin 118 - San Joaquiv Valley Groundwater Basin, Kings Subbasin.*

California Department of Water Resources, State Water Resources Control Board. (November 2018). *Making Water Conservation a California Way of Life.*

California Regional Water Qulaity Control Board. (2018). Order R5-2018-0080 Waste Discharge Requirements for Cities of Fresno and Clovis Regional Wastewater Reclamation Facility .

Carollo. (2010). Recycled Water Master Plan. City of Fresno.

Carollo. (2019). Citywide Recycled Water Demand and Southwest Recycled Water System Analysis . City of Fresno.

CH2MHill. (1992). *City of Fresno Metropolitan Water Resources Management Plan, Phase 1 Report, Volume II or II, Appendix B Hydrogeologic Conditions in the FCMA.*

City of Fresno Development and Resource Management Department. (2014). *Fresno General Plan .*

City of Fresno Development and Resource Management Department. (2017). *Fresno General Plan 2015 - 2023 Housing Element.*

City of Fresno Planning and Development Department. (2020). *2019 Housing Element Annual Progress Report.*

Department of Water Resources. (2018). *Guidance for Climate Change Data Use during Groundwater Sustainability Plan.*

First Carbon Solutions. (2014). *Master Environmental Impact Report General Plan and Development Code Update City of Fresno, Fresno County, California.*

Fresno City Water, Engineering Department. (1940). Average of Groundwater Depth for City of Wells Log.

History of SJRECWA Exchange Contractors. (n.d.). Retrieved 03 18, 2021, from San Joaquin River Exchange Contractrs Water Authority: http://www.sjrecwa.net/about/history/

John Carollo Engineers. (1969). *Report on Water Resources City of Fresno.*

Kings River Water Association and Kings River Conservation District. (June 2003). *The Kings River Handbook, pg. 7.*

LSA. (2020). *Fresno General Plan Public Review Draft Program Environmental Impact Report.*

Partida, C. K. (2020, November 15). Planning for a shorter rainy season and more frequent extreme storms in California. *California WaterBlog*. Retrieved from https://californiawaterblog.com/2020/11/15/planning-for-a-shorter-rainy-season-and-more-frequent-extreme-storms-in-california/

Persad, G. G. (2020, October). Inter-model agreement on projected shifts in California hydroclimate characteristics critical to water management. *Climatic Change*. Retrieved from https://doi.org/10.1007/s10584-020-02882-4

Provost & Pritchard. (November 2019). *North Kings Groundwater Sustainability Plan.* North Kings Groundwater Sustainability Agency.

WateReuse Research Foundation. (2013). *Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment.*

West Yost Associates. (January 2014). *City of Fresno Metropolitan Water Resources Management Plan Update Addendum.*

WRIME. (2007). The Integrated Groundwater and Surface Water Model prepared for the Kings Basin Integrated Regional Water Management Authority.

A

2020 UWMP Checklist

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1
x	x	Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Executive Summary
x	x	Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Chapter 2, Section 10.2
x	x	Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.1
x	x	Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.1, Section 10.1
x		Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	N/A
	x	Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A
x	x	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Section 3.1 and 3.2
x	x	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Table 3-2 Section 3.3
x	x	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Table 3-3 Section 3.4.1
x	x	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.3.1
x	x	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Table 3-3 Section 3.4.1
x	x	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Table 3-1 Section 3.1.1, Section 4.2.4.1, Table 4-3, Figure 4-3,
x	x	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2
x	x	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Losses included Section 4.2.2, City has not adopted loss standards

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Table 4-5 Section 4.2.4.2
x	x	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.5.2
x	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Table 4-1 Section 4.2.2
x	optional	Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Table 4-9 Section 4.3
x	x	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.4
x		Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Table 5-1 Section 5.4 Appendix C
x		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.5 Appendix C
	x	Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
x		Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	N/A
x		Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	N/A
x		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Appendix C
x	x	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 6.1-6.4 Section 7.1.3
x	x	Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change.*	System Supplies	Section 6.8.2.1
x	x	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.8
x	x	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.7
x	x	Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Table 6-7 and Table 6-8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.1
x	x	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.1 Appendix G
x	x	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.1.1
x	x	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	N/A
x	x	Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.1.2
x	x	Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.1.6 Figure 6-6
x	x	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.1.5 Table 6-1
x	x	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6-6
x	x	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.4.2, Appendix B Table 6-3R
x	x	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.4.4 Table 6-5
x	x	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.4.4
x	x	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.4.4 Table 6-6
x	x	Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.4.5
x	x	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.4.5
x	x	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.5
x	x	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.4.2, Appendix B Table 6-3R

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.7
x	x	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.9
x	x	Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1.1
x	x	Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.1.2
x	x	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.1.4
x	x	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.1.3.3
x	x	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.1.3
x	x	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.1.4 Table 7-1, Table 7-2, and Table 7-3
x	x	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.1.3 and 7.1.4
x	x	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Appendix J
x	x	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Appendix J - Section 1.2
x	x	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Appendix J - Section 1.10

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Appendix J - Section 1.3
x	x	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Appendix J - Section 1.3
x	x	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Appendix J - Section 1.4 Table 2
x	x	Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Appendix J - Section 1.4 Figure 2
x	x	Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Appendix J - Section 1.5.3 Table 4
x	x	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Appendix J - Section 1.5.2 Table 3
x	x	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Appendix J - Section 1.5.4
x	x	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Appendix J - Section 1.5.1
x	x	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Appendix J - Section 1.5.2 Table 3
x	x	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Appendix J - Section 1.5.6
x	x	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Appendix J - Section 1.6
x	x	Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Appendix J - Section 1.6
x		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Appendix J - Section 1.7
x		Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Appendix J - Section 1.8
x	x	Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Appendix J - Section 1.8
x	x	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.9
x	x	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.9
x		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Appendix J - Section 1.9
x		Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Appendix J - Section 1.10
x		Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Appendix J - Section 1.12
x	x	Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Appendix J - Section 1.13
x	x	Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Appendix J - Section 1.13
	x	Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A
x		Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Section 9.1
x		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 10.2
x	x	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.1, Table 2-1, Appendix L

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Appendix L
x	x	Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Appendix L
x	x	Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Appendix M
x	x	Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A
x	x	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	TBD

B

DWR Standardized Tables

2-1R | Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020
CA1010007	CITY OF FRESNO	139,523	121,994
	Total:	**139,523**	**121,994**
Note: Data provided by City of Fresno Water Division			

2-2 | Public Water Systems

Type of Plan	Member of RUWMP	Member of Regional Alliance	Name of RUWMP or Regional Alliance
Individual UWMP	No	No	N/A

2-3 | Agency Identification

Type of Supplier	Year Type	First Day of Year		Unit Type
		DD	MM	
Retailer	Calendar Years			Acre Feet (AF)

Conversion to Gallons: *325851*
Conversion to Gallons per Day: *892.7425*

2-4R | Water Supplier Information Exchange

Wholesale Water Supplier Name
United States Bureau of Reclamation
Fresno Irrigation District

3-1R | Current & Projected Population

Population Served	2020	2025	2030	2035	2040	2045
Total	550,217	609,433	674,677	719,327	765,278	812,529

4-1R | Actual Demands for Water

Use Type	Additional Description	Level of Treatment When Delivered	2020 Volume
Single Family		Drinking Water	60,065
Multi-Family		Drinking Water	18,842
Commercial		Drinking Water	16,971
Industrial		Drinking Water	5,729
Institutional/Governmental	See Note 1	Drinking Water	---
Landscape		Drinking Water	10,478
Other	Travel Meters	Drinking Water	340
Losses		Drinking Water	9,568
Groundwater Recharge		Raw Water	42,686
		Total:	**164,679**

Notes:
1. Institutional and Governmental water usage is included in the Commercial use type.

4-2R | Projected Demands for Water

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Single Family		76,255	80,429	82,934	85,437	87,936
Multi-Family		19,000	20,654	21,737	22,831	23,935
Commercial		19,052	21,135	22,587	24,041	25,496
Industrial		7,410	9,003	9,922	10,841	11,758
Institutional/Governmental	See Note 1					
Landscape		4,490	5,035	5,422	5,809	6,196
Other	Travel Meters	200	200	200	200	200
Losses		10,097	10,900	11,408	11,917	12,426
Groundwater Recharge	Raw Water	62,700	65,400	68,100	70,800	73,500
Total:		**199,204**	**212,756**	**222,310**	**231,876**	**241,447**

Notes:
1. Institutional and Governmental water usage is included in the Commercial use type.

4-3R | Total Gross Water Use

	2020	2025	2030	2035	2040	2045
Potable and Raw Water From Table 4-1R and 4-2R	164,679	199,204	212,756	222,310	231,876	241,447
Recycled Water Demand From Table 6-4R	4,757					
Total Water Use:	**169,436**	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**

Note: Recycled water supply is a potable water offset, thus the recycled water demand in years 2025-2045 is included in the potable and raw water demand total.

4-4R | 12 Month Water Loss Audit Reporting

Report Period Start Date		Volume of Water Loss*
MM	YYYY	
1	2016	9,036
1	2017	10,235
1	2018	9,028
1	2019	9,059
1	2020	9,568

*For years 2016, through 2019, volume of water loss is taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet. For 2020 the volume of water loss is estimates as the difference in metered water produced and entered into the distribution system and metered consumption.

4-5R | Inclusion in Water Use Projections

Are Future Water Savings Included in Projections? Refer to Appendix K of UWMP Guidebook.	Yes
Section or page number where the citations utilized in the demand projects can it be found:	Section 4.2.4.2
Are Lower Income Residential Demands Included in Projections?	Yes

5-1R | Baselines & Targets Summary

Baseline Period	Start Year	End Year	Average Baseline GPCD*	Confirmed 2020 Target *
10-15 Year	1999	2008	309	247
5 Year	2003	2007	304	N/A

*All values are in Gallons per Capita per Day (GPCD)

5-2R | 2020 Compliance

Actual 2020 GPCD*	Optional Adjustments to 2020 GPCD					2020 GPCD* (Adjusted if applicable)	Supplier Achieved Targeted Reduction in 2020
	Extraordinary Events*	Economic Adjustment*	Weather Normalization*	Total Adjustments*	Adjusted 2020 GPCD*		
198	0	0	0	0	0	0	Yes

*All values are in Gallons per Capita per Day (GPCD)

6-1R | Groundwater Volume Pumped

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial Basin	San Joaquin Groundwater Basin: Kings Subbasin	99,107	105,211	76,796	54,609	55,028
	Total:	**99,107**	**105,211**	**76,796**	**54,609**	**55,028**

6-2R | Wastewater Collected within Service Area in 2020

The supplier will complete the table.				
			Percentage of 2020 service area covered	
			Percentage of 2020 service area population covered	
Wastewater Collection			**Recipient of C**	
Name of Wastewater Collection Agency	**Wastewater Volume Metered or Estimated**	**Wastewater Volume Collected from UWMP Service Area in 2020**	**Name of Wastewater Agency Receiving Collected Wastewater**	**Wastewater Treatment Plant Name**
City of Fresno	Metered	63,652	**City of Fresno**	RWRF
City of Fresno	Metered	325	**City of Fresno**	NFWRF
	Total:	**63,977**		
Note: Wastewater Volume in units of AF				

6-3R | Wastewater Treatment & Discharge Within Service Area in 2020

The supplier will complete the table.							
Wastewater Treatment Plant Name	**Discharge Location Name or Identifier**	**Discharge Location Description**	**Wastewater Discharge ID Number**	**Method of Disposal**	**Plant Treats Wastewater Generated Outside the Service Area**	**Treatment Level**	**Wa Tre**
RWRF	Treatment Site	Onsite Percolation Ponds	WDR Order R5-2018-0080	Percolation ponds	Yes	Secondary, Undisinfected	
RWRF	Treatment Site	Onsite Percolation Ponds	WDR Order R5-2018-0080	Percolation ponds	Yes	Tertiary	
NFWRF	Treatment Site	Onsite Pond	WDR Order R5-2014-0162	Percolation ponds	No	Tertiary	
						Total:	

6-4R | Recycled Water Direct Beneficial Uses Within Service Area

The supplier will complete the table.				
Name of Supplier Producing (Treating) the Recycled Water:			City of Fresno	
Name of Supplier Operating the Recycled Water Distribution System:			City of Fresno	
Supplemental Volume of Water Added in 2020:				
Source of 2020 Supplemental Water:			N/A	
Beneficial Use Type	**Potential Beneficial Uses of Recycled Water**	**Amount of Potential Uses of Recycled Water**	**General Description of 2020 Uses**	**Level of Treatment**
Agricultural Irrigation	Non-food crop irrigation	7,900	Irrigate non-food crops	Secondary, Undisinfected
Landscape Irrigation (excludes golf courses)	Landscape Irrigation	5,800	Landscape irrigation, distribtued through the southwest recycled water distribution system	Tertiary
Agricultural Irrigation	Food crop irrigation	410	Irrigate limited food crops, distribtued through the southwest recycled water distribution system	Tertiary
Golf Course Irrigation	Landscape Irrigation	110	Copper River Golf Course	Tertiary
				Total
Internal Reuse (Not included in Statewide Recycled Water Volume).				

6-5R | 2015 Recycled Water Use Projection Compared to 2020 Actual

The supplier will complete the table.

Use Type	2015 Projection for 2020	2020 Actual Use
Agricultural Irrigation	14,200	3,845
Landscape Irrigation (excludes golf courses)	4,300	858
Golf Course Irrigation		54
Commercial Use		
Industrial Use	1,400	
Geothermal and Other Energy Production		
Seawater Intrusion Barrier		
Recreational Impoundment		
Wetlands or Wildlife Habitat		
Groundwater Recharge (IPR)*	1,300	
Surface Water Augmentation (IPR)*		
Direct Potable Reuse		
Total:	**21,200**	**4,757**

6-6R | Methods to Expand Future Recycled Water Use

The supplier will complete the table below.			
Name of Action	**Description**	**Planned Implementation Year**	**Expected Increase of Recycled Water Use**
Build Infrastructure	Recycled Water Distribution System Expansion	2021	5,000
		Total:	**5,000**

6-7R | Expected Future Water Supply Projects or Programs

Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.						
Page Location for Narrative in UWMP:			Section 6.7			
Name of Future Projects or Programs	**Joint Project with Other Suppliers**	**Agency Name**	**Description**	**Planned Implementation Year**	**Planned for Use in Year Type**	**Expected Increase in Water Supply to Supplier**
Expansion of Tertiary Recycled Water Treatment	No		See Section 6.7		All Year Types	
Expansion of Surface Water Treatment Capacity	No		See Section 6.7		All Year Types	
Expansion of Groundwater Recharge Program	No		See Section 6.7		All Year Types	

6-8R | Actual Water Supplies

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield
Groundwater (not desalinated)		55,028	Drinking Water	
Surface water (not desalinated)	USBR CVP	37,447	Drinking Water	
Surface water (not desalinated)	FID Contract	71,292	Drinking Water	
Recycled Water	RWRF	858	Recycled Water	
Recycled Water	NFWRF	54	Recycled Water	
	Total:	**164,679**		**-**

6-8DS | Source Water Desalination

Neither groundwater nor surface water are reduced in salinity prior to distribution. The supplier will not complete the table.

6-9R | Projected Water Supplies

Water Supply	Additional Detail on Water Supply	Projected Water Sup					
		2025		2030		2035	
		Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total R Safe
Groundwater (not desalinated)	Kings Subbasin	138,090		143,630		149,100	
Surface water (not desalinated)	USBR CVP	60,000		60,000		60,000	
Surface water (not desalinated)	FID Contract	125,030		131,600		131,600	
Recycled Water	NFWRF Tertiary Disinfected	5,800		5,800		5,800	
Recycled Water	RWRF Tertiary Disinfected	110		110		110	
	Total:	**329,030**	**-**	**341,140**	**-**	**346,610**	

7-1R | Basis of Water Year Data (Reliability Assessment)

Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP.	
Page Location for Narrative in UWMP:	See Section 7.1.3 in the UWMP

7-2R | Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals From Table 6-9R	329,030	341,140	346,610	352,000	357,330
Demand Totals From Table 4-3R	199,204	212,756	222,310	231,876	241,447
Difference:	**129,826**	**128,384**	**124,300**	**120,124**	**115,883**

7-3R | Single Dry Year Supply & Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals	189,852	195,392	200,862	206,252	211,582
Demand Totals	164,092	176,132	184,174	192,228	200,287
Difference:	**25,760**	**19,260**	**16,688**	**14,024**	**11,295**

7-4R | Multiple Dry Years Supply & Demand Comparison

		2025	2030	2035	2040	2045
First Year	**Supply Totals**	273,725	279,265	284,735	290,125	295,455
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**74,521**	**66,509**	**62,425**	**58,249**	**54,008**
Second Year	**Supply Totals**	274,626	280,166	285,636	291,026	296,356
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**75,422**	**67,410**	**63,326**	**59,150**	**54,909**
Third Year	**Supply Totals**	217,568	223,108	228,578	233,968	239,298
	Demand Totals	190,267	193,637	197,736	201,753	205,708
	Difference:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
Fourth Year	**Supply Totals**	189,852	195,392	200,862	206,252	211,582
	Demand Totals	162,551	165,920	170,020	174,036	177,992
	Difference:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
Fifth Year	**Supply Totals**	314,840	320,380	325,850	331,240	336,570
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**115,636**	**107,624**	**103,540**	**99,364**	**95,123**

7-5 | Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

2021	**Gross Water Use**	184,910
	Total Supplies	240,905
	Surplus/Shortfall without WSCP Action	**55,995**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**55,995**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2022	**Gross Water Use**	187,827
	Total Supplies	244,448
	Surplus/Shortfall without WSCP Action	**56,621**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**56,621**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2023	**Gross Water Use**	170,051
	Total Supplies	196,200
	Surplus/Shortfall without WSCP Action	**26,149**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**26,149**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2024	**Gross Water Use**	151,432
	Total Supplies	178,164
	Surplus/Shortfall without WSCP Action	**26,732**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**26,732**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2025	**Gross Water Use**	196,504
	Total Supplies	300,911
	Surplus/Shortfall without WSCP Action	**104,407**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**104,407**
	Resulting Percent Use Reduction from WSCP Action	**0%**

8-1 | Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage[1]	Water Shortage Condition
0		No water shortage condition. Corresponds with year-round water use measures listed in Section 1.5.1 and demand reduction measures listed for "All" stages in Table 3.
1	0-10%	Stage 1 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 100% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 2 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10-25%	Stage 2 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 90% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 3 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
3	25-35%	Stage 3 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 75% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 4 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
4	35-50%	Stage 4 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 65% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 5 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
5	>50%	Stage 5 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 50% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment.

[1]Shortage levels indicate the gap between supply and demand compared to normal-year conditions. The Annual Assessment incorporates a 10% buffer on top of projected demands for conservative planning.
[2]Water year types were defined 2006 San Joaquin River Restoration Settlement Agreement for USBR allocations and characterized in Section 6.2 of the City's 2020 UWMP.

8-2 | Demand Reduction Actions

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap?[1]	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement[2]
All	Expand Public Information Campaign	Not Applicable	Community outreach includes classroom presentations, outreach educational information, and water tours. Increase communication as drought stages increase.	Not Applicable
All	Improve Customer Billing	Not Applicable	Water bills show customer usage vs. average usage for the customer category. Increase customer notifications of high water use based on advanced metering infrastructure (AMI) data as drought stages increase.	Not Applicable
All	Offer Water Use Surveys	Not Applicable	Use water leak surveys with all community members.	Not Applicable
All	Provide Rebates for Landscape Irrigation Efficiency	Not Applicable	The City offers rebates for micro-irrigation conversions, soil moisture sensors, smart irrigation controller, and rain sensors to improve efficiencies.	Not Applicable
All	Provide Rebates for Turf Replacement	Not Applicable	The City provides rebates for community members who wish to replace their turf with a drought-resistant garden.	Not Applicable
All	Provide Rebates on Plumbing Fixtures and Devices	Not Applicable	The City offers rebates on a variety of high-efficiency plumbing fixtures, such as washers, toilets, and urinals.	Not Applicable
All	Decrease Line Flushing	Not Applicable	The City uses NO-DES for regular pipe flushing to eliminate discharging water.	Not Applicable
All	Reduce System Water Loss	Not Applicable	The City has a comprehensive system water loss reduction program in place. Increase efforts to correct water system losses as drought stages increase.	Not Applicable
1	Decrease Line Flushing	0 to 100% of shortage gap	For dead-end flushing where the NO-DES truck cannot be used, reduce normal flushing time.	Not Applicable
1	Increase Water Waste Patrols	0 to 100% of shortage gap	Increase monitoring of AMI reporting and communication with customers; Conduct patrols based on public input.	Not Applicable
1	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Voluntary limits: Summer: three days/week Winter: one day/week	No
2	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: three days/week Winter: one day/week	Yes
3	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: two days/week Winter: one day/week	Yes
4	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: one day/week Winter: one day/week	Yes
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	The City provides rebates for community members who wish to replace their turf with a drought resistant garden	No
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, and building washdowns where non-potable or recycled water is sufficient.	Yes
4	Other — Prohibit vehicle washing except at facilities using recycled or recirculating water	0 to 100% of shortage gap	Prohibit washing cars, boats, trailers, aircraft, or other vehicles, except at commercial or fleet vehicle-washing facilities using water recycling equipment.	Yes
4	Pools and Spas - Require covers for pools and spas	0 to 100% of shortage gap	Require covers for swimming pools when not in use.	No
4	Other	0 to 100% of shortage gap	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City manager.	Not Applicable
4	Other	0 to 100% of shortage gap	Prohibit use of outdoor misters.	No
5	Landscape — Prohibit all landscape irrigation	0 to 100% of shortage gap	Prohibit outdoor irrigation year-round.	Yes
5	Moratorium or Net Zero Demand Increase on New Connections	0 to 100% of shortage gap	The City will temporarily limit or ban new water service connections within the service area.	Not Applicable

[1]Reduction in the shortage gap is estimated and can vary significantly.
[2]Refer to WSCP Section 1.7 for Penalties for Water Wastage.

8-3R | Supply Augmentation & Other Actions

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap?	Additional Explanation or Reference
1 to 5	Transfers	As Needed	Purchase or exchange available USBR or FID surface water
1 to 5	Other Purchases	As Needed	Interconnection with City of Clovis for use in emergencies

10-1R | Notification to Cities & Counties

City	60 Day Notice	Notice of Public Hearing	Other
City of Clovis	Yes	Yes	
County	**60 Day Notice**	**Notice of Public Hearing**	**Other**
County of Fresno	Yes	Yes	
Other	**60 Day Notice**	**Notice of Public Hearing**	**Other**
Bakman Water Company	Yes	Yes	
Fresno Irrigation District	Yes	Yes	
Fresno Metropolitan Flood Control District	Yes	Yes	
Friant Water Authority	Yes	Yes	
Garfield Water District	Yes	Yes	
Malaga County Water District	Yes	Yes	
North Kings Groundwater Sustainabilty Agency	Yes	Yes	
Pinedale County Water District	Yes	Yes	
United Stated Bureau of Reclamation South-Central California Area Office	Yes	Yes	

C

SBx7-7 Tables and Verification Form

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
309	247
NOTES:	

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
304	288	247	247
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES:			

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
190	278	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	189.745674	189.745674	YES
NOTES:								

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	550,217
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use							
Compliance Year 2020	**2020 Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**2020 Deductions**					**2020 Gross Water Use**
		Exported Water *	**Change in Dist. System Storage*** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use***	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	121,994	-	-	-	-	-	**121,994**
*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.							
NOTES:							

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Groundwater
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	55,028	-	55,028

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- NESWTF
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	20,724		20,724

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- SESWTF
This water source is *(check one)* **:**	

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* (+/-)	Corrected Volume Entering Distribution System
	45,367		45,367

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- T-3 SWTF

This water source is *(check one)* **:**

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional* (+/-)	Corrected Volume Entering Distribution System
	875		875

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Enter Name of Source 5

This water source is *(check one)* **:**

☐	The supplier's own water source
☐	A purchased or imported source

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water *Fm SB X7-7 Table 4*	**2020 Population** *Fm SB X7-7 Table 3*	**2020 GPCD**
121,994	550,217	**198**
NOTES:		

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
198	-	-	-	-	198	247	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

D

City of Fresno's Reduce Delta Reliance Reporting

Appendix D - Delta Reliance

1. Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action (e.g., a proposed project) in the Sacramento-San Joaquin Delta (Delta), prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.

Anyone may appeal a certification of consistency. If the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency. The covered action may be implemented if either: 1) no appeal is filed; or 2) the Delta Stewardship Council denies the appeal to the revised certification of consistency.

The City of Fresno (City) contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 af of Class 1 water through an agreement originally executed in January 1961. Although the Friant Division of the CVP does not pull water from the Delta, the project was developed through an exchange agreement reached in 1939 with the Delta-Mendota supply that provides water to the Exchange Contractors[1] with historic pre-1914 San Joaquin River water rights. As restrictions on Delta exports have hindered USBR from making deliveries to the Delta-Mendota Canal, the Exchange Contractors can call on their historic rights, which reduces the Friant Division Class 1 allocations. As such, the City is required to demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta.

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

[1] The Exchange Contractors are the benefactors of the historic pre-1914 water rights established by Miller and Lux. These contracts include: Central California Irrigation District; San Luis Canal Company; Firebaugh Canal Water District; and Columbia Canal Company, per http://www.sjrecwa.net/history.html (accessed March 10, 2021).

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);

(2) That failure has significantly caused the need for the export, transfer, or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self- reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

The analysis and documentation provided below include all the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

2. Methodology

As stated in WR P1(c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for improved regional self-reliance and measurable reduction in Delta reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta. The expected outcomes for the City's regional self-reliance and reduced Delta reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 issued in March 2020 (Guidebook Appendix C), including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources.

All data were obtained from planning documents adopted by the City Council, including the current and previous UWMPs and Metropolitan Water Resource Management Plan (Metro Plan) and represent average or normal water year conditions. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the UWMP Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

To calculate the expected outcomes for improved regional self-reliance and reduced Delta reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from the City's 2008 UWMP. Consistent with the 2010 baseline data approach, the expected outcomes for improved regional self-reliance and reduced Delta reliance for 2015 and 2020 were taken from the City's 2010 and 2015 UWMPs, respectively. Expected outcomes for 2025-2045 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

3. Demonstration of Regional Self-Reliance

3.1 Service Area Demands without Water Use Efficiency

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as the City that do not explicitly quantify water use efficiency savings in their UWMPs can calculate their embedded water use efficiency savings based on changes in forecasted per capita water use since the baseline.

Agencies that explicitly calculate and report water use efficiency savings in their UWMP will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. **Table 1** (included at the end of this appendix) shows the results of this adjustment for the City. Supporting narratives and documentation for all the data shown in Table 1 are provided below.

Service Area Demands with Water Use Efficiency

The service area demands shown in Table 1 represent the total water demands for the City's service area. The demand data shown in Table 1 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 6-5
- 2015: Fresno 2010 UWMP, Table 7-2
- 2020: Fresno 2015 UWMP, Table 4-4
- 2025-2045: Fresno 2020 UWMP, Table 4-6

Non-Potable Water Demands

The non-potable water demands shown in Table 1 represent recycled water use that offsets potable water use in the City's service area. The demand data shown in Table 1 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 10-7
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14
- 2025-2045: Fresno 2020 UWMP, Table 4-7

Potable Service Area Demands with Water Use Efficiency

Subtract "Non-Potable Water Demands" from "Service Area Demands with Water Use Efficiency."

Service Area Population

The population data shown in Table 1 were collected from the following sources:

- Baseline (2010) and 2015: Fresno 2015 UWMP, Table 5-1
- 2020-2045: Fresno 2020 UWMP, Table 3-3

Estimated Water Use Efficiency Since Baseline

The "Per Capita Water Use" calculated using "Potable Service Area Demands with Water Use Efficiency" divided by "Service Area Population". The "Change in Per Capita Water Use from Baseline" was then calculated by comparing with 2010 Per Capita Water Use. Finally, the "Estimated Water Use Efficiency Since Baseline" was calculated by multiplying the "Change in Per Capita Water Use from Baseline" by the population for one (1) year.

Service Area Water Demands without Water Use Efficiency

Add "Service Area Demands with Water Use Efficiency" to "Estimated Water Use Efficiency Since Baseline."

3.2 Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table 2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in **Table 2** (included at the end of this appendix) represent efforts to improve regional self-reliance for the City's entire service area and include the total contributions of the City and its customers. Supporting narratives and documentation for all of the data shown in Table 2 are provided below.

Estimated Water Use Efficiency Since Baseline

The water use efficiency information shown in Table 2 is taken directly from Table 1.

Water Recycling

The water recycling information shown in Table 2 is taken from the Non-Potable Water Demands row in Table 1.

Local and Regional Water Supply and Storage Programs

The values shown in Table 2 represent groundwater supplies considering both natural recharge and intentional recharge. The supply data shown in Table 2 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-9
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14

- 2025-2045: Fresno 2020 UWMP, Table 6-8

Other Programs and Projects the Contribute to Regional Self-Reliance

The values shown in Table 2 represent Kings River supplies considering both contracted supplies and recycled water exchange supplies. The supply data shown in Table 2 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-11
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-5
- 2025-2045: Fresno 2020 UWMP, Table 6-8

Water Supplies Contributing to Regional Self Reliance

Sum of:

- Estimated Water Use Efficiency Since Baseline
- Water Recycling
- Local and Regional Water Supply and Storage Programs
- Other Programs and Projects the Contribute to Regional Self-Reliance

Percent of Water Supplies Contributing to Regional Self-Reliance

“Water Supplies Contributing to Regional Self Reliance” divided by “Service Area Water Demands without Water Use Efficiency” (from Section 3.1).

3.3 Conclusions

The results shown in Table 2 demonstrate that the City’s service area is measurably improving its regional self-reliance. The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City’s regional self-reliance:

- Near-term (2025): The expected outcome for normal water year regional self-reliance is expected to increase by 129,700 AFY from the 2010 baseline; this represents an increase of about 31 percent of 2025 normal water year demands (Table 2).
- Long-term (2045): The expected outcome for normal water year regional self-reliance is expected to increase by more than 191,600 AFY from the 2010 baseline, this represents an increase of about 14 percent of 2045 normal water year retail demands (Table 2).

The results show that the City is measurably improving regional self-reliance, both as an amount of water used and as a percentage of water used.

4. Demonstration of Reduced Reliance on the Delta

The City's service area reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures.

4.1 Calculation of Reliance on Water Supplies from the Delta Watershed

The calculation of reliance on water supplies from the Delta watershed, shown in **Table 3** (included at the end of this appendix), is based on the following assumptions.

CVP/SWP Contract Supplies

The City water supplies with a connection to the Delta watershed are CVP/SWP Contract Supplies. The supply data shown in Table 3 is for anticipated average yield from the City's USBR contract and were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-6
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14
- 2025-2045: Fresno 2020 UWMP, Table 6-2

Water Supplies from the Delta Watershed

Equal to "CVP/SWP Contract Supplies."

Percent Change in Supplies from the Delta Watershed

Divides "Water Supplies from the Delta Watershed" by "Service Area Demands without Water Use Efficiency" (from Section 3.1) and calculates changes from the 2010 baseline.

4.2 Conclusions

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City's Delta reliance on supplies from the Delta watershed:

- Near-term (2025): The expected outcome for normal water year reliance on supplies from the Delta watershed is expected to decrease by 4,520 AF from the 2010 baseline. With Delta water representing 25.5% of service area water demand without water use efficiency, this represents a decrease from the 2010 baseline of 10.1% (Table 3).
- Long-term (2045): The expected outcome for normal water year reliance on supplies from the Delta watershed is expected to decrease by 4,520 AF from the 2010 baseline. With Delta water representing 19.5% of service area water demand without water use efficiency, this represents a decrease from the 2010 baseline of 16.2% (Table 3).

The results shown in Table 3 demonstrate that City is measurably reducing reliance on the Delta, both as an amount of water used and as a percentage of water used.

5. UWMP Implementation

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta[.]*

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Chapter 6 of the City's 2020 UWMP summarizes the implementation of future water projects and continued progress in developing a diversified water portfolio to meet the City's water needs.

6. 2015 UWMP Appendix L

The information contained in this appendix is also intended to be a new Appendix L attached to the City's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). The City provided notice of the availability of the draft 2020 UWMP, 2020 WSCP, and a new Appendix L to the 2015 UWMP and the public hearing to consider adoption of the documents in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix L to the 2015 UWMP, and the 2020 WSCP were posted on the City's website, fresno.gov, on June 28, 2021, more than 14 days in advance of the public hearing on July 15, 2021. The notice of availability of the documents was sent to the City's customers, as well as cities and counties in the City's service area. Copies of the notification letter sent to the customers and cities and counties in the City's service area are included in the 2020 UWMP Appendix L. Thus, this Appendix D to the City's 2020 UWMP, which was adopted with the City's 2020 UWMP, will also be recognized and treated as Appendix L to the City's 2015 UWMP.

The City held the public hearing for the draft 2020 UWMP, draft Appendix L to the 2015 UWMP, and draft 2020 WSCP on July 15, 2021, at a regular City Council meeting, held online due to COVID-19 concerns. At the meeting, the City Council determined that the 2020 UWMP and the 2020 WSCP accurately represent the water resources plan for the City's service area. In addition, the City Council determined that Appendix L to the 2015 UWMP and Appendix D to the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 2021-196, 2021-197, and 2021-198, the City Council adopted the 2020 UWMP, the 2020 WSCP, and Appendix L to the 2015 UWMP and authorized their submittal to the State of California. Copies of the resolutions are included in the 2020 UWMP Appendix M.

Table 1. Calculation of Service Area Water Demands without Water Use Efficiency (UWMP Table C-1 and Table C-2)

Table C-1: Optional Calculation of Water Use Efficiency -To be completed if Water Supplier does not specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	163,300	172,900	168,200	136,579	147,505	154,434	161,372	168,318
Non-Potable Water Demands	750	1,000	9,500	14,220	14,220	14,220	14,220	14,220
Potable Service Area Demands with Water Use Efficiency Accounted For	162,550	171,900	158,700	122,359	133,285	140,214	147,152	154,098

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Population	505,315	525,575	550,217	609,433	674,677	719,327	765,278	812,529

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Per Capita Water Use (GPCD)	287	292	257	179	176	174	172	169
Change in Per Capita Water Use from Baseline (GPCD)		5	(30)	(108)	(111)	(113)	(116)	(118)
Estimated Water Use Efficiency Since Baseline		(2,833)	18,294	73,684	83,745	91,180	99,023	107,277

Table C-2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	163,300	172,900	168,200	136,579	147,505	154,434	161,372	168,318
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	(2,833)	18,294	73,684	83,745	91,180	99,023	107,277
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Table 2. Calculation of Supplies Contributing to Regional Self-Reliance (UWMP Table C-3)

Table C-3: Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Estimated Water Use Efficiency since Baseline	-	(2,833)	18,294	73,684	83,745	91,180	99,023	107,277
Water Recycling	750	1,000	9,500	14,220	14,220	14,220	14,220	14,220
Stormwater Capture and Use								
Advanced Water Technologies								
Conjunctive Use Projects								
Local and Regional Water Supply and Storage Projects	88,800	76,100	132,480	138,090	143,630	149,100	154,490	159,820
Other Programs and Projects the Contribute to Regional Self-Reliance	131,750	117,400	116,000	125,030	131,600	131,600	131,600	131,600
Water Supplies Contributing to Regional Self-Reliance	221,300	191,667	276,274	351,024	373,195	386,100	399,333	412,917

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	221,300	191,667	276,274	351,024	373,195	386,100	399,333	412,917
Change in Water Supplies Contributing to Regional Self-Reliance		(29,633)	54,974	129,724	151,895	164,800	178,033	191,617

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	135.5%	112.7%	148.1%	166.9%	161.4%	157.2%	153.4%	149.8%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		-22.8%	12.6%	31.4%	25.9%	21.7%	17.8%	14.3%

Table 3. Reliance on Water Supplies from the Delta Watershed (UWMP Table C-4)

Table C-4: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680
Delta/Delta Tributary Diversions								
Transfers and Exchanges of Supplies from the Delta Watershed								
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680
Change in Water Supplies from the Delta Watershed		-	(5,600)	(4,520)	(4,520)	(4,520)	(4,520)	(4,520)

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	35.6%	34.2%	28.2%	25.5%	23.2%	21.9%	20.6%	19.5%
Change in Percent of Water Supplies from the Delta Watershed		-1.4%	-7.4%	-10.1%	-12.4%	-13.8%	-15.0%	-16.2%

E

AWWA Water Audits

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association

? Click to access definition

+ Click to add a comment

Water Audit Report for: City of Fresno (1010007)

Reporting Year: 2016 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ----------> Pcnt: Value:

Volume from own sources:	5	112,398.020	acre-ft/yr	3			acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration

Enter positive % or value for over-registration

WATER SUPPLIED: 112,398.020 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

				Pcnt:	Value:	
Billed metered:	9	103,038.468	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	42.876	acre-ft/yr			
Unbilled unmetered:	5	280.995	acre-ft/yr		280.995	acre-ft/yr

Use buttons to select percentage of water supplied OR value

AUTHORIZED CONSUMPTION: 103,362.339 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

9,035.681 acre-ft/yr

Apparent Losses

Pcnt: Value:

Unauthorized consumption:	280.995	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,041.226	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		257.596	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,579.817 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 7,455.864 acre-ft/yr

WATER LOSSES: 9,035.681 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 9,359.552 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,810.39	miles
Number of active AND inactive service connections:	9	143,916	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 3 50.0 psi

COST DATA

Total annual cost of operating water system:	10	$71,848,500	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$1.86	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	5	$152.10	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Customer metering inaccuracies

3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

American Water Works Association
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? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Fresno
Reporting Year: 2017 1/2017 - 12/2017

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

						Pcnt:	Value:	
Volume from own sources:	5	121,079.641	acre-ft/yr	5				acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr					acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr					acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 121,079.641 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	9	110,520.840	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	48.124	acre-ft/yr			
Unbilled unmetered:	5	276.052	acre-ft/yr		276.052	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 110,845.016 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

10,234.625 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		302.699	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,116.858	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		276.302	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,695.859 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 8,538.766 acre-ft/yr

WATER LOSSES: 10,234.625 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 10,558.801 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,854.4	miles
Number of active AND inactive service connections:	9	146,212	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 4 50.0 psi

COST DATA

Total annual cost of operating water system:	10	$76,015,350	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$2.01	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	5	$175.42	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

American Water Works Association.
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? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Fresno
Reporting Year: 2018 | 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	120,065.780	acre-ft/yr	8			acre-ft/yr
Water imported:	n/a		acre-ft/yr				acre-ft/yr
Water exported:	n/a		acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 120,065.780 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	9	110,710.560	acre-ft/yr		
Billed unmetered:	n/a	0.000	acre-ft/yr		
Unbilled metered:	8	27.129	acre-ft/yr		
Unbilled unmetered:	5	300.164	acre-ft/yr		300.164 acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 111,037.853 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

9,027.927 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		300.164	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,118.563	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		276.776	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,695.503 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 7,332.423 acre-ft/yr

WATER LOSSES: 9,027.927 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 9,355.220 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,854.7	miles
Number of active AND inactive service connections:	9	146,608	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	10	53.3	psi

COST DATA

Total annual cost of operating water system:	10	$82,960,821	$/Year	
Customer retail unit cost (applied to Apparent Losses):	10	$2.33	$/1000 litres	
Variable production cost (applied to Real Losses):	5	$178.06	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software: Worksheet

FWAS v6.0

American Water Works Association.

Water Audit Report for: City of Fresno

Audit Year: 2019 | Jan 01 2019 - Dec 31 2019 | Calendar

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	n	g	115,544.090	Acre-ft/Yr	n	g	5.00%	percent	under-registration VOSEA
WI	Water Imported:	n	g	0.000	Acre-ft/Yr					WIEA
WE	Water Exported:	n	g	0.000	Acre-ft/Yr					WEEA
	WATER SUPPLIED:			121,625.358	Acre-ft/Yr					

AUTHORIZED CONSUMPTION

BMAC	Billed Metered:	n	g	106,485.360	Acre-ft/Yr		
BUAC	Billed Unmetered:	n	g	0.000	Acre-ft/Yr		
UMAC	Unbilled Metered:	n	g	52.635	Acre-ft/Yr	choose entry option:	
UUAC	Unbilled Unmetered:	n	g 3	266.213	Acre-ft/Yr	0.25%	default

Default option selected for Unbilled Unmetered, with automatic data grading of 3

AUTHORIZED CONSUMPTION: 106,804.208 Acre-ft/Yr

WATER LOSSES

14,821.149 Acre-ft/Yr

Apparent Losses

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g 3	266.213	Acre-ft/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n	g	1,076.141	Acre-ft/Yr	1.00%	percent	under-registration
UC	Unauthorized Consumption:	n	g 3	266.213	Acre-ft/Yr	0.25%	default	

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Apparent Losses: 1,608.568 Acre-ft/Yr

Real Losses

Real Losses: 13,212.581 Acre-ft/Yr

WATER LOSSES: 14,821.149 Acre-ft/Yr

NON-REVENUE WATER

NON-REVENUE WATER: 15,139.998 Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g	1,862.2	miles	(including fire hydrant lead lengths)
Nc	Number of service connections:	n	g	147,633		(active *and* inactive)
	Service connection density:			79	conn./mile main	

Are customer meters typically located at the curbstop/property line? Yes

Lp n g 10

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP Average Operating Pressure: n g 50.0 psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	$2.33	$/1000 gallons (US)	Total Annual Operating Cost	
VPC	Variable Production Cost:	n	g	$230.95	$/acre-ft	$106,528,917	$/yr (optional input)

WATER AUDIT DATA VALIDITY TIER:

Click 'g' for 10 parameter(s), then complete all visible data grading questions to enable the Data Validity Score to calculate

go to dashboard

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[^]:		gal/conn/day
Unit Real Losses[=]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

F

DWR Population Tool Output

WUEdata - Fresno City Of

Sign Out

Please print this page to a PDF and include as part of your UWMP submittal.

Confirmation Information

Generated By	Water Supplier Name	Confirmation #	Generated On
Heather Freed	Fresno City Of	8103177726	3/17/2021 12:16:56 PM

Boundary Information

Census Year	Boundary Filename	Internal Boundary ID
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515

Baseline Period Ranges

10 to 15-year baseline period

Number of years in baseline period: 10

Year beginning baseline period range: 1996

Year ending baseline period range[1]: 2005

5-year baseline period

Year beginning baseline period range: 2003

Year ending baseline period range[2]: 2007

[1] The ending year must be between December 31, 2004 and December 31, 2010.

[2] The ending year must be between December 31, 2007 and December 31, 2010.

Persons per Connection

Year	Census Block Level Total Population	Number of Connections *	Persons per Connection
1990	364,084		4.23
1991	-	-	4.23
1992	-	-	4.24
1993	-	-	4.24
1994	-	-	4.25
1995	-	-	4.26
1996	-	-	4.26
1997	-	-	4.27
1998	-	-	4.27
1999	-	-	4.28
2000	439,062	102476	4.28
2001	-	-	4.29
2002	-	-	4.29
2003	-	-	4.30
2004	-	-	4.30
2005	-	-	4.31
2006	-	-	4.32
2007	-	-	4.32
2008	-	-	4.33
2009	-	-	4.33
2010	505,315	116373	4.34
2011	-	-	4.28
2012	-	-	4.28
2013	-	-	4.28
2014	-	-	4.28
2015	-	-	4.28
2020	-	-	4.41 **

Population Using Persons-Per-Connection

Year		Number of Connections *	Persons per Connection	Total Population
10 to 15 Year Baseline Population Calculations				
Year 1	1996		4.26	
Year 2	1997		4.27	
Year 3	1998		4.27	
Year 4	1999		4.28	
Year 5	2000	102476	4.28	439,062
Year 6	2001		4.29	
Year 7	2002		4.29	
Year 8	2003		4.30	
Year 9	2004		4.30	
Year 10	2005		4.31	
5 Year Baseline Population Calculations				
Year 1	2003		4.30	
Year 2	2004		4.30	
Year 3	2005		4.31	
Year 4	2006		4.32	
Year 5	2007		4.32	
2020 Compliance Year Population Calculations				
2020		124862	4.41 **	550,217

Hide Print Confirmation

QUESTIONS / ISSUES? CONTACT THE WUEDATA HELP DESK
MWELO QUESTIONS / ISSUES? CONTACT THE MWELO HELP DESK

G

North Kings Subbasin Groundwater Sustainability Plan

Reference the North Kings Subbasin Groundwater Sustainability Plan online: https://www.northkingsgsa.org/groundwater-sustainability-plan/

H

City of Fresno's Central Valley Project Contract

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

LONG-TERM RENEWAL CONTRACT BETWEEN THE UNITED STATES
AND
CITY OF FRESNO
PROVIDING FOR PROJECT WATER SERVICE
FROM FRIANT DIVISION

THIS CONTRACT, made this 18 day of August, 2005, in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between the UNITED STATES OF AMERICA, hereinafter referred to as the United States, and the CITY OF FRESNO, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States has constructed and is operating the Central Valley Project (Project), California, for diversion, storage, carriage, distribution and beneficial use, for flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation, protection and restoration, generation and distribution of electric energy, salinity control, navigation and other beneficial uses, of waters of the Sacramento River, the American River, the Trinity River, and the San Joaquin River and their tributaries; and

[2nd] WHEREAS, the United States constructed Friant Dam (thereby creating Millerton Lake) and the Friant-Kern and Madera Canals, hereinafter collectively referred to as the Friant Division facilities, which will be used in part for the furnishing of water to the Contractor pursuant to the terms of this Contract; and

[3rd] WHEREAS, pursuant to Section 8 of the Act of June 17, 1902 (32 Stat. 388), the United States has acquired water rights and other rights to the flows of the San Joaquin River, including without limitation the permits issued as the result of Decision 935 by the California State Water Resources Control Board and the contracts described in subdivision (n) of Article 3 of this Contract, pursuant to which the Contracting Officer develops, diverts, stores and delivers Project Water stored or flowing through Millerton Lake in accordance with State and Federal law for the benefit of Project Contractors in the Friant Division; and

[3.1] WHEREAS, the water supplied to the Contractor pursuant to this Contract is Project Water developed through the exercise of the rights described in the third Explanatory Recital of this Contract; and

[4th] WHEREAS, the Contractor and the United States entered into Contract No. 14-06-200-8901, which established terms for the delivery to the Contractor of Project Water from the Friant Division from March 1, 1966, to February 28, 2006, hereinafter referred to as the Existing Contract; and

[5th] WHEREAS, the Contractor and the United States have, pursuant to Subsection 3404(c)(3) of the Central Valley Project Improvement Act (CVPIA), subsequently entered into a Binding Agreement identified as Binding Agreement No. 14-06-200-8901-BA, which sets out the terms pursuant to which the Contractor agreed to renew the Existing Contract before its expiration date after completion of the programmatic environmental impact statement and other appropriate environmental documentation and negotiation of a renewal contract, and which also sets out the consequences of a subsequent decision not to renew; and

[6th] WHEREAS, Section 3404(c) of the CVPIA provides for long-term renewal of the Existing Contract following completion of appropriate environmental documentation, including a programmatic environmental impact statement (PEIS) pursuant to the National Environmental Policy Act (NEPA) analyzing the direct and indirect impacts and benefits of implementing the CVPIA and the potential renewal of all existing contracts for Project Water; and

[7th] WHEREAS, the United States has completed the PEIS and all other appropriate environmental review necessary to provide for long-term renewal of the Existing Contract; and

[8th] WHEREAS, the Contractor has requested the long-term renewal of the Existing Contract, pursuant to the terms of the Existing Contract, Federal Reclamation law, and the laws of the State of California, for water service from the Project; and

[9th] WHEREAS, the United States has determined that the Contractor has fulfilled all of its obligations under the Existing Contract; and

[10th] WHEREAS, the Contractor has demonstrated to the satisfaction of the Contracting Officer that the Contractor has utilized the Project Water supplies available to it for reasonable and beneficial use and/or has demonstrated projected future demand for water use such that the Contractor has the capability and expects to utilize fully for reasonable and beneficial use the quantity of Project Water to be made available to it pursuant to this Contract; and

[11th] WHEREAS, water obtained from the Project has been relied upon by urban and agricultural areas within California for more than 50 years, and is considered by the Contractor as an essential portion of its water supply; and

[12th] WHEREAS, the economies of regions within the Project, including the Contractor's, depend upon the continued availability of water, including water service from the Project; and

[13th] WHEREAS, the Secretary intends through coordination, cooperation, and partnerships to pursue measures to improve water supply, water quality, and reliability of the Project for all Project purposes; and

[14th] WHEREAS, the mutual goals of the United States and the Contractor include: to provide for reliable Project Water supplies; to control costs of those supplies; to achieve repayment of the Project as required by law; to guard reasonably against Project Water shortages; to achieve a reasonable balance among competing demands for use of Project Water; and to comply with all applicable environmental statutes, all consistent with the legal obligations of the United States relative to the Project; and

[15th] WHEREAS, the parties intend by this Contract to develop a more cooperative relationship in order to achieve their mutual goals; and

[15.1] WHEREAS, during uncontrolled seasons, Friant Division Project Contractors utilize undependable Class 2 Water in their service areas to, among other things, assist in the management and alleviation of groundwater overdraft in the Friant Division service area, provide opportunities for environmental enhancement, including restoration of the San Joaquin River below Friant Dam, minimize flooding along the San Joaquin River, encourage optimal water management, and maximize the reasonable and beneficial use of the water; and

[15.2] WHEREAS, the parties desire and intend that this Contract not provide a disincentive to the Friant Division Project Contractors continuing to carry out the beneficial activities set out in the Explanatory Recital immediately above; and

[16th] WHEREAS, the United States and the Contractor are willing to enter into this Contract pursuant to Federal Reclamation law on the terms and conditions set forth below;

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby mutually agreed by the parties hereto as follows:

DEFINITIONS

1. When used herein unless otherwise distinctly expressed, or manifestly incompatible with the intent of the parties as expressed in this Contract, the term:

(a) "Calendar Year" shall mean the period January 1 through December 31, both dates inclusive;

(b) "Charges" shall mean the payments required by Federal Reclamation law in addition to the Rates and Tiered Pricing Component specified in this Contract as determined annually by the Contracting Officer pursuant to this Contract;

(b2) "Class 1 Water" shall mean that supply of water stored in or flowing through Millerton Lake which, subject to the contingencies hereinafter described in Articles 3, 11, and 12 of this Contract, will be available for delivery from Millerton Lake and the Friant-Kern and Madera Canals as a dependable water supply during each Year;

(b3) "Class 2 Water" shall mean that supply of water which can be made available subject to the contingencies hereinafter described in Articles 3, 11, and 12 of this Contract for delivery from Millerton Lake and the Friant-Kern and Madera Canals in addition to the supply of Class 1 Water. Because of its uncertainty as to availability and time of occurrence, such water will be undependable in character and will be furnished only if, as, and when it can be made available as determined by the Contracting Officer;

(c) "Condition of Shortage" shall mean a condition respecting the Project during any Year such that the Contracting Officer is unable to deliver sufficient water to meet the Contract Total;

(d) "Contracting Officer" shall mean the Secretary of the Interior's duly authorized representative acting pursuant to this Contract or applicable Federal Reclamation law or regulation;

(e) "Contract Total" shall mean the maximum amount of Class 1 Water, plus the maximum amount of Class 2 Water to which the Contractor is entitled under subdivision (a) of Article 3 of this Contract;

(f) "Contractor's Service Area" shall mean the area to which the Contractor is permitted to provide Project Water under this Contract as described in Exhibit "A" attached hereto, which may be modified from time to time in accordance with Article 35 of this Contract without amendment of this Contract;

(g) "CVPIA" shall mean the Central Valley Project Improvement Act, Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

(h-i) Omitted;

(j) "Full Cost Rate" shall mean an annual rate as determined by the Contracting Officer that shall amortize the expenditures for construction properly allocable to the Project irrigation or M&I functions, as appropriate, of facilities in service including all O&M deficits funded, less payments, over such periods as may be required under Federal Reclamation law or applicable contract provisions. Interest will accrue on both the construction expenditures and funded O&M deficits from October 12, 1982, on costs outstanding at that date, or from the date incurred in the case of costs arising subsequent to October 12, 1982, and shall be calculated in accordance with subsections 202(3)(B) and (3)(C) of the RRA. The Full Cost Rate includes actual operation, maintenance, and replacement costs consistent with Section 426.2 of the Rules and Regulations for the RRA;

(k-l) Omitted;

(m) "Irrigation Water" shall mean water made available from the Project that is used primarily in the production of agricultural crops or livestock, including domestic use incidental thereto, and watering of livestock;

(n) Omitted;

(n2) "Long Term Historic Average" shall mean the average of the final forecast of Water Made Available to the Contractor pursuant to this Contract and the contract referenced in the fourth Explanatory Recital of this Contract;

(o) "Municipal and Industrial (M&I) Water" shall mean Project Water, other than Irrigation Water, made available to the Contractor. M&I Water shall include water used for human use and purposes such as the watering of landscaping or pasture for animals (e.g., horses) which are kept for personal enjoyment or water delivered to land holdings operated in units of less than five acres unless the Contractor establishes to the satisfaction of the Contracting Officer that the use of water delivered to any such landholding is a use described in subdivision (m) of this Article;

(p) "M&I Full Cost Water Rate" shall mean the Full Cost Rate applicable to the delivery of M&I Water;

(q) "Operation and Maintenance" or "O&M" shall mean normal and reasonable care, control, operation, repair, replacement (other than capital replacement), and maintenance of Project facilities;

(r) "Operating Non-Federal Entity" shall mean the Friant Water Authority, its successors or assigns, a non-Federal entity which has the obligation to operate and maintain all or a portion of the Friant Division facilities pursuant to an agreement with the United States, and which may have funding obligations with respect thereto;

(s) "Project" shall mean the Central Valley Project owned by the United States and managed by the Department of the Interior, Bureau of Reclamation;

(t) "Project Contractors" shall mean all parties who have water service contracts for Project Water from the Project with the United States pursuant to Federal Reclamation law;

(u) "Project Water" shall mean all water that is developed, diverted, stored, or delivered by the Secretary in accordance with the statutes authorizing the Project and in accordance with the terms and conditions of water rights acquired pursuant to California law;

(v) "Rates" shall mean the payments determined annually by the Contracting Officer in accordance with the then-current applicable water ratesetting policies for the Project, as described in subdivision (a) of Article 7 of this Contract;

(w) Omitted;

(x) "Secretary" shall mean the Secretary of the Interior, a duly appointed successor, or an authorized representative acting pursuant to any authority of the Secretary and through any agency of the Department of the Interior;

(y) "Tiered Pricing Component" shall be the incremental amount to be paid for each acre-foot of Water Delivered as described in subdivision (j) of Article 7 of this Contract;

(z) "Water Delivered" or "Delivered Water" shall mean Project Water diverted for use by the Contractor at the point(s) of delivery approved by the Contracting Officer;

(aa) "Water Made Available" shall mean the estimated amount of Project Water that can be delivered to the Contractor for the upcoming Year as declared by the Contracting Officer, pursuant to subdivision (a) of Article 4 of this Contract;

(bb) "Water Scheduled" shall mean Project Water made available to the Contractor for which times and quantities for delivery have been established by the Contractor and Contracting Officer, pursuant to subdivision (b) of Article 4 of this Contract; and

(cc) "Year" shall mean the period from and including March 1 of each Calendar Year through the last day of February of the following Calendar Year.

TERM OF CONTRACT

2. (a) This Contract supersedes the Existing Contract and shall be effective on the date first hereinabove written through February 28, 2045. In the event the Contractor wishes to renew this Contract beyond February 28, 2045, the Contractor shall submit a request for renewal in writing to the Contracting Officer no later than two years prior to the date this Contract expires.

(b) Omitted.

(c) Provided the Contractor is complying with all terms and conditions of this Contract and all legal obligations of the Contractor, if any, set forth in an enforceable court order, final judgment and/or settlement relating to restoration of the San Joaquin River, this Contract shall be renewed for successive periods of up to 40 years each, which periods shall be consistent with the then-existing Reclamation-wide policy, under terms and conditions mutually agreeable to the parties and consistent with Federal and State law. The Contractor shall be afforded the opportunity to comment to the Contracting Officer on the proposed adoption and application of any revised policy applicable to the delivery of M&I Water that would limit the term of any subsequent renewal contract with the Contractor for the furnishing of M&I Water to less than 40 years.

(d) The Contracting Officer shall make a determination ten years after the date of execution of this Contract, and every five years thereafter during the term of this Contract, of whether a conversion to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939 can be accomplished. The Contracting Officer anticipates that during the term of this Contract, all authorized Project construction expected to occur will have occurred, and on that basis the Contracting Officer agrees upon such completion to allocate all costs that are properly assignable to the Contractor, and agrees further that, at any time after such allocation is made, and subject to satisfaction of the conditions set out in this subdivision, this Contract shall, at the request of the Contractor, be converted to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939, subject to applicable Federal law and under stated terms and conditions mutually agreeable to the Contractor and the Contracting Officer. A condition for such conversion to occur shall be a determination by the Contracting Officer that, account being taken of the amount credited to return by the Contractor as provided for under Federal Reclamation law, the remaining amount of construction costs assignable for ultimate return by the Contractor can probably be repaid to the United States within the term of a contract under subsection 9(c)(1). If the remaining amount of costs that are properly assignable to the Contractor cannot be determined during the term of this Contract, the Contracting Officer shall notify the Contractor, and provide the reason(s) why such a determination could not be made. Further, the Contracting Officer shall make such a determination as soon thereafter as possible so as to permit, upon request of the Contractor and satisfaction of the conditions set out above, conversion to a contract under subsection 9(c)(1). In the event such determination of costs has not been made at a time which allows conversion of this Contract during the term of this

Contract or the Contractor has not requested conversion of this Contract within such term, the parties shall incorporate in any subsequent renewal contract as described in subdivision (c) of this Article a provision that carries forth in substantially identical terms the provisions of this subdivision.

WATER TO BE MADE AVAILABLE AND DELIVERED TO THE CONTRACTOR

3. (a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 60,000 acre-feet of Class 1 Water for M&I purposes. Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract.

(b) Omitted.

(c) The Contractor shall utilize the Project Water in accordance with all applicable legal requirements.

(d) The Contractor shall make reasonable and beneficial use of all water furnished pursuant to this Contract. Groundwater recharge programs (direct, indirect, or in lieu), groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted within the Contractor's Service Area which are consistent with applicable State law and result in use consistent with Federal Reclamation law will be allowed: Provided, That any direct recharge program(s) is (are) described in the Contractor's water conservation plan submitted pursuant to Article 26 of this Contract: Provided further, That such water conservation plan demonstrates sufficient lawful uses exist in the

Contractor's Service Area so that using a long-term average, the quantity of Delivered Water is demonstrated to be reasonable for such uses and in compliance with Federal Reclamation law. Groundwater recharge programs, groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted outside the Contractor's Service Area may be permitted upon written approval of the Contracting Officer, which approval will be based upon environmental documentation, Project Water rights, and Project operational concerns. The Contracting Officer will address such concerns in regulations, policies, or guidelines.

(e) The Contractor shall comply with requirements applicable to the Contractor in biological opinion(s) prepared as a result of a consultation regarding the execution of this Contract undertaken pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, that are within the Contractor's legal authority to implement. The Existing Contract, which evidences in excess of 39 years of diversions for M&I purposes of the quantities of water provided in subdivision (a) of Article 3 of this Contract, will be considered in developing an appropriate baseline for the biological assessment(s) prepared pursuant to the ESA, and any other needed environmental review. Nothing herein shall be construed to prevent the Contractor from challenging or seeking judicial relief in a court of competent jurisdiction with respect to any biological opinion or other environmental documentation referred to in this Article.

(f) Subject to subdivisions (l) and (n) of Article 3 of this Contract, following the declaration of Water Made Available under Article 4 of this Contract, the Contracting Officer will make a determination whether Project Water, or other water available to the Project, can be made

available to the Contractor in addition to the Contract Total under Article 3 of this Contract during the Year without adversely impacting other Project Contractors. At the request of the Contractor, the Contracting Officer will consult with the Contractor prior to making such a determination. Subject to subdivisions (l) and (n) of Article 3 of this Contract, if the Contracting Officer determines that Project Water, or other water available to the Project, can be made available to the Contractor, the Contracting Officer will announce the availability of such water and shall so notify the Contractor as soon as practicable. The Contracting Officer will thereafter meet with the Contractor and other Project Contractors capable of taking such water to determine the most equitable and efficient allocation of such water. If the Contractor requests the delivery of any quantity of such water, the Contracting Officer shall make such water available to the Contractor in accordance with applicable statutes, regulations, guidelines, and policies.

(g) The Contractor may request permission to reschedule for use during the subsequent Year some or all of the Water Made Available to the Contractor during the current Year referred to as "carryover." The Contractor may request permission to use during the current Year a quantity of Project Water which may be made available by the United States to the Contractor during the subsequent Year referred to as "preuse." The Contracting Officer's written approval may permit such uses in accordance with applicable statutes, regulations, guidelines, and policies.

(h) The Contractor's right pursuant to Federal Reclamation law and applicable State law to the reasonable and beneficial use of Water Delivered pursuant to this Contract during the term thereof and any subsequent renewal contracts, as described in Article 2 of this Contract, during the terms thereof shall not be disturbed so long as the Contractor shall fulfill all of its obligations

under this Contract and any renewals thereof. Nothing in the preceding sentence shall affect the Contracting Officer's ability to impose shortages under Article 11 or subdivision (b) of Article 12 of this Contract or applicable provisions of any subsequent renewal contracts.

(i) Project Water furnished to the Contractor pursuant to this Contract may be delivered for other than M&I purposes upon written approval by the Contracting Officer in accordance with the terms and conditions of such approval.

(j) The Contracting Officer shall make reasonable efforts to protect the water rights and other rights described in the third Explanatory Recital of this Contract necessary for the Project and to provide the water available under this Contract. The Contracting Officer shall not object to participation by the Contractor, in the capacity and to the extent permitted by law, in administrative proceedings related to the water rights and other rights described in the third Explanatory Recital of this Contract: Provided, That the Contracting Officer retains the right to object to the substance of the Contractor's position in such a proceeding: Provided further, That in such proceedings the Contracting Officer shall recognize the Contractor has a legal right under the terms of this Contract to use Project Water.

(k) Project Water furnished to the Contractor during any month designated in a schedule or revised schedule submitted by the Contractor and approved by the Contracting Officer shall be deemed to have been accepted by the Contractor as Class 1 Water to the extent that Class 1 Water is called for in such schedule for such month and shall be deemed to have been accepted as Class 2 Water to the extent Class 2 Water is called for in such schedule for such month. If in any month the Contractor diverts a quantity of water in addition to the total amount of Class 1 Water and

Class 2 Water set forth in the Contractor's approved schedule or revised schedule for such month, such additional diversions shall be charged first against the Contractor's remaining Class 2 Water supply available in the current Year. To the extent the Contractor's remaining Class 2 Water supply available in the current Year is not sufficient to account for such additional diversions, such additional diversions shall be charged against the Contractor's remaining Class 1 Water supply available in the current Year. To the extent the Contractor's remaining Class 1 Water and Class 2 Water supplies available in the current Year are not sufficient to account for such additional diversions, such additional diversions shall be charged first against the Contractor's available Class 2 Water supply and then against the Contractor's available Class 1 Water supply, both for the following Year. Payment for all additional diversions of water shall be made in accordance with Article 7 of this Contract.

(l) If the Contracting Officer determines there is a Project Water supply available at Friant Dam as the result of an unusually large water supply not otherwise storable for Project purposes or infrequent and otherwise unmanaged flood flows of short duration, such water will be made available to the Contractor and others under Section 215 of the RRA pursuant to the priorities specified below if the Contractor enters into a temporary contract with the United States not to exceed one year for the delivery of such water or, as otherwise provided for in Federal Reclamation law and associated regulations. Such water may be identified by the Contractor either (i) as additional water to supplement the supply of Class 1 Water and/or Class 2 Water made available to it pursuant to this Contract or, (ii) upon written notification to the Contracting Officer, as water to be credited against the Contractor's Class 2 Water supply available pursuant to this Contract. The Contracting Officer

shall make water determined to be available pursuant to this subsection according to the following priorities: first, to long-term contractors for Class 1 Water and/or Class 2 Water within the Friant Division; second, to long-term contractors in the Cross Valley Division of the Project. The Contracting Officer will consider and seek to accommodate requests from other parties for Section 215 Water for use within the area identified as the Friant Division service area in the environmental assessment developed in connection with the execution of this Contract.

(m) Nothing in this Contract, nor any action or inaction of the Contractor or Contracting Officer in connection with the implementation of this Contract, is intended to override, modify, supersede, or otherwise interfere with any term or condition of the water rights and other rights referred in the third Explanatory Recital of this Contract.

(n) The rights of the Contractor under this Contract are subject to the terms of the contract for exchange waters, dated July 27, 1939, between the United States and the San Joaquin and Kings River Canal and Irrigation Company, Incorporated, et al., (hereinafter referred to as the Exchange Contractors), Contract No. I1r-1144, as amended. The United States agrees that it will not deliver to the Exchange Contractors thereunder waters of the San Joaquin River unless and until required by the terms of said contract, and the United States further agrees that it will not voluntarily and knowingly determine itself unable to deliver to the Exchange Contractors entitled thereto from water that is available or that may become available to it from the Sacramento River and its tributaries or the Sacramento-San Joaquin Delta those quantities required to satisfy the obligations of the United States under said Exchange Contract and under Schedule 2 of the Contract for Purchase of Miller and Lux Water Rights (Contract No. I1r-1145, dated July 27, 1939).

TIME FOR DELIVERY OF WATER

4. (a) On or about February 20 of each Calendar Year, the Contracting Officer shall announce the Contracting Officer's expected declaration of the Water Made Available. Such declaration will be expressed in terms of both Water Made Available and the Long Term Historic Average and will be updated monthly, and more frequently if necessary, based on then-current operational and hydrologic conditions and a new declaration with changes, if any, to the Water Made Available will be made. The Contracting Officer shall provide forecasts of Project operations and the basis of the estimate, with relevant supporting information, upon the written request of the Contractor. Concurrently with the declaration of the Water Made Available, the Contracting Officer shall provide the Contractor with the updated Long-Term Historic Average.

(b) On or before each March 1 and at such other times as necessary, the Contractor shall submit to the Contracting Officer a written schedule, satisfactory to the Contracting Officer, showing the monthly quantities of Project Water to be delivered by the United States to the Contractor pursuant to this Contract for the Year commencing on such March 1. The Contracting Officer shall use all reasonable means to deliver Project Water according to the approved schedule for the Year commencing on such March 1.

(c) The Contractor shall not schedule Project Water in excess of the quantity of Project Water the Contractor intends to put to reasonable and beneficial use within the Contractor's Service Area or to sell, transfer, or exchange pursuant to Article 9 of this Contract during any Year.

(d) Subject to the conditions set forth in subdivision (a) of Article 3 of this Contract, the United States shall deliver Project Water to the Contractor in accordance with the initial

schedule submitted by the Contractor pursuant to subdivision (b) of this Article, or any written revision(s), satisfactory to the Contracting Officer, thereto submitted within a reasonable time prior to the date(s) on which the requested change(s) is/are to be implemented: Provided, That the total amount of water requested in that schedule or revision does not exceed the quantities announced by the Contracting Officer pursuant to the provisions of subdivision (a) of Article 3, and the Contracting Officer determines that there will be sufficient capacity available in the appropriate Friant Division facilities to deliver the water in accordance with that schedule: Provided further, That the Contractor shall not schedule the delivery of any water during any period as to which the Contractor is notified by the Contracting Officer or Operating Non-Federal Entity that Project facilities required to make deliveries to the Contractor will not be in operation because of scheduled O&M.

(e) The Contractor may, during the period from and including November 1 of each Year through and including the last day of February of that Year, request delivery of any amount of the Class 1 Water estimated by the Contracting Officer to be made available to it during the following Year. The Contractor may, during the period from and including January 1 of each Year (or such earlier date as may be determined by the Contracting Officer) through and including the last day of February of that Year, request delivery of any amount of Class 2 Water estimated by the Contracting Officer to be made available to it during the following Year. Such water shall hereinafter be referred to as preuse water. Such request must be submitted in writing by the Contractor for a specified quantity of preuse water and shall be subject to the approval of the Contracting Officer. Payment for preuse water so requested shall be at the appropriate rate(s) for the following Year in accordance with Article 7 of this Contract and shall be made in advance of delivery of any preuse water. The

Contracting Officer shall deliver such preuse water in accordance with a schedule or any revision thereof submitted by the Contractor and approved by the Contracting Officer, to the extent such water is available and to the extent such deliveries will not interfere with the delivery of Project Water entitlements to other Friant Division contractors or the physical maintenance of the Project facilities. The quantities of preuse water delivered pursuant to this subdivision shall be deducted from the quantities of water that the Contracting Officer would otherwise be obligated to make available to the Contractor during the following Year: Provided, That the quantity of preuse water to be deducted from the quantities of either Class 1 Water or Class 2 Water to be made available to the Contractor in the following Year shall be specified by the Contractor at the time the preuse water is requested or as revised in its first schedule for the following Year submitted in accordance with subdivision (b) of this Article, based on the availability of the following Year water supplies as determined by the Contracting Officer.

POINT OF DIVERSION AND RESPONSIBILITY FOR DISTRIBUTION OF WATER

5. (a) Project Water scheduled pursuant to subdivision (b) of Article 4 of this Contract shall be delivered to the Contractor at a point or points of delivery either on Project facilities or another location or locations mutually agreed to in writing by the Contracting Officer and the Contractor.

(b) The Contracting Officer, either directly or through its written agreement(s) with the Operating Non-Federal Entity, shall make all reasonable efforts to maintain sufficient flows and levels of water in the Friant-Kern Canal to deliver Project Water to the Contractor at specific turnouts established pursuant to subdivision (a) of this Article.

(c) The Contractor shall not deliver Project Water to land outside the Contractor's Service Area unless approved in advance by the Contracting Officer.

(d) All Water Delivered to the Contractor pursuant to this Contract shall be measured and recorded with equipment furnished, installed, operated, and maintained by the United States or the Operating Non-Federal Entity at the point or points of delivery established pursuant to subdivision (a) of this Article. Upon the request of either party to this Contract, the Contracting Officer shall investigate, or cause to be investigated by the appropriate Operating Non-Federal Entity, the accuracy of such measurements and shall take any necessary steps to adjust any errors appearing therein. For any period of time when accurate measurements have not been made, the Contracting Officer shall consult with the Contractor and the responsible Operating Non-Federal Entity prior to making a final determination of the quantity delivered for that period of time.

(e) Neither the Contracting Officer nor any Operating Non-Federal Entity shall be responsible for the control, carriage, handling, use, disposal, or distribution of Water Delivered to the Contractor pursuant to this Contract beyond the delivery points specified in subdivision (a) of this Article. The Contractor shall indemnify the United States, its officers, employees, agents, and assigns on account of damage or claim of damage of any nature whatsoever for which there is legal responsibility, including property damage, personal injury, or death arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such Project Water Delivered beyond such delivery points, except for any damage or claim arising out of: (i) acts or omissions of the Contracting Officer or any of its officers, employees, agents, or assigns, including the Operating Non-Federal Entity, with the intent of creating the situation resulting in any damage or claim;

(ii) willful misconduct of the Contracting Officer or any of its officers, employees, agents, or assigns, including the Operating Non-Federal Entity; (iii) negligence of the Contracting Officer or any of its officers, employees, agents, or assigns including the Operating Non-Federal Entity; or (iv) damage or claims resulting from a malfunction of facilities owned and/or operated by the United States or responsible Operating Non-Federal Entity.

MEASUREMENT OF WATER WITHIN THE CONTRACTOR'S SERVICE AREA

6. (a) Within five years of the date of Contract execution, the Contractor will have an established measuring program satisfactory to the Contracting Officer. The Contractor shall ensure that all surface water delivered for M&I purposes is measured at each M&I service connection. The water measuring devices or water measuring methods of comparable effectiveness must be acceptable to the Contracting Officer. The Contractor shall be responsible for installing, operating, and maintaining and repairing all such measuring devices and implementing all such water measuring methods at no cost to the United States. The Contracting Officer acknowledges that the Contractor has a metering plan (Exhibit "C") setting forth the milestones and schedule that the Contractor will implement to comply with the requirements of this Article. Beginning January 2006, the Contractor shall provide an annual written report to the Contracting Officer describing the Contractor's metering plan implementation progress. The Contractor shall use the information obtained from such water measuring devices or water measuring methods to ensure its proper management of the water, to bill water users for water delivered by the Contractor; and, if applicable, to record water delivered for M&I purposes by customer class as defined in the Contractor's water conservation plan provided for in Article 26 of this Contract. Nothing herein contained, however, shall preclude the Contractor from

establishing and collecting any charges, assessments, or other revenues authorized by California law. The Contractor shall include a summary of all its annual surface water deliveries in the annual report described in subdivision (c) of Article 26.

(b) To the extent the information has not otherwise been provided, upon execution of this Contract, the Contractor shall provide to the Contracting Officer a written report describing the measurement devices or water measuring methods being used or to be used to implement subdivision (a) of this Article and identifying the M&I service connections or alternative measurement programs approved by the Contracting Officer, at which such measurement devices or water measuring methods are being used, and, if applicable, identifying the locations at which such devices and/or methods are not yet being used including a time schedule for implementation at such locations. The Contracting Officer shall advise the Contractor in writing within 60 days as to the adequacy, and necessary modifications, if any, of the measuring devices or water measuring methods identified in the Contractor's report and if the Contracting Officer does not respond in such time, they shall be deemed adequate. If the Contracting Officer notifies the Contractor that the measuring devices or methods are inadequate, the parties shall within 60 days following the Contracting Officer's response, negotiate in good faith the earliest practicable date by which the Contractor shall modify said measuring devices and/or measuring methods as required by the Contracting Officer to ensure compliance with subdivision (a) of this Article.

(c) All new surface water delivery systems installed within the Contractor's Service Area after the effective date of this Contract shall also comply with the measurement provisions described in subdivision (a) of this Article.

(d) The Contractor shall inform the Contracting Officer and the State of California in writing by April 30 of each Year of the monthly volume of surface water delivered within the Contractor's Service Area during the previous Year.

(e) The Contractor shall inform the Contracting Officer and the Operating Non-Federal Entity on or before the 20th calendar day of each month of the quantity of M&I Water taken during the preceding month.

(f) In the event the provisions of subdivision (a) of this Article or any portion thereof, are challenged in a judicial proceeding, the parties agree to meet and confer promptly and as often as necessary to employ their reasonable best efforts to coordinate their response to the challenge and, as appropriate, develop revisions to this Contract.

RATES AND METHOD OF PAYMENT FOR WATER

7. (a) The Contractor shall pay the United States as provided in this Article for all Delivered Water at Rates, Charges, and the Tiered Pricing Component established in accordance with (i) the Secretary's then-existing ratesetting policy for M&I Water. Such ratesetting policies shall be amended, modified, or superseded only through a public notice and comment procedure; (ii) applicable Federal Reclamation law and associated rules and regulations, or policies; and (iii) other applicable provisions of this Contract. Payments shall be made by cash transaction, electronic funds transfer, or any other mechanism as may be agreed to in writing by the Contractor and the Contracting Officer. The Rates, Charges, and Tiered Pricing Component applicable to the Contractor upon execution of this Contract are set forth in Exhibit "B", as may be revised annually.

(b) The Contracting Officer shall notify the Contractor of the Rates, Charges, and Tiered Pricing Component as follows:

(1) Prior to July 1 of each Calendar Year, the Contracting Officer shall provide the Contractor an estimate of the Charges for Project Water that will be applied to the period October 1, of the current Calendar Year, through September 30, of the following Calendar Year, and the basis for such estimate. The Contractor shall be allowed not less than two months to review and comment on such estimates. On or before September 15 of each Calendar Year, the Contracting Officer shall notify the Contractor in writing of the Charges to be in effect during the period October 1 of the current Calendar Year, through September 30, of the following Calendar Year, and such notification shall revise Exhibit "B."

(2) Prior to October 1 of each Calendar Year, the Contracting Officer shall make available to the Contractor an estimate of the Rates and Tiered Pricing Component for Project Water for the following Year and the computations and cost allocations upon which those Rates are based. The Contractor shall be allowed not less than two months to review and comment on such computations and cost allocations. By December 31 of each Calendar Year, the Contracting Officer shall provide the Contractor with the final Rates and Tiered Pricing Component to be in effect for the upcoming Year, and such notification shall revise Exhibit "B."

(c) At the time the Contractor submits the initial schedule for the delivery of Project Water for each Year pursuant to subdivision (b) of Article 4 of this Contract, the Contractor shall make an advance payment to the United States equal to the total amount payable pursuant to the applicable Rate(s) set under subdivision (a) of this Article, for the Project Water scheduled to be

delivered pursuant to this Contract during the first two calendar months of the Year. Before the end of the first month and before the end of each calendar month thereafter, the Contractor shall make an advance payment to the United States, at the Rate(s) set under subdivision (a) of this Article, for the Water Scheduled to be delivered pursuant to this Contract during the second month immediately following. Adjustments between advance payments for Water Scheduled and payments at Rates due for Water Delivered shall be made before the end of the following month: Provided, That any revised schedule submitted by the Contractor pursuant to Article 4 of this Contract which increases the amount of Water Delivered pursuant to this Contract during any month shall be accompanied with appropriate advance payment, at the Rates then in effect, to assure that Project Water is not delivered to the Contractor in advance of such payment. In any month in which the quantity of Water Delivered to the Contractor pursuant to this Contract equals the quantity of Water Scheduled and paid for by the Contractor, no additional Project Water shall be delivered to the Contractor unless and until an advance payment at the Rates then in effect for such additional Project Water is made. Final adjustment between the advance payments for the Water Scheduled and payments for the quantities of Water Delivered during each Year pursuant to this Contract shall be made as soon as practicable but no later than April 30th of the following Year, or 60 days after the delivery of Project Water carried over under subdivision (g) of Article 3 of this Contract if such water is not delivered by the last day of February.

(d) The Contractor shall also make a payment in addition to the Rate(s) in subdivision (c) of this Article to the United States for Water Delivered, at the Charges and the appropriate Tiered Pricing Component then in effect, before the end of the month following the

month of delivery. The payments shall be consistent with the quantities of M&I Water Delivered as shown in the water delivery report for the subject month prepared by the Operating Non-Federal Entity or, if there is no Operating Non-Federal Entity, by the Contracting Officer. Such water delivery report shall be the basis for payment of Charges and Tiered Pricing Component by the Contractor, and shall be provided to the Contractor by the Operating Non-Federal Entity or the Contracting Officer (as applicable) within five days after the end of the month of delivery. The water delivery report shall be deemed a bill for the payment of Charges and the applicable Tiered Pricing Component for Water Delivered. Adjustment for overpayment or underpayment of Charges shall be made through the adjustment of payments due to the United States for Charges for the next month. Any amount to be paid for past due payment of Charges and the Tiered Pricing Component shall be computed pursuant to Article 20 of this Contract.

(e) The Contractor shall pay for any Water Delivered under subdivision (a), (f), or (g) of Article 3 of this Contract as determined by the Contracting Officer pursuant to applicable statutes, associated regulations, any applicable provisions of guidelines or ratesetting policies: Provided, That the Rate for Water Delivered under subdivision (f) of Article 3 of this Contract shall be no more than the otherwise applicable Rate for M&I Water under subdivision (a) of this Article.

(f) Payments to be made by the Contractor to the United States under this Contract may be paid from any revenues available to the Contractor.

(g) All revenues received by the United States from the Contractor relating to the delivery of Project Water or the delivery of non-Project water through Project facilities shall be

allocated and applied in accordance with Federal Reclamation law and the associated rules or regulations, and the then-current Project ratesetting policies for M&I Water.

(h) The Contracting Officer shall keep its accounts pertaining to the administration of the financial terms and conditions of its long-term contracts, in accordance with applicable Federal standards, so as to reflect the application of Project costs and revenues. The Contracting Officer shall, each Year upon request of the Contractor, provide to the Contractor a detailed accounting of all Project and Contractor expense allocations, the disposition of all Project and Contractor revenues, and a summary of all water delivery information. The Contracting Officer and the Contractor shall enter into good faith negotiations to resolve any discrepancies or disputes relating to accountings, reports, or information.

(i) The parties acknowledge and agree that the efficient administration of this Contract is their mutual goal. Recognizing that experience has demonstrated that mechanisms, policies, and procedures used for establishing Rates, Charges, and Tiered Pricing Components, and/or for making and allocating payments, other than those set forth in this Article may be in the mutual best interest of the parties, it is expressly agreed that the parties may enter into agreements to modify the mechanisms, policies, and procedures for any of those purposes while this Contract is in effect without amending this Contract.

(j) (1) Beginning at such time as the total of the deliveries of Class 1 Water and Class 2 Water in a Year exceed 80 percent of the Contract Total, then before the end of the month following the month of delivery the Contractor shall make an additional payment to the United States equal to the applicable Tiered Pricing Component. The Tiered Pricing Component for the total of the

deliveries of Class 1 Water and Class 2 Water in excess of 80 percent of the Contract Total, but less than or equal to 90 percent of the Contract Total, shall equal one-half of the difference between the Rate established under subdivision (a) of this Article and the M&I Full Cost Water Rate. The Tiered Pricing Component for the total of the deliveries of Class 1 Water and Class 2 Water which exceeds 90 percent of the Contract total shall equal the difference between (i) the Rate established under subdivision (a) of this Article and (ii) the M&I Full Cost Water Rate.

(2) Omitted.

(3) For purposes of determining the applicability of the Tiered Pricing Component pursuant to this Article, Water Delivered shall include Project Water that the Contractor transfers to others but shall not include Project Water transferred and delivered to the Contractor.

(k) For the term of this Contract, Rates under the respective ratesetting policies will be established to recover only reimbursable O&M (including any deficits) and capital costs of the Project, as those terms are used in the then-current Project ratesetting policies, and interest, where appropriate, except in instances where a minimum Rate is applicable in accordance with the relevant Project ratesetting policy. Changes of significance in practices which implement the Contracting Officer's ratesetting policies will not be implemented until the Contracting Officer has provided the Contractor an opportunity to discuss the nature, need, and impact of the proposed change.

(l) Except as provided in subsections 3405(a)(1)(B) and 3405(f) of the CVPIA, the Rates for Project Water transferred by the Contractor shall be the Contractor's Rates adjusted upward or downward to reflect the changed costs, if any, incurred by the Contracting Officer in the

delivery of the transferred Project Water to the transferee's point of delivery in accordance with the then-applicable Project ratesetting policy.

(m) Omitted.

(n) Omitted.

8. Omitted.

SALES, TRANSFERS, OR EXCHANGES OF WATER

9. (a) The right to receive Project Water provided for in this Contract may be sold, transferred, or exchanged to others for reasonable and beneficial uses within the State of California if such sale, transfer, or exchange is authorized by applicable Federal and State laws, and applicable guidelines or regulations then in effect. No sale, transfer, or exchange of Project Water under this Contract may take place without the prior written approval of the Contracting Officer, except as provided for in subdivision (b) of this Article, and no such sales, transfers, or exchanges shall be approved absent all appropriate environmental documentation including, but not limited to, documents prepared pursuant to the NEPA and ESA. Such environmental documentation should include, as appropriate, an analysis of groundwater impacts and economic and social effects, including environmental justice, of the proposed water transfers on both the transferor and transferee.

(b) In order to facilitate efficient water management by means of water transfers of the type historically carried out among Project Contractors located within the same geographical area and to allow the Contractor to participate in an accelerated water transfer program during the term of this Contract, the Contracting Officer shall prepare, as appropriate, all necessary environmental

documentation including, but not limited to, documents prepared pursuant to NEPA and ESA, analyzing annual transfers within such geographical areas, and the Contracting Officer shall determine whether such transfers comply with applicable law. Following the completion of the environmental documentation, such transfers addressed in such documentation shall be conducted with advance notice to the Contracting Officer, but shall not require prior written approval by the Contracting Officer. Such environmental documentation and the Contracting Officer's compliance determination shall be reviewed every five years and updated, as necessary, prior to the expiration of the then-existing five-year period. All subsequent environmental documentation shall include an alternative to evaluate not less than the quantity of Project Water historically transferred within the same geographical area.

(c) For a water transfer to qualify under subdivision (b) of this Article, such water transfer must: (i) be for irrigation purposes for lands irrigated within the previous three years, for M&I use, groundwater recharge, water banking, or fish and wildlife resources; not lead to land conversion; and be delivered to established cropland, wildlife refuges, groundwater basins or M&I use; (ii) occur within a single Year; (iii) occur between a willing seller and a willing buyer; (iv) convey water through existing facilities with no new construction or modifications to facilities and be between existing Project Contractors and/or the Contractor and the United States, Department of the Interior; and (v) comply with all applicable Federal, State, and local or tribal laws and requirements imposed for protection of the environment and Indian Trust Assets, as defined under Federal law.

APPLICATION OF PAYMENTS AND ADJUSTMENTS

10. (a) The amount of any overpayment by the Contractor of the Contractor's O&M, capital, and deficit (if any) obligations for the Year shall be applied first to any current liabilities of the Contractor arising out of this Contract then due and payable. Overpayments of more than $1,000 shall be refunded at the Contractor's request. In lieu of a refund, any amount of such overpayment, at the option of the Contractor, may be credited against amounts to become due to the United States by the Contractor. With respect to overpayment, such refund or adjustment shall constitute the sole remedy of the Contractor or anyone having or claiming to have the right to the use of any of the Project Water supply provided for herein. All credits and refunds of overpayments shall be made within 30 days of the Contracting Officer obtaining direction as to how to credit or refund such overpayment in response to the notice to the Contractor that it has finalized the accounts for the Year in which the overpayment was made.

(b) All advances for miscellaneous costs incurred for work requested by the Contractor pursuant to Article 25 of this Contract shall be adjusted to reflect the actual costs when the work has been completed. If the advances exceed the actual costs incurred, the difference will be refunded to the Contractor. If the actual costs exceed the Contractor's advances, the Contractor will be billed for the additional costs pursuant to Article 25.

TEMPORARY REDUCTIONS--RETURN FLOWS

11. (a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make

all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract.

(b) The Contracting Officer or Operating Non-Federal Entity may temporarily discontinue or reduce the quantity of Water Delivered to the Contractor as herein provided for the purposes of investigation, inspection, maintenance, repair, or replacement of any of the Project facilities or any part thereof necessary for the delivery of Project Water to the Contractor, but so far as feasible the Contracting Officer or Operating Non-Federal Entity will give the Contractor due notice in advance of such temporary discontinuance or reduction, except in case of emergency, in which case no notice need be given: Provided, That the United States shall use its best efforts to avoid any discontinuance or reduction in such service. Upon resumption of service after such reduction or discontinuance, and if requested by the Contractor, the United States will, if possible, deliver the quantity of Project Water which would have been delivered hereunder in the absence of such discontinuance or reduction.

(c) The United States reserves the right to all seepage and return flow water derived from Water Delivered to the Contractor hereunder which escapes or is discharged beyond the Contractor's Service Area: Provided, That this shall not be construed as claiming for the United States any right to seepage or return flow being put to reasonable and beneficial use pursuant to this Contract within the Contractor's Service Area by the Contractor or those claiming by, through, or under the Contractor.

CONSTRAINTS ON THE AVAILABILITY OF WATER

12. (a) In its operation of the Project, the Contracting Officer will use all reasonable means to guard against a Condition of Shortage in the quantity of water to be made available to the Contractor pursuant to this Contract. In the event the Contracting Officer determines that a Condition of Shortage appears probable, the Contracting Officer will notify the Contractor of said determination as soon as practicable.

(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer, or actions taken by the Contracting Officer to meet legal obligations then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom.

(c) The United States shall not execute contracts which together with this Contract, shall in the aggregate provide for furnishing during the life of this Contract or any renewals hereof Class 1 Water in excess of 800,000 acre-feet per Year or Class 2 Water in excess of 1,401,475 acre-feet per Year: Provided, That, subject to subdivision (l) of Article 3 of this Contract, the limitation placed on Class 2 Water contracts shall not prohibit the United States from entering into temporary contracts of one year or less in duration for delivery of Project Water to other entities if such water is not necessary to meet the schedules as may be submitted by all Friant Division long-term water service contractors entitled to receive Class 1 Water and/or Class 2 Water under their water service contracts. Nothing in this subdivision shall limit the Contracting Officer's ability to take actions that result in the availability of new water supplies to be used for Project purposes and

allocating such new supplies: Provided, That the Contracting Officer shall not take such actions until after consultation with the Friant Division Project Contractors.

(d) The Contracting Officer shall not deliver any Class 2 Water pursuant to this or any other contract for water service heretofore or hereafter entered into any Year unless and until the Contracting Officer determines that the cumulative total quantity of Class 1 Water specified in subdivision (c) of this Article will be available for delivery in said Year. If the Contracting Officer determines there is or will be a shortage in any Year in the quantity of Class 1 Water available for delivery, the Contracting Officer shall apportion the available Class 1 Water among all contractors entitled to receive such water that will be made available at Friant Dam in accordance with the following:

(1) A determination shall be made of the total quantity of Class 1 Water at Friant Dam which is available for meeting Class 1 Water contractual commitments, the amount so determined being herein referred to as the available supply.

(2) The total available Class 1 supply shall be divided by the Class 1 Water contractual commitments, the quotient thus obtained being herein referred to as the Class 1 apportionment coefficient.

(3) The total quantity of Class 1 Water under Article 3 of this Contract shall be multiplied by the Class 1 apportionment coefficient and the result shall be the quantity of Class 1 Water required to be delivered by the Contracting Officer to the Contractor for the respective Year, but in no event shall such amount exceed the total quantity of Class 1 Water specified in subdivision (a) of Article 3 of this Contract.

(e) If the Contracting Officer determines there is less than the quantity of Class 2 Water which the Contractor otherwise would be entitled to receive pursuant to Article 3 of this Contract, the quantity of Class 2 Water which shall be furnished to the Contractor by the Contracting Officer will be determined in the manner set forth in paragraphs (1), (2), and (3), of subdivision (d) of this Article substituting the term "Class 2" for the term "Class 1."

(f) In the event that in any Year there is made available to the Contractor, by reason of any shortage or apportionment as provided in subdivisions (a), (d), or (e) of this Article, or any discontinuance or reduction of service as set forth in subdivision (b) of Article 11 of this Contract, less than the quantity of water which the Contractor otherwise would be entitled to receive hereunder, there shall be made an adjustment on account of the amounts already paid to the Contracting Officer by the Contractor for Class 1 Water and Class 2 Water for said Year in accordance with Article 10 of this Contract.

13. Omitted.

RULES AND REGULATIONS

14. (a) The parties agree that the delivery of Project Water or use of Federal facilities pursuant to this Contract is subject to Federal Reclamation law, as amended and supplemented, and the rules and regulations promulgated by the Secretary of the Interior under Federal Reclamation law.

(b) The terms of this Contract are subject to any enforceable order, judgment, and/or settlement in NRDC v. Patterson, No. CIVS 88-1658-LKK-EM and shall be timely modified as necessary to effectuate or facilitate any final order, judgment, or settlement in said litigation.

(c) Omitted.

WATER AND AIR POLLUTION CONTROL

15. The Contractor, in carrying out this Contract, shall comply with all applicable water and air pollution laws and regulations of the United States and the State of California, and shall obtain all required permits or licenses from the appropriate Federal, State, or local authorities.

QUALITY OF WATER

16. (a) Project facilities used to deliver Project Water to the Contractor pursuant to this Contract shall be operated and maintained to enable the United States to deliver Project Water to the Contractor in accordance with the water quality standards specified in subsection 2(b) of the Act of August 26, 1937 (50 Stat. 865), as added by Section 101 of the Act of October 27, 1986 (100 Stat. 3050) or other existing Federal laws. The United States is under no obligation to construct or furnish water treatment facilities to maintain or to improve the quality of Water Delivered to the Contractor pursuant to this Contract. The United States does not warrant the quality of Water Delivered to the Contractor pursuant to this Contract.

(b) The O&M of Project facilities shall be performed in such manner as is practicable to maintain the quality of raw water made available through such facilities at the highest level reasonably attainable as determined by the Contracting Officer. The Contractor shall be responsible for compliance with all State and Federal water quality standards applicable to surface and subsurface agricultural drainage discharges generated through the use of Federal or Contractor facilities or Project Water provided by the Contractor within the Contractor's Service Area.

WATER ACQUIRED BY THE CONTRACTOR OTHER THAN FROM THE UNITED STATES

17. (a) Omitted.

(b) Water or water rights now owned or hereafter acquired by the Contractor, other than from the United States, may be stored, conveyed, and/or diverted through Project facilities, subject to the completion of appropriate environmental documentation, with the approval of the Contracting Officer and the execution of any contract determined by the Contracting Officer to be necessary, consistent with the following provisions:

(1) The Contractor may introduce non-Project water into Project facilities and deliver said water within the Contractor's Service Area subject to payment to the United States and/or to any applicable Operating Non-Federal Entity of an appropriate rate as determined by the applicable Project ratesetting policy, the RRA, and the Project use power policy, if such Project use power policy is applicable, each as amended, modified, or superseded from time to time.

(2) Delivery of such non-Project water in and through Project facilities shall only be allowed to the extent such deliveries do not: (i) interfere with other Project purposes as determined by the Contracting Officer; (ii) reduce the quantity or quality of water available to other Project Contractors; (iii) interfere with the delivery of contractual water entitlements to any other Project Contractors; or (iv) interfere with the physical maintenance of the Project facilities.

(3) Neither the United States nor the Operating Non-Federal Entity shall be responsible for control, care, or distribution of the non-Project water before it is introduced into or after it is delivered from the Project facilities. The Contractor hereby releases and agrees to defend

and indemnify the United States and the Operating Non-Federal Entity, and their respective officers, agents, and employees, from any claim for damage to persons or property, direct or indirect, resulting from the acts of the Contractor its officers', employees', agents', or assigns' act(s) in (i) extracting or diverting non-Project water from any source, or (ii) diverting such non-Project water into Project facilities.

(4) Diversion of such non-Project water into Project facilities shall be consistent with all applicable laws, and if involving groundwater, consistent with any groundwater management plan for the area from which it was extracted.

(5) After Project purposes are met, as determined by the Contracting Officer, the United States and the Contractor shall share priority to utilize the remaining capacity of the facilities declared to be available by the Contracting Officer for conveyance and transportation of non-Project water prior to any such remaining capacity being made available to non-Project contractors.

OPINIONS AND DETERMINATIONS

18. (a) Where the terms of this Contract provide for actions to be based upon the opinion or determination of either party to this Contract, said terms shall not be construed as permitting such action to be predicated upon arbitrary, capricious, or unreasonable opinions or determinations. Both parties, notwithstanding any other provisions of this Contract, expressly reserve the right to seek relief from and appropriate adjustment for any such arbitrary, capricious, or unreasonable opinion or determination. Each opinion or determination by either party shall be provided in a timely manner. Nothing in subdivision (a) of Article 18 of this Contract is intended to

or shall affect or alter the standard of judicial review applicable under Federal law to any opinion or determination implementing a specific provision of Federal law embodied in statute or regulation.

(b) The Contracting Officer shall have the right to make determinations necessary to administer this Contract that are consistent with the expressed and implied provisions of this Contract, the laws of the United States and of the State of California, and the rules and regulations promulgated by the Secretary of the Interior. Such determinations shall be made in consultation with the Contractor to the extent reasonably practicable.

COORDINATION AND COOPERATION

19. (a) In order to further their mutual goals and objectives, the Contracting Officer and the Contractor shall communicate, coordinate, and cooperate with each other, and with other affected Project Contractors, in order to improve the operation and management of the Project. The communication, coordination, and cooperation regarding operations and management shall include, but not be limited to, any action which will or may materially affect the quantity or quality of Project Water supply, the allocation of Project Water supply, and Project financial matters including, but not limited to, budget issues. The communication, coordination, and cooperation provided for hereunder shall extend to all provisions of this Contract. Each party shall retain exclusive decision making authority for all actions, opinion, and determinations to be made by the respective party.

(b) Within 120 days following the effective date of this Contract, the Contractor, other affected Project Contractors, and the Contracting Officer shall arrange to meet with interested Project Contractors to develop a mutually agreeable, written Project-wide process, which may be amended as necessary, separate and apart from this Contract. The goal of this process shall be to

provide, to the extent practicable, the means of mutual communication and interaction regarding significant decisions concerning Project operation and management on a real-time basis.

(c) It is the intent of the Secretary to improve water supply reliability. To carry out this intent:

(1) The Contracting Officer will, at the request of the Contractor, assist in the development of integrated resource management plans for the Contractor. Further, the Contracting Officer will, as appropriate, seek authorizations for implementation of partnerships to improve water supply, water quality, and reliability.

(2) The Secretary will, as appropriate, pursue program and project implementation and authorization in coordination with Project Contractors to improve the water supply, water quality, and reliability of the Project for all Project purposes.

(3) The Secretary will coordinate with Project Contractors and the State of California to seek improved water resource management.

(4) The Secretary will coordinate actions of agencies within the Department of the Interior that may impact the availability of water for Project purposes.

(5) The Contracting Officer shall periodically, but not less than annually, hold division level meetings to discuss Project operations, division level water management activities, and other issues as appropriate.

(d) Without limiting the contractual obligations of the Contracting Officer under the other Articles of this Contract, nothing in this Article shall be construed to limit or constrain the Contracting Officer's ability to communicate, coordinate, and cooperate with the Contractor or other

interested stakeholders or to make decisions in a timely fashion as needed to protect health, safety, or the physical integrity of structures or facilities.

CHARGES FOR DELINQUENT PAYMENTS

20. (a) The Contractor shall be subject to interest, administrative, and penalty charges on delinquent installments or payments. When a payment is not received by the due date, the Contractor shall pay an interest charge for each day the payment is delinquent beyond the due date. When a payment becomes sixty (60) days delinquent, the Contractor shall pay an administrative charge to cover additional costs of billing and processing the delinquent payment. When a payment is delinquent ninety (90) days or more, the Contractor shall pay an additional penalty charge of six (6%) percent per year for each day the payment is delinquent beyond the due date. Further, the Contractor shall pay any fees incurred for debt collection services associated with a delinquent payment.

(b) The interest charge rate shall be the greater of the rate prescribed quarterly in the Federal Register by the Department of the Treasury for application to overdue payments, or the interest rate of one-half of one (0.5%) percent per month prescribed by Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest charge rate shall be determined as of the due date and remain fixed for the duration of the delinquent period.

(c) When a partial payment on a delinquent account is received, the amount received shall be applied, first to the penalty, second to the administrative charges, third to the accrued interest, and finally to the overdue payment.

EQUAL OPPORTUNITY

21. During the performance of this Contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of payment or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without discrimination because of race, color, religion, sex, or national origin.

(c) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Contracting Officer, advising the said labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Contractor will furnish all information and reports required by said amended Executive Order and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the Contracting Officer and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in said amended Executive Order, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of said amended Executive Order, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT

22. (a) The obligation of the Contractor to pay the United States as provided in this Contract is a general obligation of the Contractor notwithstanding the manner in which the obligation may be distributed among the Contractor's water users and notwithstanding the default of individual water users in their obligations to the Contractor.

(b) The payment of charges becoming due hereunder is a condition precedent to receiving benefits under this Contract. The United States shall not make water available to the Contractor through Project facilities during any period in which the Contractor may be in arrears in the advance payment of water rates due the United States. The Contractor shall not furnish water made available pursuant to this Contract for lands or parties which are in arrears in the advance payment of water rates levied or established by the Contractor.

(c) With respect to subdivision (b) of this Article, the Contractor shall have no obligation to require advance payment for water rates which it levies.

COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS

23. (a) The Contractor shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other applicable civil rights laws, as well as with their respective implementing regulations and guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

(b) These statutes require that no person in the United States shall, on the grounds of race, color, national origin, handicap, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving financial assistance from the Bureau of Reclamation. By executing this Contract, the Contractor agrees to immediately take any measures necessary to implement this obligation, including permitting officials of the United States to inspect premises, programs, and documents.

(c) The Contractor makes this agreement in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or other Federal financial assistance extended after the date hereof to the Contractor by the Bureau of Reclamation, including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Contractor recognizes and agrees that such Federal assistance will be extended in reliance on the representations and agreements made in this Article, and that the United States reserves the right to seek judicial enforcement thereof.

24. Omitted.

CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

25. In addition to all other payments to be made by the Contractor pursuant to this Contract, the Contractor shall pay to the United States, within 60 days after receipt of a bill and detailed statement submitted by the Contracting Officer to the Contractor for such specific items of direct cost incurred by the United States for work requested by the Contractor associated with this Contract plus indirect costs in accordance with applicable Bureau of Reclamation policies and procedures. All such amounts referred to in this Article shall not exceed the amount agreed to in writing in advance by the Contractor. This Article shall not apply to costs for routine contract administration.

WATER CONSERVATION

26. (a) Prior to the delivery of water provided from or conveyed through Federally constructed or Federally financed facilities pursuant to this Contract, the Contractor shall be implementing an effective water conservation and efficiency program based on the Contractor's water conservation plan that has been determined by the Contracting Officer to meet the conservation and efficiency criteria for evaluating water conservation plans established under Federal law. The water conservation and efficiency program shall contain definite water conservation objectives, appropriate economically feasible water conservation measures, and time schedules for meeting those objectives. Continued Project Water delivery pursuant to this Contract shall be contingent upon the Contractor's continued implementation of such water conservation program. In the event the Contractor's water conservation plan or any revised water conservation plan completed pursuant to subdivision (d) of Article 26 of this Contract have not yet been determined by the Contracting Officer to meet such

criteria, due to circumstances which the Contracting Officer determines are beyond the control of the Contractor, water deliveries shall be made under this Contract so long as the Contractor diligently works with the Contracting Officer to obtain such determination at the earliest practicable date, and thereafter the Contractor immediately begins implementing its water conservation and efficiency program in accordance with the time schedules therein.

(b) Should the amount of M&I Water delivered pursuant to subdivision (a) of Article 3 of this Contract equal or exceed 2,000 acre-feet per Year, the Contractor shall implement the Best Management Practices identified by the time frames issued by the California Urban Water Conservation Council for such M&I Water unless any such practice is determined by the Contracting Officer to be inappropriate for the Contractor.

(c) The Contractor shall submit to the Contracting Officer a report on the status of its implementation of the water conservation plan on the reporting dates specified in the then-existing conservation and efficiency criteria established under Federal law.

(d) At five-year intervals, the Contractor shall revise its water conservation plan to reflect the then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law and submit such revised water management plan to the Contracting Officer for review and evaluation. The Contracting Officer will then determine if the water conservation plan meets Reclamation's then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law.

(e) If the Contractor is engaged in direct groundwater recharge, such activity shall be described in the Contractor's water conservation plan.

EXISTING OR ACQUIRED WATER OR WATER RIGHTS

27. Except as specifically provided in Article 17 of this Contract, the provisions of this Contract shall not be applicable to or affect non-Project water or water rights now owned or hereafter acquired by the Contractor or any user of such water within the Contractor's Service Area. Any such water shall not be considered Project Water under this Contract. In addition, this Contract shall not be construed as limiting or curtailing any rights which the Contractor or any water user within the Contractor's Service Area acquires or has available under any other contract pursuant to Federal Reclamation law.

OPERATION AND MAINTENANCE BY OPERATING NON-FEDERAL ENTITY

28. (a) The O&M of a portion of the Project facilities which serve the Contractor, and responsibility for funding a portion of the costs of such O&M, have been transferred to the Operating Non-Federal Entity by separate agreement between the United States and the Operating Non-Federal Entity. That separate agreement shall not interfere with or affect the rights or obligations of the Contractor or the United States hereunder.

(b) The Contracting Officer has previously notified the Contractor in writing that the O&M of a portion of the Project facilities which serve the Contractor has been transferred to the Operating Non-Federal Entity, and therefore, the Contractor shall pay directly to the Operating Non-Federal Entity, or to any successor approved by the Contracting Officer under the terms and conditions of the separate agreement between the United States and the Operating Non-Federal Entity described in subdivision (a) of this Article, all rates, charges, or assessments of any kind, including any assessment for reserve funds, which the Operating Non-Federal Entity or such successor

determines, sets, or establishes for (i) the O&M of the portion of the Project facilities operated and maintained by the Operating Non-Federal Entity or such successor, or (ii) the Friant Division's share of the operation, maintenance, and replacement costs for physical works and appurtenances associated with the Tracy Pumping Plant, the Delta-Mendota Canal, the O'Neill Pumping/Generating Plant, the Federal share of the O'Neill Forebay, the Mendota Pool, and the Federal share of San Luis Unit joint use conveyance and conveyance pumping facilities. Such direct payments to the Operating Non-Federal Entity or such successor shall not relieve the Contractor of its obligation to pay directly to the United States the Contractor's share of the Project Rates, Charges, and Tiered Pricing Component(s) except to the extent the Operating Non-Federal Entity collects payments on behalf of the United States in accordance with the separate agreement identified in subdivision (a) of this Article.

(c) For so long as the O&M of any portion of the Project facilities serving the Contractor is performed by the Operating Non-Federal Entity, or any successor thereto, the Contracting Officer shall adjust those components of the Rates for Water Delivered under this Contract representing the cost associated with the activity being performed by the Operating Non-Federal Entity or its successor.

(d) In the event the O&M of the Project facilities operated and maintained by the Operating Non-Federal Entity is re-assumed by the United States during the term of this Contract, the Contracting Officer shall so notify the Contractor, in writing, and present to the Contractor a revised Exhibit "B" which shall include the portion of the Rates to be paid by the Contractor for Project Water under this Contract representing the O&M costs of the portion of such Project facilities which

have been re-assumed. The Contractor shall, thereafter, in the absence of written notification from the Contracting Officer to the contrary, pay the Rates, Charges, and Tiered Pricing Component(s) specified in the revised Exhibit "B" directly to the United States in compliance with Article 7 of this Contract.

CONTINGENT UPON APPROPRIATION OR ALLOTMENT OF FUNDS

29. The expenditure or advance of any money or the performance of any obligation of the United States under this Contract shall be contingent upon appropriation or allotment of funds. Absence of appropriation or allotment of funds shall not relieve the Contractor from any obligations under this Contract. No liability shall accrue to the United States in case funds are not appropriated or allotted.

BOOKS, RECORDS, AND REPORTS

30. (a) The Contractor shall establish and maintain accounts and other books and records pertaining to administration of the terms and conditions of this Contract, including: the Contractor's financial transactions, water supply data, and Project land and right-of-way agreements; water use data; and other matters that the Contracting Officer may require. Reports thereon shall be furnished to the Contracting Officer in such form and on such date or dates as the Contracting Officer may require. Subject to applicable Federal laws and regulations, each party to this Contract shall have the right during office hours to examine and make copies of the other party's books and records relating to matters covered by this Contract.

(b) Notwithstanding the provisions of subdivision (a) of this Article, no books, records, or other information shall be requested from the Contractor by the Contracting Officer unless such books, records, or information are reasonably related to the administration or performance of this Contract. Any such request shall allow the Contractor a reasonable period of time within which to provide the requested books, records, or information.

(c) At such time as the Contractor provides information to the Contracting Officer pursuant to subdivision (a) of this Article, a copy of such information shall be provided to the Operating Non-Federal Entity.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

31. (a) The provisions of this Contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this Contract or any right or interest therein shall be valid until approved in writing by the Contracting Officer.

(b) The assignment of any right or interest in this Contract by either party shall not interfere with the rights or obligations of the other party to this Contract absent the written concurrence of said other party.

(c) The Contracting Officer shall not unreasonably condition or withhold approval of any proposed assignment.

SEVERABILITY

32. In the event that a person or entity who is neither (i) a party to a Project contract, nor (ii) a person or entity that receives Project Water from a party to a Project contract, nor (iii) an association or other form of organization whose primary function is to represent parties to Project contracts, brings an action in a court of competent jurisdiction challenging the legality or enforceability of a provision included in this Contract and said person, entity, association, or organization obtains a final court decision holding that such provision is legally invalid or unenforceable and the Contractor has not intervened in that lawsuit in support of the plaintiff(s), the parties to this Contract shall use their best efforts to (i) within 30 days of the date of such final court decision identify by mutual agreement the provisions in this Contract which must be revised and

(ii) within three months thereafter promptly agree on the appropriate revision(s). The time periods specified above may be extended by mutual agreement of the parties. Pending the completion of the actions designated above, to the extent it can do so without violating any applicable provisions of law, the United States shall continue to make the quantities of Project Water specified in this Contract available to the Contractor pursuant to the provisions of this Contract which were not found to be legally invalid or unenforceable in the final court decision.

RESOLUTION OF DISPUTES

33. Should any dispute arise concerning any provisions of this Contract, or the parties' rights and obligations thereunder, the parties shall meet and confer in an attempt to resolve the dispute. Prior to the Contractor commencing any legal action, or the Contracting Officer referring any matter to Department of Justice, the party shall provide to the other party 30 days' written notice of the intent to take such action: Provided, That such notice shall not be required where a delay in commencing an action would prejudice the interests of the party that intends to file suit. During the 30-day notice period, the Contractor and the Contracting Officer shall meet and confer in an attempt to resolve the dispute. Except as specifically provided, nothing herein is intended to waive or abridge any right or remedy that the Contractor or the United States may have.

OFFICIALS NOT TO BENEFIT

34. No Member of or Delegate to Congress, Resident Commissioner, or official of the Contractor shall benefit from this Contract other than as a water user or landowner in the same manner as other water users or landowners.

CHANGES IN CONTRACTOR'S SERVICE AREA

35. (a) While this Contract is in effect, no change may be made in the Contractor's Service Area, by inclusion or exclusion of lands, dissolution, consolidation, merger, or otherwise, except upon the Contracting Officer's written consent.

(b) Within 30 days of receipt of a request for such a change, the Contracting Officer will notify the Contractor of any additional information required by the Contracting Officer for processing said request, and both parties will meet to establish a mutually agreeable schedule for timely completion of the process. Such process will analyze whether the proposed change is likely to: (i) result in the use of Project Water contrary to the terms of this Contract; (ii) impair the ability of the Contractor to pay for Project Water furnished under this Contract or to pay for any Federally-constructed facilities for which the Contractor is responsible; and (iii) have an impact on any Project Water rights applications, permits, or licenses. In addition, the Contracting Officer shall comply with the NEPA and the ESA. The Contractor will be responsible for all costs incurred by the Contracting Officer in this process, and such costs will be paid in accordance with Article 25 of this Contract.

FEDERAL LAWS

36. By entering into this Contract, the Contractor does not waive its rights to contest the validity or application in connection with the performance of the terms and conditions of this Contract of any Federal law or regulation: Provided, That the Contractor agrees to comply with the terms and conditions of this Contract unless and until relief from application of such Federal law or regulation to the implementing provision of the Contract is granted by a court of competent jurisdiction.

NOTICES

37. Any notice, demand, or request authorized or required by this Contract shall be deemed to have been given, on behalf of the Contractor, when mailed, postage prepaid, or delivered to the Area Manager, South-Central California Area Office, 1243 "N" Street, Fresno, California 93721, and on behalf of the United States, when mailed, postage prepaid, or delivered to the City of Fresno, Public Utilities Director, 2600 Fresno Street, Room 3065, Fresno, California 93721-3624. The designation of the addressee or the address may be changed by notice given in the same manner as provided in this Article for other notices.

CONFIRMATION OF CONTRACT

38. The Contractor, after the execution of this Contract, shall furnish to the Contracting Officer evidence that pursuant to the laws of the State of California the Contractor is a legally constituted entity, and the Contract is lawful, valid, and binding on the Contractor. This Contract shall not be binding on the United States until such evidence has been provided to the Contracting Officer's satisfaction.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
James E Jackson
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

(SEAL)

CITY OF FRESNO

By: _____
City Manager

Attest:

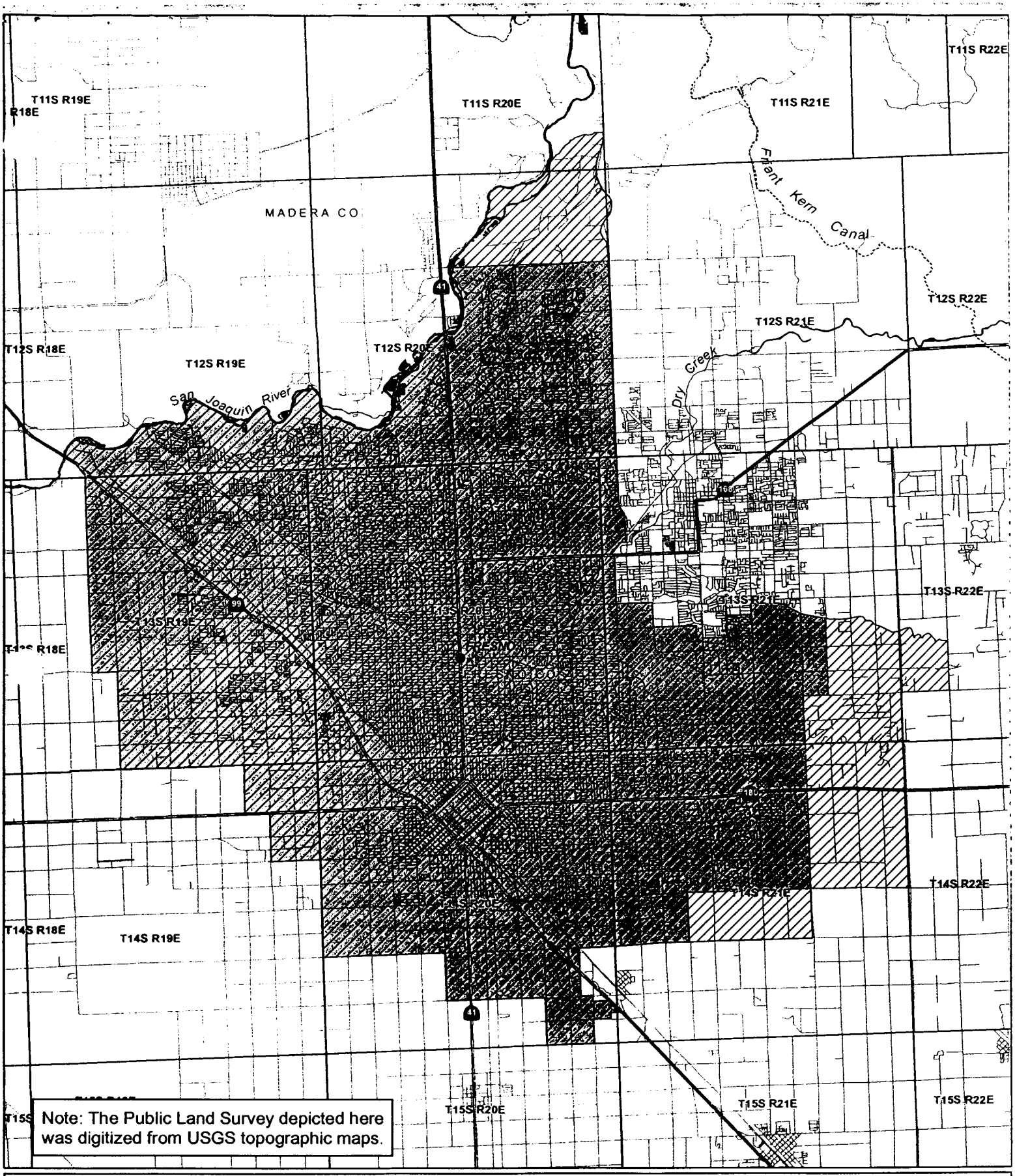
By: Rebecca E Klisch
City Clerk 7-25-05

By: _____
Public Utilities Director

Approved as to form:

Hilda Cantu Montez
City Attorney

(I:\LTRC\Final Draft LTRC's – Fresno, Tracy\City of Fresno R. O. Final Draft Contract 05-04-2005.doc)



Contractor's Proposed Service Area (Sphere of Influence)

Contractor's Current Service Area

City of Fresno

Contract No. 14-06-200-8901-LTR1

EXHIBIT A

Miles

0 0.5 1 2 3 4

Date: October 26, 2004

File Name: N:\districts\contracts\city_of_fresno\city_of_fresno2.mxd

214-208-12705

EXHIBIT B
CITY OF FRESNO
WATER RATES AND CHARGES

	2005 Rates Per Acre-Foot M&I Water
O&M AND COST-OF-SERVICE RATES:	
Capital Rates:	$20.04
O&M Rates:	
Water Marketing	$ 3.89
Storage	$ 6.67
Conveyance	*
Deficit Rates:	
Non-Interest Bearing	
Interest Bearing	$53.53
CFO/PER Adj. Rate **	$ 1.70
TOTAL COST-OF-SERVICE RATES (COS):	$85.83
M&I FULL-COST RATE	$97.15
Tiered Pricing Component>80%<=90% of Contract Total [Full Cost Rate – COS Rate /2]:	$ 5.66
Tiered Pricing Component>90% of Contract Total [Full Cost Rate – COS Rate]:	$11.32
SURCHARGES UNDER PUB. L. 102-575 TO RESTORATION FUND***	
Friant Surcharge [3406(c)(1)]	$ 7.00
Restoration Payments [3407(d)(2)(A)]	$15.87

* Conveyance and Conveyance Pumping Operation and Maintenance Costs were removed for ratesetting purposes and are to be billed directly to the water authorities.

** Chief Financial Officer (CFO) Adjustment and Provision for Replacement (PFR) Credit are being distributed over a 5-year period beginning in FY2003 for the contractors that requested that the costs be deferred.

*** The surcharges are payments in addition to the water rates and were determined pursuant to Title XXXIV of Public Law 102-575. Restoration fund surcharges under P. L. 102-575 are on a fiscal year basis (10/1-9/30).

EXHIBIT C
METERING PLAN

Completion Date	Item	Comments
03/05*	Contract effective	
01/06	Implementation study	Select and obtain consultant study re implementation
01/06	Submit progress report to Bureau	
12/06	Confirmation of existing meters	Verify integrity and servicing of existing meters
01/07	Submit progress report to Bureau	
06/07	Secure installation contract	Begin implementation of consultant recommendations
12/07	Draft rate ordinance	Initial development of tiered rate structure
01/08	Submit progress report to Bureau	
01/08	Initiate retrofit	Begin installation of meters on existing dwellings
12/08	Meter installation progress	29% (30,000 of approximately 105,000 units installed)
01/09	Submit progress report to Bureau	
12/09	Meter installation progress	43% (45,000 units)
01/10	Submit progress report to Bureau	
03/10	Impose new rate ordinance (fees based on metered use)	New rate structure applicable to currently metered customers. Rates to be effective as new meter installations occur.
12/10	Meter installation progress	62% (65,000 units)
01/11	Submit progress report to Bureau	
12/11	Adopt new rate ordinance	81% (85,000 units)
01/12	Submit compliance report to Bureau	
12/12	Meter installation progress	100% (105,000 units)
01/13	Submit completion report	Retrofit complete.

Schedule subject to change due to unforeseen circumstances.

*This date will be revised at the time the contract is executed on behalf of the United States.

Amendment to Contract
No. 14-06-200-8901-LTR1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

AMENDMENT TO LONG-TERM RENEWAL CONTRACT BETWEEN
THE UNITED STATES
AND
CITY OF FRESNO
PROVIDING FOR PROJECT WATER SERVICE FROM FRIANT DIVISION

THIS CONTRACT AMENDMENT, is made this 6th day of April, 2007, in pursuance generally of the Act of Congress of June 17, 1902 (32 Stat. 388), and the acts amendatory thereof or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between THE UNITED STATES OF AMERICA, hereinafter referred to as the United States, and, CITY OF FRESNO, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States and the Contractor entered into a contract dated August 18, 2005, designated Contract No. 14-06-200-8901-LTR1, providing for water service from the Central Valley Project, hereinafter referred to as the "Existing Contract;" and

[2nd] WHEREAS, pursuant to subdivision (b) of Article 14 of the Existing Contract, the terms of the Existing Contract are subject to any enforceable order, judgment and/or settlement in *NRDC* v. *Patterson*, No. CIVS 88-1658-LKK-EM (now styled *Natural Resources Defense Council, et al.* v. *Rodgers, et al.,* No. CIV-S-88-1658 LKK/GGH) and that the Existing Contract shall be timely modified as necessary to effectuate or facilitate any final order, judgment or settlement in said litigation; and

[3rd] WHEREAS, the parties to said litigation have reached agreement on a global resolution of all Claims for Relief in the Seventh Amended Complaint, on the terms and conditions stated in the Stipulation of Settlement dated September 13, 2006, designated Exhibit 1 in the Order Approving Stipulation dated October 23, 2006; and

[4th] WHEREAS, the parties hereto desire to amend the Existing Contract as required by said Stipulation of Settlement.

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby agreed as follows:

1. Subdivision (a) of Article 3 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, and the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 60,000 acre-feet of Class 1 Water for M&I purposes. The quantity of Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract."

2. Subdivision (a) of Article 11 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law, and the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract."

3. Subdivision (b) of Article 12 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer or actions taken by the Contracting Officer to meet legal obligations, including but not limited to obligations pursuant to the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom."

4. Subdivision (b) of Article 14 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(b) The terms of this Contract are subject to the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH. Nothing in this Contract shall be interpreted to limit or interfere with the full implementation of this Settlement, Order, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement."

5. Except as specifically amended herein, the Existing Contract is valid and shall continue in full force and effect as originally written and executed.

IN WITNESS WHEREOF, the parties hereto have executed this Contract Amendment as of the day and year first above written.

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

THE UNITED STATES OF AMERICA

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

CITY OF FRESNO

(SEAL)

By: _____
City Manager

By: _____
Public Utilities Director

Attest:

By: _____ (3/26/07)
City Clerk

Approved as to form:

By: _____
City Attorney

City of Fresno and Fresno Irrigation District Agreements

REVISED, AMENDED AND RESTATED COOPERATIVE AGREEMENT BETWEEN FRESNO IRRIGATION DISTRICT AND CITY OF FRESNO FOR WATER UTILIZATION AND CONVEYANCE

THIS AGREEMENT is entered into as of December 20, 2016 by and between the Fresno Irrigation District, an irrigation district (herein called "District") and City of Fresno, a municipal corporation (herein called "City").

WITNESSETH:

WHEREAS, District is an irrigation district organized and existing under the laws of the State of California and is the owner of certain water supplies, water rights and a water distribution system that can convey water to lands both within and outside District boundaries; and

WHEREAS, City is a municipal corporation with boundaries largely overlapping those of District and is the owner of a water distribution system for the distribution of water to lands both in and outside the exterior boundaries of City; and

WHEREAS, District and City have heretofore entered into a cooperative program of water utilization between said parties evidenced by a written agreement for such water utilization and conveyance dated August 12, 1970, which by its terms and by the terms of amendments thereto terminated on May 30, 1976; and

WHEREAS, District and City continued with said cooperative program and entered into a replacement contract for water utilization and conveyance dated May 25, 1976 ("1976 Agreement"); and

WHEREAS, District and City wish to amend and restate the 1976 Agreement in its entirety in order to continue with and expand said cooperative program to recognize changed circumstances affecting them via this Revised, Amended and Restated Cooperative Agreement between Fresno Irrigation District and City of Fresno for Water Utilization and Conveyance ; and

WHEREAS, certain provisions of this Agreement are specifically authorized by, and entered into pursuant to, Chapter 9 (commencing with Section 26670), Part 10, Division 11 of the California Water Code; and

WHEREAS, by agreement dated December 22, 2010 between City and the United States of America identified as Contract No. 14-06-200-8901D (the "City Bureau Contract"), City is entitled to purchase certain water from the United States; and

WHEREAS, by agreement dated December 22, 2010 between District and the United States of America identified as Contract No. 14-06-200-1122D (the "District Bureau Contract"), District is entitled to purchase certain water from the United States; and

WHEREAS, District holds rights to Kings River water and storage in Pine Flat Reservoir on the Kings River, subject to various contracts with the United States of America, water supply schedules and agreements by and among members of the Kings River Water Association and others, judicial and regulatory decrees, and the water rights governing the diversion and use of Kings River water, all as they may be amended or supplemented from time to time (collectively, the "Kings River Agreements"); and

WHEREAS, it is recognized by District and City that District is primarily charged with the distribution and delivery of water within District for Agricultural Use and that its canals and distribution system must primarily be used for that purpose; and

WHEREAS, it is recognized by both District and City that many inhabitants of District also require water for domestic, industrial or fire protection purposes supplied to them by City; and

WHEREAS, under the 1976 Agreement, Kings River water was available to City once lands within District boundaries with surface water allotments were annexed into City and were covered by the 1976 Agreement's contract rate for surface water delivery to City by District for those lands; and

WHEREAS, City and District now wish to limit the amount of Kings River water available to City to provide more certainty regarding water supply availability and to address City's current and anticipated needs and circumstances; and

WHEREAS, City and District are both committed to working cooperatively under the Sustainable Groundwater Management Act ("SGMA") so that the groundwater basin shared by City and District is sustainable and so that undesirable results (as defined in SGMA) are minimized or avoided; and

WHEREAS, City and District recognize that changes to the operations of the Central Valley Project have impacted the availability of water from said project; and

WHEREAS, City has heretofore used much of the water delivered to it under the 1976 Agreement for groundwater recharge because of City's historical reliance on groundwater, and therefore did not require delivery of water year around; and

WHEREAS, City desires to use more of its surface water for direct delivery to its water users and ratepayers while limiting its reliance on groundwater; and

WHEREAS, with the development of its surface water treatment facilities ("SWTFs") City now requires a long-term, reliable and certain surface water supply, deliverable continuously year around; and

WHEREAS, conveyance of raw surface water to the SWTFs on a continuous year around basis will require, among other things, (i) new conveyance infrastructure built by City to overcome certain operational challenges and/or interruptions to District's infrastructure to accommodate normal and routine maintenance of District's canals and pipelines than have historically delivered surface water to City, (ii) District to alter its operations and incur additional

costs to make Out of Season Deliveries, and (iii) the use of new management techniques by District, with the attendant costs, including without limitation water sales, purchases, transfers and exchanges, to meet the need for a continuous supply of surface water to City's SWTFs, all while addressing SGMA and other legal and regulatory requirements that impact the groundwater basin shared by District and City; and

WHEREAS, providing Out of Season Deliveries by District to City may also require the development of new water supplies and projects to provide the water being sought by City; and

WHEREAS, City acknowledges that District has a great depth of experience, knowledge and expertise in the management of surface water supply resources (including but not limited to water supply sales, purchases, transfers and exchanges); and

WHEREAS, City recognizes that the coordinated management of both District's and City's water supplies by District is desirable to maximize the use of the current water supplies and the future development of water supplies for both parties; and

WHEREAS, City has determined that it is in City's interest, and in the interest of its water users and ratepayers, to engage District to employ District's experience, knowledge and expertise on behalf of City in the management of City's Surface Water pursuant to the terms hereof in order to achieve City's and District's goals described herein and to accommodate City's desire for a continuous year around surface water supply, and District has agreed to be so engaged; and

WHEREAS, the changing conditions and manner of management of water supplies throughout the State of California, and other factors beyond the control of City and District, will require increased vigilance on the part of water purveyors in the Fresno area to cooperate with each other on long-range implementation strategies to improve the availability, reliability, and drought resiliency of water supplies; and

WHEREAS, through this Agreement and additional cooperative efforts, City, District and other entities in the region intend to capture of flood released waters, optimize existing water supply storage assets, develop new water supply storage assets, expand groundwater recharge capacities, engage in strategic water supply sales, transfers and exchanges and enhance the utilization of recycled and/or treated waters; and

WHEREAS, in light of SGMA, environmental regulations, water supply challenges and competition with other users and regions in the State for water supplies, City and District wish to further enhance their cooperative working relationship for the benefit of the water users and ratepayers they serve by entering into this Agreement to provide for strategic, long-range and coordinated water supply planning and management that will optimize water conservation, the efficient uses of water for agricultural and municipal uses, the capture of flood released water, the use of existing water supply storage assets, the development of new water supply storage assets, the expansion of groundwater recharge capacity, the effectiveness of strategic water supply sales, transfers, exchanges and purchases, and the enhancement of recycled water utilization.

NOW, THEREFORE, adopting the foregoing recitals as being applicable to this Agreement, it is mutually agreed as follows:

1. Term. The term of this Agreement shall be for a period commencing on the date it is executed by both District and City and ending at 12:00 o'clock p.m. on the last day of June in the year 2035, and thereafter until terminated by either party as of the last day of February of any subsequent year by written notice to the other party mailed prior to September 1st of the previous year. Upon the execution of this Agreement the 1976 Agreement and all amendments thereto shall be of no further force or effect, except that City agrees to pay District any monies owing or to become owing to District under and according to the terms of the 1976 Agreement, if any.

2. Agreement Subject to Other Obligations. This Agreement shall be at all times subject to all of the terms and conditions of the City Bureau Contract, the District Bureau Contract and the Kings River Agreements, and to the extent that any agreement contained herein is contrary to or inconsistent with any term or condition of those contracts or agreements, that contrary provision of this Agreement shall be unenforceable. In the event any such agreement contained herein shall become unenforceable, the entire Agreement may be terminated by the party adversely affected as of the last day of February of the next succeeding year, by written notice served upon the other party on or before the first day of September of the year preceding such termination.

3. Definitions. For the purpose of this Agreement, the following terms shall be defined as follows:

(a) "Agricultural Use" means the use of water primarily in the production of agricultural crops or livestock including but not restricted to domestic use incidental to such agricultural purposes, the watering of livestock, and underground water replenishment conducted by District.

(b) "City's Friant Supply" means all water to which City is entitled under the City Bureau Contract or otherwise as a result of City's status as a long-term repayment contractor for water service from the Friant Division of the Central Valley Project (CVP), including without limitation Class 1 water, Section 215 water, uncontrolled season water, unreleased restoration flows and recirculated water. City's Friant Supply shall not include any water available to District under the District Bureau Contract or as a result of District's status as a long-term repayment contractor in the Friant Division of the CVP, which water is not governed by this Agreement.

(c) "City's Kings River Supply" means the percentage of District's Kings River Supply available to be delivered to City in a Water Year under this Agreement.

(d) "District's Kings River Supply" means the Kings River water District may deliver to its water users under the Kings River Agreements and applicable judicial and regulatory decrees in a Water Year as the result of the calculated natural flow of the Kings River during that Water Year.

(e) "City's Surface Water" means all water available to City in a Water Year by means other than pumping from the underground water supply, including without limitation

City's Kings River Supply and City's Friant Supply and any surface water supply acquired or developed after the date of this Agreement.

(f) "City's Water Service Area" means all lands within the exterior boundaries of City, and also all lands outside such boundaries that are within the exterior boundaries of District, to which City now delivers water or hereafter consents to deliver water by means of the City Water System and that are not hereafter designated or assessed by District as lands receiving or to receive District Water Service.

(g) "City Water System" means the conduits, pipes and other facilities (including without limitation the SWTFs) owned by City and used by City to convey water to lands whether in or outside City.

(h) "District Water Service" means the furnishing of water by District directly to lands within District by means of the District Water System other than pumping conducted by a landowner or water user directly from the underground water supply upon the lands receiving such water.

(i) "District Water System" means the conduits, pipes, canals, pumping stations and other facilities owned and/or used by District to convey water to lands or facilities whether in or outside of District.

(j) "Excluded Areas" means those acres within the City's Water Service Area that are outside of the District's boundaries.

(k) "Included Acres" means those acres within the City's Water Service Area that are within the District's boundaries.

(l) "Municipal, Industrial and Domestic Uses" means the use of water other than for Agricultural Use, and underground water replenishment conducted by City.

(m) "Out of Season Deliveries" means deliveries of City's Surface Water via the District Water System during periods when District is not otherwise delivering irrigation water to its landowners or water users via the portions of the District Water System used to convey City's Surface Water to the points on the District Water System where City will assume physical control of the delivered water.

(n) "Point of Delivery" means, for water delivered to City via the District Water System, the headworks of the Gould Canal and the Fresno Canal as specified in the applicable schedule, for water delivered to City via the Friant-Kern Canal Raw Water Pipeline, the headworks of the Friant-Kern Canal Raw Water Pipeline, for water delivered to City via the South Raw Water Pipeline, the headworks of the Fresno Canal, and such other location(s) as City and District may mutually agree.

(o) "Transfer" means a water sale, transfer or exchange involving any of City's Friant Supply.

(p) "Water Year" means March 1 of one year through the last day of the following February when used in reference to City's Friant Supply and October 1 of one year through September 30 for the following year when used in reference to City's Kings River Supply or District's Kings River Supply.

4. Management of City's Surface Water. To fulfill the purposes of this Agreement, and to facilitate the continuous and year around supply of water to City's Water System and facilities, District shall undertake, and is hereby appointed by City as City's exclusive agent for the management of City's Surface Water pursuant and subject to the terms of this Agreement, including but not limited to subsection 4(f) below. District's management authority and responsibilities shall terminate with respect to any of City's Surface Water upon delivery of that water to City.

(a) The management authority hereby granted to District shall include without limitation the exclusive right to:

i. Direct the storage and release of City's Surface Water;

ii. Schedule, order and provide for the delivery of City's Surface Water to District's points of diversion;

iii. Facilitate the reasonable and beneficial use of City's Surface Water and other water supplies available to City, while also providing for delivery of water to the applicable Point(s) of Delivery as specified in this Agreement;

iv. Pursue and implement Transfers pursuant to this Agreement; and

v. Take all other actions associated with the management and administration of City's Surface Water prior to its delivery to the applicable Point of Delivery in furtherance of the goals provided in subsection 4(f).

(b) District shall not voluntarily take any action that would:

i. Breach City's Bureau Contract or any other agreement governing any of City's Surface Water;

ii. Result in a long-term reduction in amount of City's Surface Water; or

iii. Result in management or use of City Surface Water inconsistent with the goals provided in subsection 4(f) below, unless City provides prior written authorization of such management or use.

(c) Notwithstanding District's management of City's Surface Water, City shall be solely responsible for, and shall timely pay, all charges and other amounts payable in connection with any of City's Surface Water.

(d) Subject to the express rights of City under this Agreement, City shall take no action that interferes with District's management of City's Surface Water as long as District provides the deliveries thereof in accordance with Section 5.

(e) District shall coordinate with City to define and identify uses of City's Surface Water that benefit City's water users and ratepayers. This coordination shall be performed as described in this subsection.

i. As frequently as appropriate and necessary, and at least annually, City and District shall confer to review available water supply information and data, including without limitation: precipitation, snow pack, and runoff conditions; water storage conditions; relevant environmental programs and projects; forecasted Municipal, Industrial and Domestic Uses; surface water delivery priorities for City; forecasted groundwater pumping required to meet City's forecasted Municipal, Industrial and Domestic Uses; and other pertinent information and data related to water supply availability and water demands for the relevant Water Year(s). City and District shall also confer regarding the anticipated availability of City's Friant Supply, if any, for Transfers.

ii. City will be responsible for providing periodic updates to the City Council and City administration. At least annually, City staff shall provide an informational workshop to the City Council, summarizing ongoing water supply conditions, the implementation of this Agreement and fulfillment of the water supply goals as listed in 4(f), as well as any anticipated water supply issues of concern for the relevant Water Year(s). District shall make reasonable efforts to coordinate with City staff to provide any data, information, and materials required for this annual informational workshop to the City Council.

iii. It is understood that during any given Water Year it may be necessary to adjust the water supply planning forecast established pursuant to the above described process as water supply availability and demands change, and additional information and data are obtained, reviewed, and assessed. City and District shall employ reasonable efforts to meet and confer as necessary to keep each party informed to the extent water supply conditions and plans may change through the relevant Water Year. City shall be responsible for providing informational updates to the City administration to the extent there are material changes to the water supply conditions in any given Water Year.

(f) District's management of City's Surface Water shall at all times be in furtherance of one or more of the following water supply goals:

i. Providing continuous year around water supply to City's SWTFs;

ii. Improving the water supply reliability and drought-resiliency for City;

iii. Improving the operation and utilization of City-owned recharge basins;

iv. Implementing conjunctive-use water management strategies to comply with the SGMA that directly benefit City's water users and ratepayers and indirectly benefit groundwater users in the North Kings Subbasin.

(g) Included as a part of the management of City's Surface Water as described above, District shall diligently pursue Transfers of any of City's Friant Supply that City advises District that City will not require during a particular Water Year ("Temporarily Unused Friant Water").

i. Upon identifying a potential Transfer opportunity, and prior to executing the Transfer, District shall notify City of the potential Transfer opportunity, and the water quantity, unit price, delivery dates and terms, and any other material matters associated with the Transfer. This is a notification procedure and not an approval procedure.

ii. All Transfers of Temporarily Unused Friant Water pursued by District shall be in full conformance with City's water supply goals as described in Section 4(f) or otherwise agreed by City and District, and shall be limited to supporting Agricultural Use rather than urban growth or development in other jurisdictions.

iii. City shall not be prohibited from unilaterally pursuing Transfers of Temporarily Unused Friant Water; provided, that any such Transfers shall first be discussed and coordinated with District before they are implemented and shall not be undertaken over District's reasonable objection and the benefits of any such Transfer shall be allocated in accordance with subsections (h), (i) and (j) below.

iv. For avoidance of doubt, District's obligations under this Section 4(g) are limited to making reasonable and diligent efforts to pursue Transfers of Temporarily Unused Friant Water, and City acknowledges that no assurances can be provided by District that such Transfers can be made or arranged.

(h) The benefits resulting from Transfers shall be allocated in accordance with this subsection. For purposes of this Section 4, "benefits" of a Transfer include, without limitation:

i. The difference between all costs incurred in connection with a Transfer and the amount(s) received as a result of the Transfer,

ii. Water returned as a result of a Transfer, and

iii. Water supply storage or conveyance capacities made available as a result of a Transfer.

To the extent benefits include payments, City shall be reimbursed for its actual and reasonable out of pocket expenses incurred for City's Friant Supply involved in the Transfer,

and each of the parties shall next be reimbursed for any actual and reasonable out of pocket expenses incurred in connection with the Transfer. The net revenue associated with a Transfer shall be the revenue remaining after all parties have been reimbursed their actual and reasonable expenses incurred for the Transfer.

(i) To the extent benefits of a Transfer consist of water supplies, water supply storage or conveyance capacities, the allocation of such benefits as between the parties shall be negotiated by the parties before the Transfer is implemented. In the event the parties cannot negotiate such allocation, the Transfer shall not be pursued.

(j) For each Transfer that generates net revenue, City and District agree that the net revenue shall be distributed and used as follows:

i. 25-percent of the net revenue shall be deposited with City's water enterprise fund;

ii. 25-percent of the net revenue shall be deposited with District for the inspection, operations, maintenance and repair of the District's Conveyance System, which City acknowledges provides a benefit to City ratepayers;

iii. 50-percent off the net revenue shall be deposited into a Water Supply Development Fund to be used to finance water supply development programs and projects that mutually-benefit City and District.

The Water Supply Development Fund shall be a restricted-use fund to be used exclusively for water supply programs and projects that improve water supply availability, reliability and drought resiliency for both District and City. Programs and projects that may be financed from the Water Supply Development Fund include, but are not limited to, water supply purchases, transfers, and exchanges; groundwater storage; and groundwater recharge. Expenditures for water supply purchases, transfers, and exchanges may include any carryover charges and conveyance charges that may be assessed by the State of California, the United States, or other agency, to store, transport and deliver surface water, for the mutual benefit of City and District, using state or federal storage and conveyance facilities.

The Water Supply Development Fund may receive contributions from City, District, and other public agencies approved by both City and District. The Water Supply Development Fund may not receive contributions from private persons, companies, businesses, or organizations.

Prior to encumbering funds from the Water Supply Development Fund, District and City shall mutually agree in writing on the recommended expenditure and the amount to be financed with the Water Supply Development Fund.

District shall serve as the fiscal agent for the Water Supply Development Fund and implement generally accepted public agency or governmental accounting practices in managing the fund assets. District shall subject the fund to an annual audit by independent auditors during the course of District's annual audit of its financial statements. The audit shall

be conducted in accordance with the generally accepted auditing standards by the independent certified public accountant auditing District's financial statements. Upon presentation of District's comprehensive audit report to the District Board of Directors, District shall provide City with a copy of District's audit report. At any time during the term of this Agreement, City may, at its own cost, request to review and audit the financial and accounting records associated with the Water Supply Development Fund. District shall have 30 working days to submit the requested records to City for review and audit.

In the event this Agreement terminates and uncommitted amounts remain in the Water Supply Development Fund, one half of all such amounts shall be promptly distributed free of any restrictions to each of the parties.

(k) By the 25th day of each month, District shall provide City with a written summary of District's utilization of City's Friant Supply for the previous month in substantially the form attached hereto as **Exhibit A**. The written summary will identify water volumes delivered to recharge basins, surface water treatment facilities, other Points of Delivery designated by City, and Transfers. The written summary may be delivered to City by email, facsimile or U.S. mail. For Transfers, the monthly report shall include information regarding the parties involved in the Transfer, the water quantity, unit price, delivery dates and terms, and any other material matters associated with the Transfer.

5. Water Made Available to City.

(a) Subject to all other provisions of this Agreement, District shall deliver to City during each applicable Water Year, for distribution and use by City within City's Water Service Area, each day of each year on a continuous basis in accordance with Section 8 of this Agreement, the City's Surface Water available during relevant Water Year(s) that can be diverted by District at the headworks of the Gould Canal, the Fresno Canal or the Friant-Kern Canal Raw Water Pipeline. City acknowledges that the water delivered may not be City's Surface Water, but rather other water controlled by District in the District Water System of similar quality and equal quantity, including without limitation water recovered from water banks, other water for which City's Surface Water is exchanged, and/or water purchased by District for delivery to City at District's cost, and that references in this Agreement to deliveries of City's Surface Water shall include deliveries thereof of a substitute supply by means of one or more exchanges, transfers, purchases or combinations thereof. At all times, District shall have the right to exchange and to convey for City in place thereof other water of similar quality and equal quantity (except sewer effluent or industrial wastes) available to District.

(b) City's Surface Water shall be deemed delivered to City when it reaches the Point of Delivery specified in the applicable schedule provided and approved under Section 8 of this Agreement, provided that for deliveries made via the District Water System, District shall thereafter convey such water to the points on the District Water System where City will assume physical control of the delivered water.

(c) The parties acknowledge that there may be times when the City Water System is undergoing routine or emergency repairs and maintenance, or subject to other conditions, that preclude City from accepting deliveries under this Agreement. Similarly, the parties

acknowledge that there may be times when the District Water System is undergoing routine or emergency repairs and maintenance, or subject to other conditions, that preclude District from delivering water to City under this Agreement. The parties shall cooperate with the other to minimize the impacts of such events, but neither shall be in breach of this Agreement as a result thereof.

(d) Water delivered to City under this Agreement shall be used by City within City's Water Service Area only for Municipal, Industrial and Domestic Uses, Agricultural Uses incidental thereto, and within the boundaries of District for recharge of the underground water supply by percolation.

City shall not sell, transfer, deliver or exchange any surface water or groundwater to or with any other person or entity without written consent of District first had and obtained.

However, this provision shall not prevent City from entering into separate agreements with any other entity which may have a similar agreement with District for the distribution and use of water received from District under such agreements, provided such separate agreements are entered into with the written consent of District first had and obtained and are subject to all the terms and conditions of this Agreement and District's agreements with such other entities.

(e) District has entered into this Agreement with the understanding that it is, and will continue to be, City's policy to (i) require urban growth to occur sequentially in designated growth areas around City, (ii) promote infill development with City's existing boundaries and (iii) facilitate the successful implementation of SGMA within the groundwater basin shared by City and District by conditioning land use and annexation decisions on the existence of an available water supply to support new development in annexed areas. Consistent with that understanding, for the term of this Agreement, as a condition of the provision of City water service, City shall require the proponent of any proposed development project located outside of City's Water Service Area boundary as of the date of this Agreement to:

i. Define the peak water demands, plus fire protection demands, required to meet the total water supply demands of the entire project at build-out conditions;

ii. Obtain a perpetual surface water supply allocation, right, entitlement or similar from District, or other surface water supply agency, to meet the peak water demands, plus fire protection demands, at build out conditions; and

iii. Dedicate, transfer or assign the perpetual surface water supply allocation, right, entitlement or similar to City.

Once the perpetual water supply has been dedicated, transferred, or assigned to City, the water supply shall be incorporated into City's Surface Water managed by District for City under this Agreement.

In addition, to improve, restore, and maintain the availability, reliability, and drought resiliency of the groundwater and surface water resources in the North Kings Subbasin,

City and District shall jointly advocate that all public water supply systems in the North Kings Subbasin should require the proponents of new development projects to obtain perpetual surface water supply rights, allocations, entitlements, and similar, in sufficient quantity, to meet the all demands at full build out.

(f) In furtherance of the parties' goals under this Agreement, City shall utilize City's Friant Supply to provide water to the City's SWTF served by the South Raw Water Pipeline (as defined below) for the purpose of serving the Excluded Area.

6. Raw Water Pipelines. As soon as reasonably practicable, City shall construct, at its sole cost and expense, two raw water pipelines to serve City's SWTFs (the "Raw Water Pipelines"). One Raw Water Pipeline shall be a direct connection from the Friant-Kern Canal to City's SWTF located at Mile Point 7.58 (the "Friant-Kern Canal Raw Water Pipeline"). The other Raw Water Pipeline shall be a direct connection from the Fresno Canal downstream of the headworks for such canal to City's SWTF located at Trimmer Spring Road (the "South Raw Water Pipeline"). City's T3 SWTF shall continue to be served by the Enterprise and Jefferson Canals that are a part of the District Water System. Once operational, the Raw Water Pipelines shall be used to convey portions of City's Surface Water directly to the SWTFs, and all costs of the operation, maintenance, repair and replacement of the Raw Water Pipelines shall be borne by City; provided, that District shall be entitled to utilize for its own purposes any capacity in the Raw Water Pipelines not required to deliver City's Surface Water, and District shall reimburse City upon demand for any operational costs incurred as a result of District's use of the Raw Water Pipelines. Any third-party property damages resulting from City's efforts and activities related to the operation, maintenance, repair, and replacement of the Raw Water Pipelines shall be received and processed by City in accordance with City's Risk Management policies and procedures.

7. City's Friant Supply. While this Agreement is in effect, City (i) shall not convey any interest in the City Bureau Contract to any party other than District, (ii) shall at all times maintain the City Bureau Contract in effect and (ii) shall not voluntarily decrease the quantity of City's Friant Supply to be made available to City thereunder without the written consent of District. City will use every effort to obtain its maximum entitlement to City's Friant Supply annually as it may become available, and will seek to maximize any other surface water opportunities that may be available to City via the Friant Division of the Central Valley Project. Nothing in this Agreement conveys any ownership interest in the City Bureau Contract to District, which shall at all times remain the sole property of City, nor does this Agreement convey any interest in the District Bureau Contract to City, which shall at all times remain the sole property of District.

8. Schedules of Delivery and Conveyance of Water.

(a) District shall deliver City's Surface Water to City in accordance with schedules provided from time to time by City for approval by District, which approval shall not be unreasonably withheld, delayed or conditioned. Such schedules shall set forth the amounts of water desired by City, the desired timing of deliveries, the facilities by which such water is to be delivered, and the point(s) on the District Water System where City will assume physical control of the delivered water. Deliveries of water by District will take into consideration all relevant

factors, including without limitation (i) the capacity and condition the applicable portions of the District Water System, (ii) City's Bureau Contract, (iii) the District Bureau Contract, (iv) the Kings River Agreements, (v) actual and anticipated water supply conditions, (vi) the requirements of other contracts between the District and third parties (including without limitation the City of Clovis and Fresno County Waterworks District No. 19) and (vii) all other factors pertaining to the distribution, apportionment and use of water available to District.

(b) All schedules submitted by City during each Water Year shall provide for the delivery during that Water Year of all of City's Surface Water that becomes available to City during that Water Year. Notwithstanding the foregoing, City may schedule up to 10,000 acre feet of City's Surface Water that becomes available to City during one Water Year for delivery in the succeeding Water Year ("Rescheduled Water"). City shall timely pay in full all costs imposed by third parties, including without limitation the United States Bureau of Reclamation, as the result of any Rescheduled Water requests or deliveries.

9. Conveyance Losses. City shall bear all losses incurred in the District Water System downstream of the applicable Point of Delivery; provided, that no such losses shall be assessed against City when District is delivering irrigation water to its landowners or water users via the portions of the District Water System used to convey City's Surface Water to the points on the District Water System where City will assume physical control of the delivered water. Conveyance losses chargeable to City shall be computed by multiplying the losses in that portion of any canal used for conveyance of City's Surface Water during the period such water is being so conveyed by the total amount of water being conveyed for City in that canal during such time, divided by the total amount of water flowing in that portion of that canal during the same period.

10. Use by District of Water Not Used by City.

(a) Except for Rescheduled Water, in the event City is unable to use or does not use any of City's Kings River Supply in any Water Year, City shall lose the right to receive such water, and District shall have the right to take and use such water for Agricultural Use in such manner as it may determine.

(b) Except for Rescheduled Water, in the event City is unable to use or does not use any part of City's Friant Supply and District reasonably concludes that it cannot effect a Transfer for all of such unused water as Temporarily Unused Friant Water as described in Section 4(g), City shall nevertheless take and pay for such unused water and District shall have the right to use such water for Agricultural Use, but City may require District to so use such water at such locations as City may direct; provided, however, in the event City does not direct the location at which said water shall be used in time that it may be so used or in the event the District Water System will not permit the conveyance of such water to such location when so directed, or if for any other reason the conveyance of such water to such location at that time is not feasible or practicable, District shall have the right to use such water upon the same conditions as are provided in Section 10(a). Such use of any such water by District shall not relieve City from any payments required to be made by it under the City Bureau Contract or under the terms of this Agreement and its use by District shall not require any payment from District to City.

(c) Except for Rescheduled Water, in the event City is unable to use or does not use any of City's Surface Water that is neither City's Kings River Supply or City's Friant Supply in any Water Year, City shall lose the right to receive such water, and District shall have the right to take and use such water for Agricultural Use in such manner as it may determine. In such event, insofar as the District Water System will permit, and insofar as otherwise may be practicable and equitable as to other landowners, District will use such water for irrigation or percolation in areas in City or east or northeast of City, and will discuss its use with City before it is used elsewhere. However, the ultimate decision concerning such use of such water shall be within the discretion of District.

11. Water Rights Not Transferred. As was the case under the 1976 Agreement, City acknowledges that its rights to City's Kings River Supply under this Agreement are contractual rights and not water rights. Nothing in this Agreement authorizes or shall be construed or deemed to constitute the sale or transfer of a water right from either party to the other and nothing in this Agreement shall constitute the dedication by either party of water or storage to a public use. No right in any water, storage right or water right owned by District or City shall be acquired or lost by virtue of this Agreement or the actions contemplated hereby. At no time shall City make any claim, assert any right or otherwise seek, confirm or perfect in any forum any legal or beneficial interest, right or title to any of District's water supply or storage rights except as expressly set forth herein.

12. City's Sewage Effluent. City shall retain its sewage effluent and recycled water within the boundaries of District for the term of this Agreement, except with the written consent of District first had and obtained. It is the intent of City and District to develop and execute a new agreement addressing such effluent and recycled water use, and this Agreement is to be interpreted so as to be consistent with such new agreement if and when it is executed by the parties.

13. Acreages and City's Kings River Supply.

(a) City's Water Service Area consists of Included Acres and Excluded Acres, and on an annual basis City and District shall prepare a map showing the total number of acres in each area as of the first day of March of each year. When so approved, said map shall be incorporated herein by reference as **Exhibit B** and shall become a part hereof. Said map shall be amended and reapproved by both parties as of the first day of March each year and added to this Agreement as an updated **Exhibit B**. However, City shall keep the District currently advised during the year of any new lands outside of City's Water Service Area to which it commences or consents to deliver water, and District shall keep City so advised as to any new lands designated or assessed by it as lands receiving or to receive District Water Service. When so amended and reapproved as of the first day of March of each year, said map shall conclusively establish the boundaries of and the acreage in each area for all purposes of this Agreement.

(b) City's Kings River Supply shall be the herein-contracted for percentage of District's Kings River Water Supply. Such percentage shall be based on the ratio of Included Acres within City's Water Service Area to the total acres within District's boundaries. In computing the acreage within the Included Acres, the entire acreage shall be measured including properties that may be exempt from assessment for taxation and including adjacent streets,

alleys, roads, highways and other public ways to the center lines thereof. As of the execution of Agreement, and based on the land area sizes defined above, City's Kings River Supply is 25.54 percent of the District's Kings River Supply.

(c) Notwithstanding any other provision of this Agreement, and notwithstanding increases in the Included Acres, City's Kings River Supply shall be limited to 29.00 percent of District's Kings River Supply. At such time when the ratio of Included Acres within City's Water Service Area to the total acres within District equals 29.00 percent, City's Kings River Supply shall remain fixed at 29.00 percent. City and District mutually agree that the increase percentages reflected in this Section 13 include allowances for moderate growth in Growth Area 1 of City's Sphere of Influence as shown in **Exhibit C** (as depicted as Figure IM-2 of the Fresno General Plan).

(d) To improve, restore, and maintain the availability, reliability, and drought resiliency of the groundwater and surface water resources in the North Kings Subbasin, District shall support, and to the extent it has the legal authority to do so shall require, the establishment of water supply limits on all municipal water systems in the North Kings Subbasin.

District acknowledges that it may enter into surface water utilization and conveyance agreements similar to this one with other municipalities in the Kings Subbasin that provide for the delivery of portions of District's Kings River Supply. Subject to the following paragraph of this Agreement, all such agreements entered into after the date of this Agreement shall provide that the percentage of District's Kings River Supply made available to the municipality entering into such agreement shall be determined in a manner similar and comparable to that applied to City in this Agreement.

Should the District enter into such a water utilization and conveyance agreement with another municipality in the Kings River Subbasin after the date of this Agreement that makes available a percentage of District's Kings River Supply to such municipality determined in a manner that is not similar and comparable to that applied to City in this Agreement, at City's request the parties shall negotiate in good faith an adjustment in City's Kings River Supply to apply the same methodology used, and provide the same percentage increase, as granted to the other municipality; provided, that to the extent such other municipality provides additional consideration to District for such different methodology, City shall provide comparable consideration if it requests that such different methodology be used for this Agreement. Any disputes arising as a result of such negotiation shall be resolved pursuant to Section 19.

14. Payment by City to District. In consideration of the water supplies and services provided by District to City under this Agreement, City shall pay to District each Water Year in which this Agreement is effective the following:

(a) The sum calculated by multiplying the number of Included Acres by the per acre assessment imposed as of March 1 of that Water Year on lands in District receiving District Water Service, plus the sum calculated by multiplying the number of Excluded Acres by the per acre assessment imposed as of March 1 of that Water Year on lands in District not receiving District Water Service. Amounts payable to District pursuant to this Section 14(a) shall be paid by City 60% on or before the 20th day of December preceding the Water Year for which such

amounts are due, and the remaining 40% shall be paid on or before the 20th day of June of the following Water Year. City and District acknowledge that during the term of this Agreement, District may convert its rate structure to include a volumetric charge. Concurrently with such a rate structure modification, the parties shall negotiate modifications to this Section 14 so that charges imposed on City under the revised District rate structure are equitable and comparable in proportion and magnitude to the charges imposed on other District customers receiving water for Agricultural Use. Without limiting the foregoing, any volumetric charges imposed on City shall be determined in the same manner as volumetric charges imposed on other District customers receiving water for Agricultural Use.

(b) An out of season water delivery fee determined in accordance with the procedure described in the attached **Exhibit D** for each acre foot of water delivered to City under this Agreement as an Out of Season Delivery (the "Water Delivery Fee"). The Water Delivery Fee shall be payable within 30 days after District delivers City an invoice for such fee indicating the amount of water delivered during the invoice period and the total Water Delivery Fee due. City acknowledges that such fee is in part to compensate District for additional costs and risks incurred for operating its system to make Out of Season Deliveries. No such fee shall be due for water deliveries to City under this Agreement that are not Out of Season Deliveries.

(c) A rescheduling fee for each acre foot of Rescheduled Water determined in accordance with the procedure described in the attached **Exhibit E** (the "Rescheduling Fee"). The Rescheduling Fee shall be payable annually after March 1 of each Water Year within 30 days after District delivers City an invoice for such fee indicating the amount of Rescheduled Water for the applicable Water Year and the total Rescheduling Fee due. City acknowledges that the Rescheduling Fee is necessary to compensate District for additional costs and risks incurred to reschedule water for City from one Water Year to the succeeding Water Year. The Rescheduled Water Fee shall not be applied to any of City's Friant Supply carried over in Millerton Lake, as the Bureau has established a separate fee schedule for City to reschedule City's Friant Water Supply from one Water Year to the succeeding Water Year.

(d) While this Agreement is in effect, District shall not impose District assessments or other charges on landowners within City's Water Service Area or adopt special "municipal and industrial" assessments, rates or charges that would be imposed on or as a result of water deliveries to City under this Agreement. Only the amounts described in this Agreement shall be imposed on any party as a result of deliveries of City's Surface Water by District to City.

(e) Time shall be of the essence for the making of the payments described in this Section 14. If any such payment is not made on the date provided, City shall pay to District in addition to said payment costs, penalties and interest equal to those provided by law to be paid by landowners within District for the late payment of assessments. Such costs, penalties and interest are in addition to any other remedy which District may have against City because of City's failure to pay said payment as above provided.

(f) City acknowledges and agrees that the amounts payable by City pursuant to this Section 14 will vary from year to year and may increase over time. City further acknowledges that, while some of such amounts will be determined with reference to District assessments on its landowners, no amounts payable by City under this Agreement are assessments on City's

landowners. City further agrees that, as they relate to City, such amounts will be imposed as a matter of contract and are not assessments, fees or charges to which Article XIIID of the California Constitution applies. City shall be permitted to participate in public hearings and meetings held in connection with rate-setting, but City shall not assert that Article XIIID of the California Constitution applies to payments required under this Agreement. If City makes such an assertion, this Agreement may be terminated by District in its entirety as of the last day of February of the next succeeding year by written notice served upon City. City shall be responsible to set its rates to its utility users in accordance with applicable law, and shall indemnify and defend District against any claims or legal actions commenced by City's water users or ratepayers to challenge the amounts payable by or to City.

15. Re-negotiations. City and District acknowledge that changed circumstances in the future may:

i. Result in material changes in the size of City's Water Service Area, the number of Excluded Acres and/or the number of Included Acres, and/or

ii. Render the amount of City's Kings River Supply as an increasing percentage of District's Kings River Water Supply inequitable.

Such changed circumstances could result from, among other causes:

i. Annexations or detachments from City and/or District;

ii. Updates in City's Urban Water Management Plan or the Fresno General Plan;

iii. Significant regional economic development projects that require the extension of the City Water System outside of City's Water Service Area. Significant regional economic development projects shall be those that qualify for federal, state, county, or local economic development incentives; or

iv. New legal, regulatory, or environmental requirements placed on water supply agencies by a state or federal government agency.

Should either party to this Agreement determine after January 1, 2036 that such changed circumstances have arisen, it may notify the other of such determination and request that the parties meet to discuss mutually acceptable changes in the number of Excluded Acres, the number of Included Acres and/or the percentage used to determine City's Kings River Supply. Neither party shall be required to engage in such discussions prior to January 1, 2036.

The parties shall thereupon meet in good faith in an attempt to reach agreement on such changes; provided, that if no such agreement is reached within 180 days of the initial meeting, neither party shall be obligated to continue such meetings.

The number of Excluded Acres, the number of Included Acres and City's Kings River Supply shall remain unchanged pending agreement on the changes, and therein documented by a written amendment to this Agreement and executed by both parties.

16. Protection of District Facilities. City shall not permit the development of any parcel of land or the use of any public utility or other easements affecting land within its boundaries if any of the District Water System is located on, under or adjacent to such parcel until City, the landowner and/or the developer enters into an agreement acceptable to District for the repair, rehabilitation, relocation, replacement, reconfiguration or pipelining of the facilities on the parcel, and on any adjacent parcels, all as District determines is necessary or appropriate in order to (i) avoid disruption of District operations or maintenance activities as a result of the development, (ii) make District facilities suitable for operation within a developed area, or (iii) address public safety concerns.

17. No Warranty of Quality. City recognizes that City's Surface Water will be "raw," non-potable and untreated, and that the amount of water included in City's Surface Water will vary from year to year due to a variety of factors beyond the control of District. City further recognizes that wastewater (both treated and untreated) and drainage water are sometimes discharged into the District's canals, and that such discharges from a number or sources will occur and/or continue during the term of this Agreement. Accordingly, except as expressly set forth in this Agreement, District makes no representations or warranties regarding the quality of the water or the amount of water to be delivered to City each Water Year. City recognizes that the treatment of City's Surface Water to make it potable shall be the sole responsibility of City, and City shall assume all risk and responsibility therefor. The character or quality of the water furnished or conveyed hereunder may vary from time to time for reasons including, but not restricted to, the application by District of chemicals to control aquatic and ditch bank weeds, and the open canals of District are always subject to possible pollution from outside sources. District does not guarantee in any respect or assume any responsibility for the chemical, bacterial or other quality of the water made available to City through the District Water System.

18. Indemnity. City and District each agree to indemnify the other and save the other free and harmless of and from any and all liability, damage, loss, cost or expense, incurred or suffered by the other, by reason of damage to the property of the other or injury to any other person or property arising out of its own conduct, acts, omissions or faults, in connection with any matter related to this contract.

19. Dispute Resolution.

(a) District and City staff shall exercise every effort to resolve disputes through the development of a consensus.

(b) To the extent District and City staff cannot promptly resolve an issue in dispute; the parties shall promptly convene a meeting of senior party representatives to attempt to resolve the dispute. Either party may request a dispute resolution meeting pursuant to this section by providing written notice to the other party, including a summary of the issue in dispute. District representatives shall be its Board chair or president and another Board member. City representatives shall be the Mayor and City Council President. These senior party representatives shall make reasonable efforts to meet as frequently and as promptly as possible to negotiate the terms and conditions of a resolution. If these party representatives are unable to resolve the dispute through this informal process within a reasonable period, either party may pursue any remedy it may have under law or equity.

(c) The dispute resolution process described above shall be limited to material disputes regarding matters related to Transfers, expenditures from the Water Supply Development Fund, changes in City's Kings River Supply, revisions of this Agreement pursuant to Section 13(d), City's Friant Supply, changes proposed for **Exhibits B or C**, calculation procedures for fees for Out Of Season Deliveries and Rescheduling Fees, and similar matters.

(d) In cases where a dispute arises between the parties that, if unresolved, may result in imminent danger to the public, health, safety or welfare, the parties shall not be obligated to engage in dispute resolution pursuant to this Section 19.

20. Defense of Agreement. In the event of litigation this Agreement, the parties shall cooperate to provide a joint defense of the litigation. Each party shall bear its own costs of such litigation, including attorneys' fees and expert witness fees.

21. No New Agency. This Agreement is not intended to create a new joint powers authority or other entity. Each party shall conduct itself under this Agreement in good faith, using its diligent best efforts to comply with this Agreement and to achieve the objectives of the parties set forth herein. Each party shall make its personnel and resources reasonably available as required to achieve the purposes of this Agreement.

22. Approvals. Except as expressly provided in this Agreement, compliance with all legal/regulatory requirements and governmental or other third party restrictions on the use or delivery of City's Surface Water to it City water users shall be the responsibility of City. District shall be excused from delivering any water supply under this Agreement if, by so doing, District would become subject to additional legal requirements or third party restrictions imposed on deliveries of water to City's water users.

23. Entire Agreement. This Agreement and each of the exhibits referred to herein, which are incorporated by this reference, constitute the entire agreement between the parties pertaining to the subject matter hereof and supersede all prior and contemporaneous agreements and/or obligations concerning these obligations which are merged into this Agreement. Each party has made its own independent investigation of the matters settled and is not relying upon any representation not specified herein.

24. Applicable Law. This Agreement shall be construed under and shall be governed by the laws of the State of California. Any action to interpret or enforce any aspect of this Agreement shall be brought in the California Superior Court of Fresno County, California. City and District hereby expressly waive any right to remove any action to a county other than Fresno County as permitted pursuant to California Code of Civil Procedure Section 394.

25. Construction of Agreement. This Agreement is the product of negotiation and preparation by and among each party hereto and its attorneys, and the parties agree that this Agreement shall not be deemed to have been prepared or drafted by any one party. Accordingly, the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

26. Modification of Agreement. No supplement, modification, waiver, or amendment with respect to this Agreement shall be binding unless executed in writing by the party against whom enforcement of such supplement, modification, waiver or amendment is sought.

27. Counterparts. This Agreement may be signed in any number of counterparts by the parties, each of which shall be deemed to be an original, and all of which together shall be deemed one and the same instrument. Facsimile or other electronic signatures shall be binding.

28. Further Acts. The parties shall reasonably cooperate with each and take such further actions as may be necessary, including the execution of all necessary further documents, to carry out the purpose and intent of this Agreement. Each of the parties shall diligently and in good faith proceed to negotiate such other agreements as may be necessary to implement this Agreement.

29. Binding Effect. This Agreement shall be of binding legal effect only when it has been executed by all of the parties. No rights or duties under this Agreement may be assigned or delegated by a party without the express written consent of the other party, which may be withheld in the sole and absolute discretion of such other party. Subject to the foregoing, this Agreement shall be binding upon and inure to the benefit of the successors and assigns of the parties.

30. Notice to Parties. Any notice or other communication given under the terms of this Agreement shall be in writing and shall be given personally, by facsimile or by certified mail, postage prepaid and return receipt requested. Any notice shall be delivered or addressed to the parties at the addresses or facsimile numbers set forth below or at such other address or facsimile numbers as shall be designated by notice in writing in accordance with the terms of this Agreement. The date of receipt of the notice shall be the date of actual personal service or facsimile transmission with written confirmation of successful transmission, or three days after the postmark on certified mail. All notices required under or regarding this Agreement shall be made in writing addressed as follows:

Fresno Irrigation District 2907 S Maple Avenue Fresno, CA 93725 Attn: General Manager Facsimile No.: 559-233-8227	City of Fresno 2600 Fresno Street Fresno, CA, 93721 Attn: Director of Public Utilities Facsimile No.: 559-498-1304

31. Attorneys' Fees. In the event of any action or arbitration between the parties seeking enforcement or interpretation of any of the terms and conditions of this Agreement, the prevailing party in such action shall be awarded, in addition to damages, injunctive or other relief, its reasonable costs and expenses, including, but not limited to, taxable costs and reasonable attorneys' fees.

32. Cumulative Rights; Waiver. No failure by any party to exercise, and no delay in exercising any rights, shall be construed or deemed to be a waiver thereof, nor shall any single or partial exercise by any party preclude any other or future exercise thereof or the exercise of any other right. Any waiver of any provision or of any breach of any provision of this Agreement

must be in writing, and any waiver by a party of any breach of any provision of this Agreement shall not operate as or be construed to be a waiver of any other breach of that provision or of any breach of any other provision of this Agreement.

33. Severability. Subject to the parties' rights under Section 2 of this Agreement, if any provision of this Agreement is determined by a court of competent jurisdiction to be invalid, illegal or unenforceable, such provision shall be automatically reformed so as to be valid, legal and enforceable to the maximum extent permitted and the balance of this Agreement shall remain in full force and effect notwithstanding such invalidity, illegality or unenforceability.

34. No Third Party Beneficiaries. This Agreement does not create, and shall not be construed to create, any rights enforceable by any person, partnership, corporation, joint venture, limited liability company, district or other form of organization or association of any kind that is not a party. Without limiting the generality of the foregoing, landowners, residents, water users and ratepayers of the parties are not intended to be third party beneficiaries of this Agreement.

35. Force Majeure. Notwithstanding any other provision of this Agreement, neither party shall be liable for any failure to perform resulting from any cause outside the reasonable control of that party. For purposes of this Agreement, routine and emergency repairs and maintenance of the District Water System shall be deemed causes outside of the reasonable control of District (including without limitation the annual shut down of the Enterprise Canal for maintenance), provided that District shall use reasonable efforts to schedule routine maintenance so as to avoid interference with deliveries of City's Surface Water.

//

IN WITNESS WHEREOF, the parties have executed this Agreement to be effective as of the date first above written.

"District"

The Fresno Irrigation District, a California irrigation district

By _____
Ryan Jacobsen, President

By _____
Gary R. Serrato, General Manager

ATTEST:

_____
Secretary

"City"

The City of Fresno, a municipal corporation

By: _____
Ashley Swearengin, Mayor

By _____
Bruce Rudd, City Manager

ATTEST:
Yvonne Spence, CMC
City Clerk

By: _____ 1/11/17
Deputy

APPROVED AS TO FORM:
City Attorney, Douglas Sloan

By: _____ 12/22/16
AMANDA FREEMAN, DEPUTY

ATTACHMENTS:

EXHIBITS

Exhibit A – Monthly Water Supply Utilization Report
Exhibit B – City Water Service Area Map
Exhibit C – Fresno General Plan Map
Exhibit D – Out of Season Delivery Cost Methodology
Exhibit E – Rescheduled Water Cost Methodology

EXHIBIT A

EXHIBIT A

CITY OF FRESNO FMFCD BASINS
MONTHLY REPORT (AC.FT.)
2015-2016

FMFCD BASINS IN FRESNO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Basin A													
Basin AB													
Basin AC													
Basin AD													
Basin AE													
Basin AF													
Basin AG													
Basin AH													
Basin AJ													
Basin AL													
Basin AO													
Basin AW2													
Basin AZ													
Basin BE													
Basin BF													
Basin BH													
Basin BM													
Basin BO													
Basin BQ													
Basin BU													
Basin BV													
Basin BW													
Basin BZ													
Basin CC													
Basin CL													
Basin CM													
Basin CN													
Basin CO2													
Basin CS													
Basin CW													
Basin CX													
Basin CY													
Basin CZ													
Basin DD													
Basin DH													
Basin EE													
Basin EF													
Basin EG													

CITY OF FRESNO FMFCD BASINS
MONTHLY REPORT (AC.FT.)
2015-2016

FMFCD BASINS IN FRESNO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Basin EL													
Basin EM													
Basin FF													
Basin GG													
Basin HH													
Basin II1													
Basin II2													
Basin J													
Basin JJ													
Basin K													
Basin KK													
Basin L													
Basin LL													
Basin MM													
Basin N													
Basin O													
Basin OO													
Basin P													
Basin R													
Basin RR1													
Basin RR2													
Basin RR3													
Basin S													
Basin T													
Basin TT													
Basin U													
Basin UU2													
Basin UU3													
Basin Y													
Basin Z													
Basin ZZ													
Fresno's FMFCD Total													

CITY OF FRESNO RECHARGE
MONTHLY REPORT (AC.FT.)
2015-2016

OTHER FRESNO RECHARGE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Leaky Acres													
Woodward Park													
Copper River Country Club													
Big Dry Detention													
Fancher Basin (South)													
Chestnut Ave. Basin													
North Central Basin													
Kearney Basin													
Big Dry Creek West of Winery Ave.													
Delivery System Recharge Fresno													
Copper River Country Club total is the amount exceeding the Phillips Ditch entitlement of 77 ac ft per month (during FID's irrigation season).													
Basin BF Water comes from Chestnut Ave. Basin													
Fresno's Total Recharge													
Fresno's SWTP N/E & T-3													
Fresno's Total Usage													

EXHIBIT B

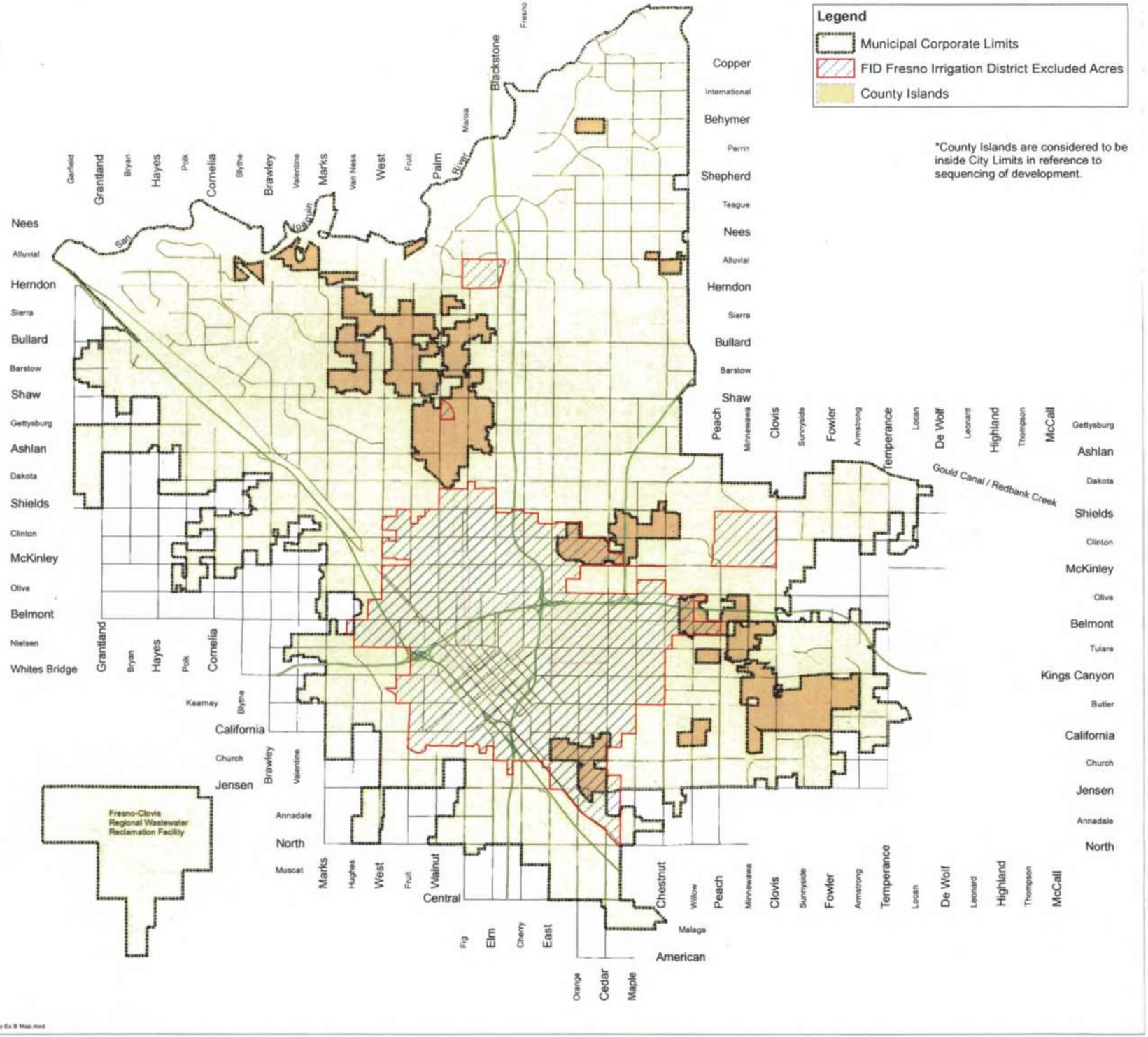
City of Fresno
Water Service Area Boundary
Exhibit "B"
December 13, 2016

"The City's Water Service Area consists of Included Acres and Excluded Acres, and on an annual basis City and District shall revised this Exhibit B map to show the total number of acres in each area as of the first day of March of each year."



Miles

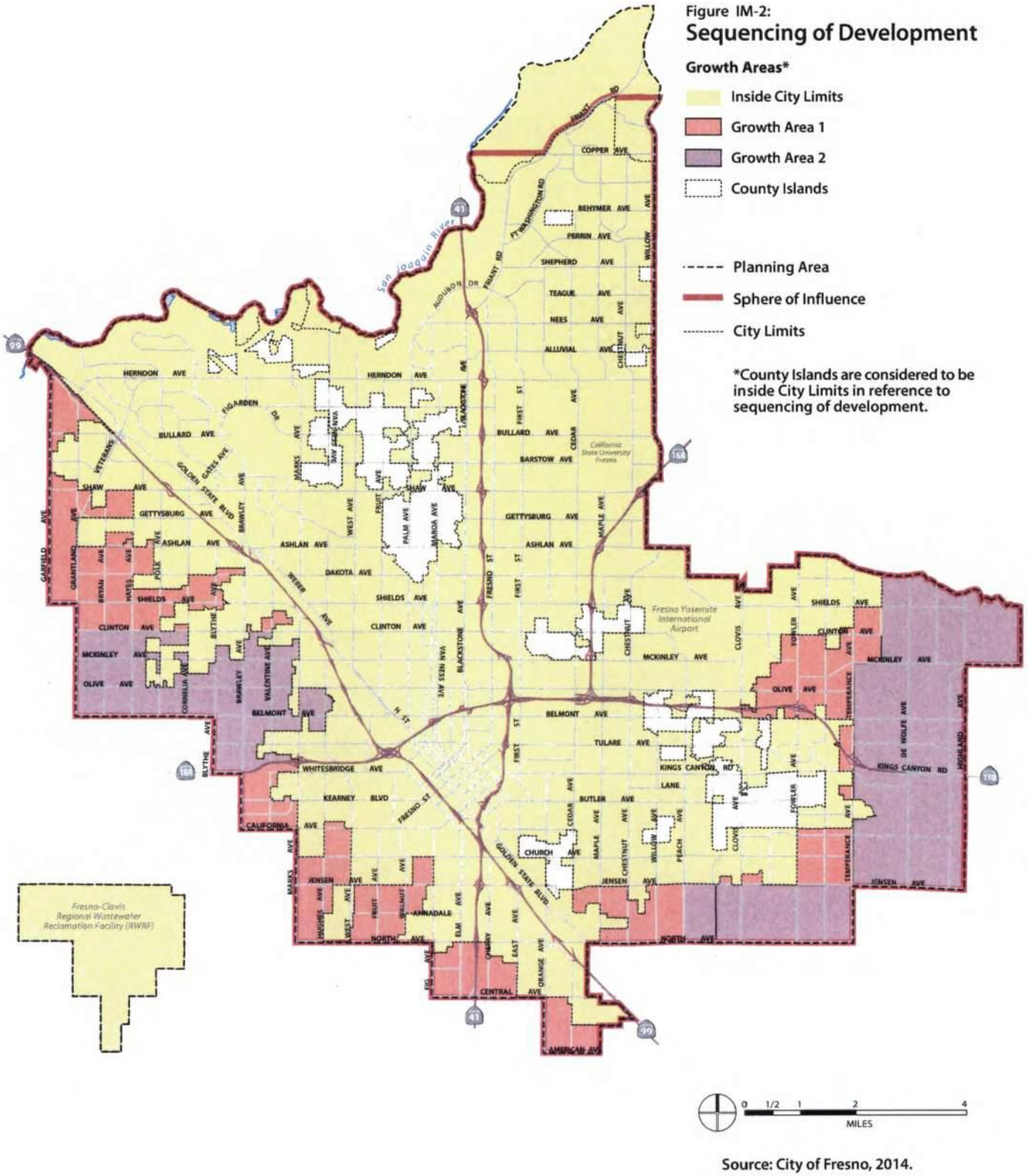
0 0.5 1 2 3



S:\USERS\PET\2016\Thomas Esqueda\Water Service Areas Map\Water Service Area Boundary Ex B Map.mxd

EXHIBIT C

EXHIBIT C



Source: City of Fresno, 2014.

EXHIBIT D

EXHIBIT D

The City will be responsible for paying the District for all costs associated with delivering water Out of Season Deliveries which will include but not limited to:

i. Staff time to deliver water (includes salary wage, labor burden and overhead.
ii. Cost to operate vehicles to operate and inspect the canal system.
iii. Power costs associated with running District's SCADA/Telemetry system, automated gate valves, flow meters, automated trash screens, etc.
iv. Repairs to the canals system which are caused by water running outside the normal irrigation season. Repairs may include but not limited to canal lining, gate replacement, structure replacement, earthwork (grading, dredging, etc.) weed treatment (aquatic or terrestrial), all-weather road maintenance, trash/debris removal, etc.

EXHIBIT E

EXHIBIT E

The Rescheduling Fee for each rescheduling request here under shall be equal to the last Friant carry over charge assessed for a water year prior to the date to the request.

47087

RECORDED IN OFFICIAL RECORDS OF FRESNO COUNTY, CALIFORNIA
AT 41 MIN. PAST 3 P.M.
JUN 24 1974
H. L. MASINI, County Recorder
FEE $

BOOK 6316 PAGE 31

AGREEMENT BETWEEN FRESNO IRRIGATION DISTRICT AND CITY OF FRESNO FOR EXCHANGE OF RECYCLED WATER

This agreement entered into this 20th day of June 1974, by and between FRESNO IRRIGATION DISTRICT, a public corporation (herein called "District"), and the CITY OF FRESNO, a municipal corporation (herein called "City");

WITNESSETH:

WHEREAS, Fresno Irrigation District is the owner of water rights on the Kings River and a water distribution system for the distribution of irrigation waters for agricultural use within the District and has entered into contracts with the United States for an additional supply of water from the Friant-Kern Canal and for storage in Pine Flat Reservoir on the Kings River for the purpose of supplementing the water available for such use within the District; and

WHEREAS, the City of Fresno is located entirely within the exterior boundaries of the District and is the owner of a water distribution system used by City for delivering water to persons and lands both within and outside its City limits for municipal, industrial and domestic uses and is also the owner of a liquid waste treatment plant located within the District southwest of the city limits which is used for the treatment, percolation, purification, recycling and other disposition of liquid effluent from the City and intends to enlarge and improve said facilities and to produce by such treatment, percolation, purification and recycling, water which is of a quality suitable for agricultural use; and

WHEREAS, the entire area represented by the District and by the City is a water deficient area and the District is in need of additional waters for agricultural use and the City is in need of additional water for municipal, industrial and domestic uses; and

To be recorded without fee on behalf of Fresno Irrigation District

WHEREAS, the amount of water available to the District for agricultural use may be increased by the use of water recycled by the City as above described and the amount of water available to the City for use in its water distribution system for municipal, industrial and domestic uses may be increased by the exchange of such recycled water for the use by District of additional Kings River and/or Friant-Kern Canal water in that portion of the District northeast of the City; and

WHEREAS, City is desirous of maintaining a water level under its liquid waste treatment plant that will provide for maximum efficiency in the operation of its said plant; and

WHEREAS, a greater beneficial use and more economical utilization of all of the waters available to both the District and to the City can be obtained by the use of such waters as herein provided and both parties believe it is in the best interests of all the landowners and inhabitants within the District and within the City to enter into such an agreement;

NOW, THEREFORE, it is mutually agreed as follows:

1. Approval by United States and State Water Quality Board. Immediately upon the approval of this contract by the parties hereto, it shall be presented to the United States, and also to the California Regional Water Quality Control Board, or its successor agency, for their approval and shall not become effective for any purpose until such approval has been obtained.

This contract shall be at all times subject to all of the terms and conditions of the City Bureau Contract, the District Bureau Contracts and the District Kings River Intra-Association Agreements and to the extent that any agreement contained herein is contrary to or inconsistent with any term or condition of those contracts or agreements, this contract shall be unenforceable. In the event the performance of any agreement contained herein shall become unenforceable or shall be in violation of any Federal,

State or local statute or ordinance or of any decision of any court of competent jurisdiction, the entire contract may be terminated by either party upon written notice mailed to the other party.

2. Definitions. For purposes of this agreement the following words and phrases shall be defined as follows:

(a) "Agricultural use" means the use of water primarily in the production of agricultural crops, including the irrigation of lands and underground water replenishment.

(b) "Recycled water" means water which has been treated and percolated into the underground water supply under the City's liquid waste treatment plant in the southwest portion of the District which is thereafter pumped from said underground water supply.

(c) "City Bureau Contract" means that certain contract between the United States and the City of Fresno providing for water service dated January 12, 1961.

(d) "District Bureau Contracts" means those certain contracts between the United States and Fresno Irrigation District more particularly described as follows:

Contract between the United States of America and Fresno Irrigation District Providing for the Payment of the District's Share of the Cost of Pine Flat Dam and Reservoir Allocated to Irrigation, dated December 23, 1963.

Contract for Operation and Maintenance of Irrigation Storage Space of Pine Flat Reservoir dated December 23, 1963.

Kings River Allocation Contract, dated December 23, 1963.

Conveyance and Covenants in Compromise and Settlement of Fresno Slough Claims, dated April 23, 1965.

Contract between the United States and Fresno Irrigation District Providing for Water Service, dated July 20, 1964.

(e) "District Kings River Intra-Association Agreements" means those certain contracts relating to Kings River and storage in Pine Flat Reservoir more particularly described as follows:

Water Right Indenture, dated May 3, 1927.

Administrative Agreement and Monthly Diversion Schedule dated May 3, 1927.

Agreement Supplementing and Amending Water Right Indenture Dated May 3, 1927, and Supplementing and Amending Administrative Agreement Dated May 3, 1927, Relating to Kings River Water Association, and Amended Monthly Diversion Schedule, dated June 1, 1949.

Agreement Admitting Kings River Water District As a Member of Kings River Water Association and Agreement Re: Centerville Bottoms Schedule, dated September 10, 1963.

Agreement Supplementing and Amending Water Right Indenture Dated May 3, 1927, and Administrative Agreement Dated May 3, 1927, Each as Amended and Supplemented June 1, 1949, Relating to Kings River Water Association, dated September 10, 1963.

3. Agreement to Deliver and Accept Recycled Water. During the term of this agreement City agrees to deliver and District agrees to accept from City recycled water pumped by City from the area under its liquid waste treatment plant in amounts and under the terms and conditions hereinafter provided. When so delivered to District said water shall become the property of the District to be used for agricultural purposes and for underground water replenishment in the southwest portion of the District as the District shall see fit.

4. Water Quality. The City shall not deliver to District or discharge into District's canals any such recycled water which is not of a quality suitable for all agricultural use or which shall be deleterious to plant or animal life and all water so delivered shall meet all the quality standards of the California Regional Water Quality Control Board, or its successor agency, for agriculture and irrigation use and any other federal, state or local agency having jurisdiction or control over water quality standards. City agrees at its expense to make such periodical tests to determine the quality of the water discharged into District's canals at the point where said water is so discharged as may be required by any such board or agency or as may be required by the District's manager and to submit the results

of such tests in writing to the District forthwith after such tests are made. City further agrees that any complaint that said recycled water does not meet the above standards, including but not limited to complaints from any such board or agency, the County of Fresno, any mosquito abatement district or any user of such recycled water, must be corrected and resolved to the satisfaction of District before any further discharge of water into said canals shall be made without the express consent of the District.

5. Exhibit A. A map showing the exterior boundaries of the District, the District's canal system, the city limits of the City of Fresno, the location of City's liquid waste treatment plant site, the exact locations at which City may discharge water into the District's canal system, the type and capacity of the discharge facilities by which each such discharge may be made, the location of observation wells as provided in Paragraph 9, and those portions of the District designated by the parties as the "easterly" and "westerly" portions of the District for purposes of this agreement shall be prepared by the District's engineering department and approved in writing upon said map by the authorized representatives of the District and the City. When so approved said maps shall be incorporated herein by reference as Exhibit A and shall become a part hereof. One duplicate so approved shall be kept in the office of the City and one in the office of the District. Said map may be amended in writing upon said map and reapproved in writing as above set forth.

6. Place and Time of Delivery. City will deliver all such water to the District during the District's irrigation season which may at the election of the District be extended to accommodate the recycled water received under this agreement. Said water delivered by the City to the District shall be discharged by the City into the District's Dry Creek Canal No. 77 and/or Houghton-

Canal No. 78 at the locations approved by the District and shown on the map marked Exhibit A and at no other location or locations.

7. Amount to be Delivered. The City shall deliver to the District under this agreement, subject to District's acceptance as provided herein, recycled water pumped by the City, which shall be delivered at a minimum rate of delivery of 100,000 acre feet in each ten-year period of this contract, provided, however, such delivery will not exceed the amount of 30,000 acre feet in any one year except that such maximum may be increased upon agreement between the District's manager and the Director of Public Works of the City. At least 10 days prior to the first day of each calendar month during the term of this agreement City will submit to District in writing a schedule of the daily amount of such water proposed to be delivered to District at each discharge point during that month and the rate of flow indicated in cubic feet per second at which said water will be delivered. Upon receiving said schedule District's manager will approve the amount of such water the District is willing to accept at each said discharge point during each day of that month and thereafter City shall deliver to District the daily amount of such water so approved. Said daily deliveries shall be at a continuous and constant rate of flow during the entire 24 hour period of each said day. In no event shall the discharge into Dry Creek Canal No. 77 in any one month be in excess of one-half of the total amount delivered to District in that month or the discharge into the Houghton Canal No. 78 in any one month be more than two-thirds of the total amount delivered to the District in that month and in no event shall the rate of discharge of water into Dry Creek Canal No. 77 exceed 60 c.f.s. or the rate of discharge into Houghton Canal No. 78 exceed 120 c.f.s. No such discharges shall be made into District's canals until said discharges have been approved

gives immediate notice thereof to the District. In such event City shall use all reasonable effort to immediately restore the delivery of water to the level approved by District's manager as provided in paragraph 7. District's manager may refuse to agree to any such change in schedule or to accept water under such changed schedule if he reasonably determines that such change may result in damage to a District canal or to other property of the District or any other person or will interfere with the operation, alteration, repair or maintenance of the canal into which said discharge is to be made or will interfere with some other operation or function of the District.

9. Ground Water Level. City shall not pump said recycled water from the underground water reservoir in such a manner or to the extent that it will adversely affect the elevation of the water table in the area surrounding its liquid waste treatment plant as determined by the District. Such effect shall not be deemed to be adverse if the ground water level is not lowered below the gradients established by the District as existing on August 1 of the previous year. City agrees to monitor ground water levels in the area from which said recycled water is pumped on a monthly basis by means of observation wells located within an area surrounding its liquid waste treatment plant. The number and location of said wells shall be agreed upon by the City and the District, and when so agreed upon shall be shown on Exhibit A as provided in paragraph 5. Each month at the time City submits its schedule of proposed discharges, City shall supply District with the results of said observations and shall also supply District with a statement of the amounts discharged into District's canals during the previous month. Said schedule and said information shall be given to District upon a standard form approved by District's manager.

10. Construction and Maintenance of Facilities. All

discharge facilities to be used by City in discharging said water into said canals and suitable measuring devices required to measure the amount of water discharged into District's canals shall be constructed by City at its expense according to plans and specifications approved by District and shall thereafter be maintained in good operating and working condition by and at the expense of City. Said discharge facilities shall have a discharge capacity not greater than that shown on said map marked Exhibit A and shall be equipped with positive shut-off controls by which any and all discharges of water into District's canal system may be shut off immediately and at any time. City shall at all times protect said canals and their banks from any damage, injury or erosion at the locations of said facilities into said canals and any such damage or injury at such locations shall be repaired at the expense of City. If City fails to do so District shall be entitled to make said repairs and the expense thereof shall forthwith be reimbursed by City.

11. Use of Water Available to District. In consideration of the agreements of the City herein contained, District agrees that insofar as feasible and practical, it will make available from its Kings River water or from the water received by it under its Bureau Contracts an additional amount of water equivalent to 46% of the water received by it from the City under this agreement for agricultural use and for ground water replenishment in the easterly portion of the District as indicated on Exhibit A. The term "additional amount of water" as above used shall mean water in addition to the amount of water which would have been made available for use in that area if said recycled water had not been received by the District and used in the westerly portion of the District as indicated on Exhibit A. If the District shall determine that the use of said water in said area is not feasible or practicable it may, after discussion with the City, use such

water elsewhere. If in the future it is deemed desirable to do so, City, with the approval of District, may cause the dividing line between the easterly portion of the District and the westerly portion of the District to be moved to the west and the percentage of water to be made available in said easterly portion of the District to be increased in proportion to the increase in the area of land within said easterly portion.

12. District's Representative. Wherever it is provided in this agreement that District's manager shall do and act or exercise his discretion in respect to any particular matter said act and said exercise of discretion may be performed by any other representative of the District to whom such authority shall be delegated either by the District's Board of Directors or by said manager. In exercising his said discretion, the District's manager or his authorized representative shall weigh and balance the equities of the parties in respect to the interests of each and the necessities of District's operations in relation to those of the City. However, in any such case, his decision shall be final.

13. Ownership of District's Water Rights, Canals and Storage. Nothing contained in this agreement shall in any way affect District's ownership of its canal system or of its water right or its right to storage in Pine Flat Reservoir or give City any right or interest therein.

14. Expense of Performance. The performance of all terms and conditions of this agreement to be performed by City shall be at the expense of City and the performance of all terms of this agreement to be performed by District shall be at the expense of District.

15. Indemnity. City agrees to indemnify District and save District harmless of, from and against any loss, cost, expense, liability or attorney's fees incurred by District as the result of

any claim made by any third party because of the City's pumping from the underground water supply as above described or in any way arising out of the execution or performance of this agreement unless such loss, cost, expense or liability is caused by independent negligence on the part of the District in performing the terms and conditions of this agreement on its part to be performed.

16. Successors and Assigns. This agreement shall be binding upon the successors and assigns of the parties hereto provided that City's right to discharge water into District's canal system is not transferable or assignable and shall not pass to any successor in interest without the consent of District. This agreement is not made for the benefit of any person, firm, corporation or public entity not a party hereto and no person, firm, corporation or public entity except a party hereto or its successor or assign shall have any right to enforce said agreement under California Civil Code §1559 or otherwise.

17. Amendments. Except as otherwise provided herein this agreement may not be amended except by the written agreement of the parties hereto.

18. Term, Termination. The term of this contract shall be twenty years from its date, except that it may be cancelled upon mutual agreement between the parties hereto. The contract shall continue in effect after the end of said term except that it may be terminated thereafter by either party upon one year's written notice of such termination. Notwithstanding the foregoing, this contract may be terminated at any time, upon sixty days' written notice by either party, given on and because of substantial breach by the other party, which breach is not repaired or corrected before the end of said sixty-day period.

IN WITNESS WHEREOF, the parties hereto have executed this

agreement the day and year first above written.

FRESNO IRRIGATION DISTRICT

By Winston Strong
President

By Ardys T. Gorder
Secretary

ATTEST:

CITY OF FRESNO

Dorothy Douglass
City Clerk Deputy

By F. W. Hanley
Chief Administrative Officer

State of California)
County of Fresno) ss.

On this 20th day of June in the year one thousand nine hundred and seventy-four, before me, Paul H. Willison a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared Winston Strong known to me to be the President and Ardys T. Gorder known to me to be the Secretary of the Fresno Irrigation District the corporation that executed the within instrument, and known to me to be the persons who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at my office in said County, the day and year in this Certificate first above written.

Paul H. Willison
Notary Public in and for said County and State

OFFICIAL SEAL
PAUL H. WILLISON
NOTARY PUBLIC, CALIFORNIA
PRINCIPAL OFFICE IN
FRESNO COUNTY
My Commission Expires November 19, 1977

CORPORATION ACKNOWLEDGMENT
Kilner Stationery Co.
1916 Echo

FORM K108

APPROVED AS TO FORM
SPENCER THOMAS, JR., City Attorney

By Assistant Macumber
Senior Deputy

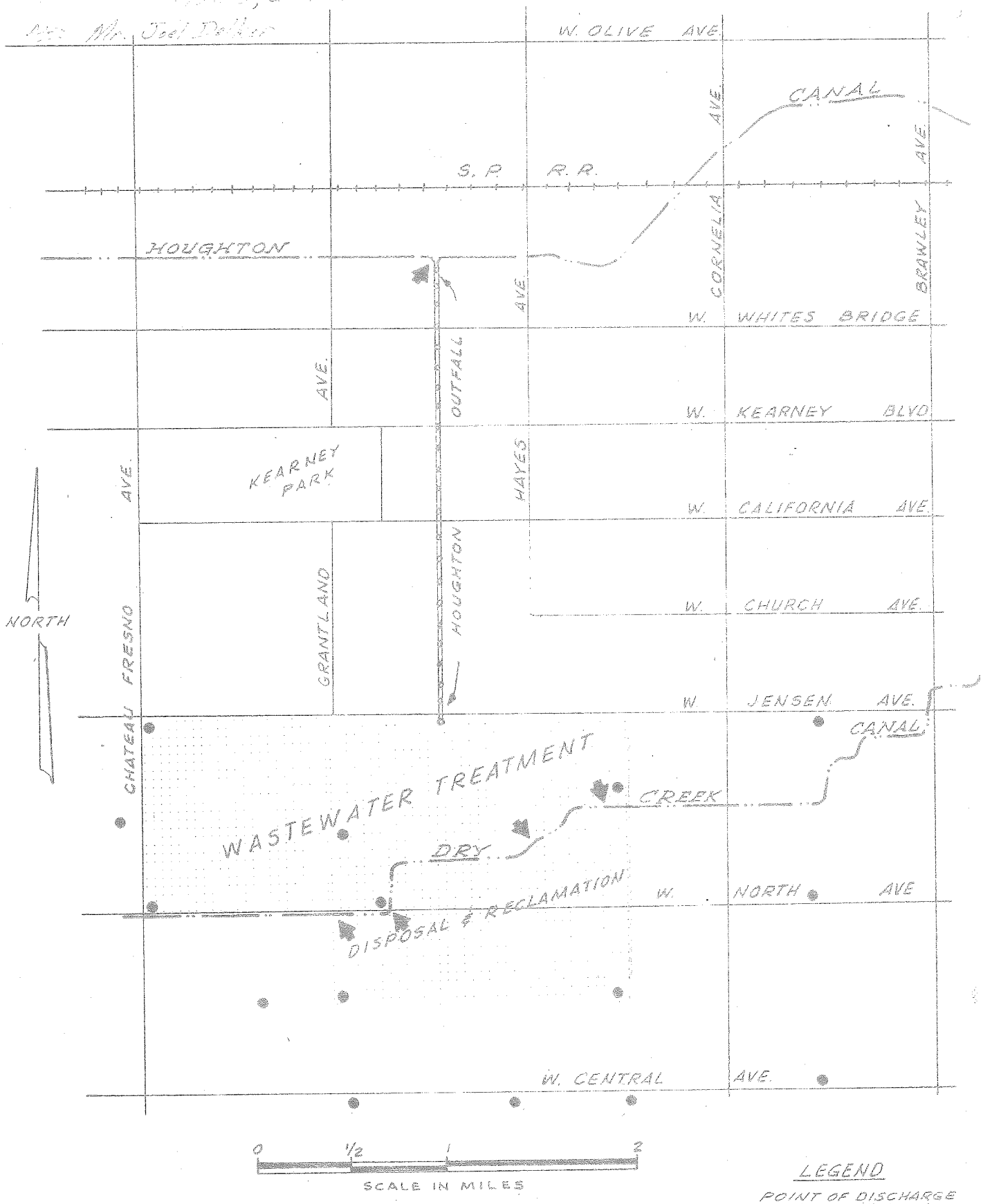

W. OLIVE AVE.
CANAL
S. P. R. R.
HOUGHTON
CORNELIA AVE.
BRAWLEY AVE.
W. WHITES BRIDGE
OUTFALL
AVE.
W. KEARNEY BLVD.
KEARNEY PARK
HAYES
W. CALIFORNIA AVE.
NORTH
CHATEAU FRESNO
GRANTLAND
HOUGHTON
W. CHURCH AVE.
W. JENSEN AVE.
CANAL
WASTEWATER TREATMENT
CREEK
DRY
W. NORTH AVE.
DISPOSAL & RECLAMATION
W. CENTRAL AVE.
0 1/2 1 2
SCALE IN MILES
LEGEND
POINT OF DISCHARGE
City's recycled water into F.I.D. Canal
OBSERVATION WELLS

EXHIBIT A-1

J

Water Shortage Contingency Plan

City of FRESNO
Department of Public Utilities

2020 Water Shortage Contingency Plan

Final

JULY 2021

CITY OF FRESNO



Photo Credit: Downtown Fresno Partnership

WSC

City of FRESNO
Department of Public Utilities

CITY OF FRESNO

Final
2020 Water Shortage Contingency Plan

JULY 2021



Prepared by Water Systems Consulting, Inc.

WSC

ACKNOWLEDGMENTS

The 2020 Water Shortage Contingency Plan was prepared by Water Systems Consulting, Inc. The primary authors are listed below.

Jeff Szytel, PE
Rob Morrow, PE
Lauren Cetin, EIT
Heather Freed, PE

Water Systems Consulting, Inc. would like to acknowledge the significant contributions of the City of Fresno, including the following staff.

Director of Public Utilities Michael Carbajal

Utilities Planning & Engineering Division

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ACRONYMS & ABBREVIATIONS

AMI	advanced metering infrastructure
City	City of Fresno
CWC	California Water Code
DPU	Department of Public Utilities
DRA	Drought Risk Assessment
DWR	Department of Water Resources
FID	Fresno Irrigation District
FMC	Fresno Municipal Code
SWTF	Surface Water Treatment Facility
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WSCP	Water Shortage Contingency Plan
WSIP	Water Storage Investment Program

1.1 Introduction

The Water Shortage Contingency Plan (WSCP) is a detailed plan on how the City of Fresno (City) intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time. The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for responsible management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

The WSCP describes the following:

1. **Water Supply Reliability Analysis:** summarizes the City's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition
2. **Annual Water Supply and Demand Assessment Procedures:** describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions
3. **Six Standard Shortage Stages:** establishes water shortage levels to clearly identify and prepare for shortages
4. **Shortage Response Actions:** describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand as well as minimize social and economic impacts to the community
5. **Communication Protocols:** describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements
6. **Compliance and Enforcement:** defines compliance and enforcement actions available to administer demand reductions
7. **Legal Authority:** lists the legal documents that grant the City the authority to declare a water shortage and implement and enforce response actions
8. **Financial Consequences of WSCP Implementation:** describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens
9. **Monitoring and Reporting:** summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation, with results used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced
10. **WSCP Refinement Procedures:** describes the factors that may trigger updates to the WSCP and outlines how to complete an update
11. **Special Water Features Distinctions:** identifies exemptions for ponds, lakes, fountains, pools, and spas, etc.
12. **Plan Adoption, Submittal, and Availability:** describes the process for the WSCP adoption, submittal, and availability after each revision

This WSCP was prepared in conjunction with the City's 2020 Urban Water Management Plan (UWMP) and is a standalone document that can be modified as needed. This document is compliant with the California Water Code (CWC) Section 10632 and incorporated guidance from the State of California Department of Water Resources (DWR) UWMP Guidebook.

Water purveyor planning for possible water supply shortages has become an increasingly important subject considering the drought conditions over the last several years. The City adopted its first WSCP in 1994 in response to the 1991 Assembly Bill 11X, which mandated all water purveyors with more than 3,000 connections develop a WSCP. The WSCP was revised as part of the 2005 UWMP and adopted by the City in 2008. The WSCP was further refined in 2016 during preparation of the 2015 UWMP and is being updated in 2021 as a standalone document, developed in parallel with the 2020 UWMP. The 2020 WSCP is still based on the original 1994 plan. The revisions are intended to meet new CWC requirements and streamline the plan's usefulness and enable the City to manage the necessary conservation measures to be enacted if a water shortage condition exists. The 2020 WSCP will be reviewed and adopted in conjunction with the 2020 UWMP.

The plan is intended to provide guidance, rather than absolute direction, for City action in response to water shortages and provide the City with options to responsibly manage water shortages.

1.2 Water Supply Reliability Analysis

This section is consistent with CWC Section 10632(a)(1) and describes the key findings of the water supply reliability analysis conducted pursuant to CWC Section 10635, which is presented in **Chapter 7** of the City's 2020 UWMP. As part of the 2020 UWMP, water suppliers must perform long-term (2025-2045) water service reliability assessment to evaluate reliability under normal, single dry year, and five-year consecutive dry year periods and a short-term (2021-2025) Drought Risk Assessment (DRA) to evaluate reliability under a five-year consecutive dry year period. Water supply reliability reflects the City's ability to meet the water needs of its customers with water supplies under varying conditions. The analysis considers plausible hydrological and regulatory variability, infrastructure capacity, climate conditions, and other factors that affect the City's water supply and demand.

The City's current water supply portfolio includes groundwater from the Kings Subbasin, surface water from the Central Valley Project Friant Division through a contract with the United States Bureau of Reclamation (USBR), and surface water from the Kings River through a contract with Fresno Irrigation District (FID), as well as recycled water produced at the Fresno-Clovis Regional Water Reclamation Facility and North Fresno Water Reclamation Facility. The City manages the surface water supplies and groundwater conjunctively such that surface water supplies are used more heavily for direct use and recharge during wet periods and groundwater is used more heavily during dry periods. Over the long term, the City aims to maximize recharge to store water for future use and help groundwater levels recover. Key issues that may create a shortage conditions include reduced surface water availability due to dry hydrologic conditions, reduction in groundwater due to contamination issues, or emergency conditions that reduce the City's water supply.

The water supply reliability analysis concluded that the City's supply portfolio is highly reliable and allows the City flexibility to use a majority of surface water when available in normal years and switch to a majority of groundwater in dry years, when surface water supplies are reduced.

The City is projected to meet potable demands with its existing supplies in all year types through conjunctive use of its groundwater and the City is projected to recharge water in most years to help store water for dry years.

1.3 Annual Water Supply and Demand Assessment

As established by CWC Section 10632.1, urban water suppliers must conduct an Annual Water Supply and Demand Assessment (Annual Assessment) and submit an Annual Water Shortage Assessment Report to DWR, with the first deadline July 1, 2022[1]. The Annual Assessment is an evaluation of the short-term outlook for supplies and demands for the current year and one projected single dry year conditions to determine whether the potential for a supply shortage exists and whether there is a need to trigger a WSCP shortage stage, appropriate response actions, compliance and enforcement actions, and communication protocols.

1.3.1 Key Data Inputs

Key data inputs and their sources for the Annual Assessments are summarized in **Table 1,** and described below**.**

Table 1. Key Data Inputs for the Annual Assessment

KEY DATA INPUT	DESCRIPTION	SOURCE
Customer demands	Estimates current year unconstrained demand plus a modest growth factor	Customer billing data, 2020 UWMP projections, input from City staff
Recharge demands	Estimates current year recharge demand	Surface water allocations, historical recharge, groundwater levels
State mandates	Reflects State orders and mandatory compliance with water use efficiency standards	Executive orders from the governor, orders and policies from the State Water Resources Control Board, input from City staff, or other sources
Surface water allocation	Reflects the City's available surface water supplies for treatment, recharge, and potential exchanges and transfers	Initial allocations from USBR and FID, typically available in April
Groundwater conditions	Reflects status of groundwater conditions	Production data, static water levels, and input from City staff
Infrastructure capacity	Reflects production and distribution capacity due to a variety of factors, including human-caused or natural catastrophic events	Production data, well production capacity, wells impacted by contamination, surface water treatment facilities' capacity, distribution system constraints, input from City staff

[1] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

1.3.1.1 Customer Demands

Upcoming year customer demands will be estimated based on the previous year's demand, with increases to address: (1) near-term projected growth of customers; (2) unconstrained water use if the previous year included any water use restrictions; and (3) potential water losses not accounted for in the previous year's demand.

1.3.1.2 Recharge Demands

Upcoming year recharge demands will be estimated by (1) availability of surface water not used at the surface water treatment facilities (SWTFs) and (2) projected availability of recharge basins.

1.3.1.3 State Mandates

The City has historically been required by the State to reduce demand regardless of supply reliability at the given time. As described previously, compliance with State mandates for water use efficiency can be declared during drought or in preparation for future droughts, such as in response to the governor's drought declarations in the 2012–2016 drought with subsequent Executive Order B-37-16 and related legislation for Making Conservation a California Way of Life. The City may consider State mandates and mandatory compliance with water use efficiency standards in determining water shortage levels.

1.3.1.4 Surface Water

The City has contracts for surface water with USBR and FID. The available surface water is dependent on hydrology, and in dry years less surface water is available to the City. Final allocations from both USBR and FID are known in April of each year, following the rainy season. In April, the City works with FID to develop a delivery schedule of surface water supplies and submits it USBR. The surface water allocation and delivery schedule will determine the City's operation of its SWTFs for the year, recharge operations, and if it will engage in any exchanges or transfers of supplies. In dry years, when less surface water is available, the City will also plan for increased groundwater use to meet its demands.

1.3.1.5 Groundwater Conditions

Groundwater level and production trends will be compiled and considered by the City staff, or with a hydrogeologist, based on the following actions:

- Plot static groundwater levels on hydrographs to determine trends.
- Plot historic and projected production data to determine trends.
- Compare historic and projected groundwater levels against production data for average and dry years.

1.3.1.6 Infrastructure Capacity

Infrastructure capabilities and overall production will be analyzed to determine if a possible power outage or deficiency may occur or continue in the coming year due to a variety of factors, potentially including human-caused or natural catastrophic events. This analysis may include well replacement, evaluation of wells for possible contamination, SWTFs capacities, and other considerations.

1.3.2 Evaluation Criteria

Staff will use the key data inputs to develop and compare supply and demand projections to determine if water shortage actions may be necessary. A preliminary Annual Assessment template is included in **Attachment 1**. Note that supply projections will incorporate infrastructure constraints and an operational buffer factor of 10% will be added to the demand estimate to account for supply and demand projection uncertainties. The estimated amount of supply available versus the estimated demand will be compared with the water shortage condition triggers presented in **Table 2**. Various trigger conditions, which summarize specific evaluation criteria for each shortage level and can be used to determine a water shortage level, are described in the following sections. Triggers are based on current conditions, and the City will evaluate these triggers and modify them as needed.

A shortage emergency may be declared when it is demonstrated that conditions threaten the ability to provide water for public health, safety, and welfare of the community. Furthermore, compliance with State mandates for water use efficiency can be declared during drought or in preparation for future droughts, such as in response to the governor's drought declarations in the 2012–2016 drought with subsequent Executive Order B-37-16 and related legislation for "Making Conservation a California Way of Life".

Short-term and long-term supply shortages may be caused by constrained production capacity or natural or human-caused catastrophic emergencies, such as: power outages, winter storms, wildfires, earthquakes, structural failures, contamination, and bomb threats. These types of emergencies may limit the City's immediate ability to provide adequate water service to meet the requirements for human consumption, sanitation, and fire protection. Impacts of such emergencies vary in duration. Thus, consumption reduction measures and prohibitions may differ for short-term and long-term conditions or shortages.

1.3.3 Annual Assessment Procedures

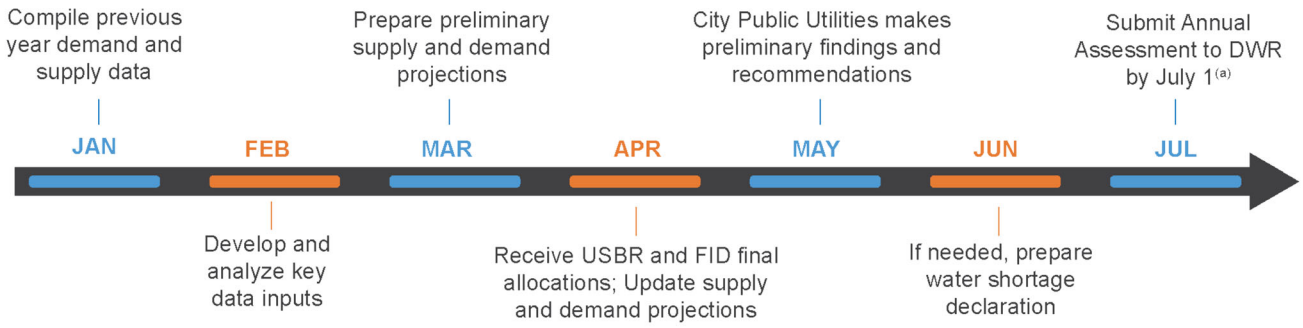
City staff will perform the Annual Assessment following initial allocations from USBR and initial projections for Kings River entitlements by FID, which is typically at the end of rainy season in April. The Annual Assessments are due to DWR by July 1 of each year[2] with the first Annual Assessment Report due to DWR by July 1, 2022. A preliminary annual assessment timeline is shown in **Figure 1.** The City may update the assessment after submission if key data inputs substantially change or other new information becomes available.

[2] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

Steps to conduct the Annual Assessment are as follows:

1. Staff gathers the key inputs, compiles historical data, and analyzes potential supply and demand gaps.
2. Demand trends, water supply conditions, and production capacity are analyzed.
3. A hydrogeologist may be consulted to provide additional groundwater condition information.
4. City Public Utilities staff will review findings and, if necessary, determine a recommended level of conservation required at the implementation or termination of each stage that will then be brought to the City Manager or Mayor for approval.
5. The City Manager, or designee, will declare and implement the level of conservation required at the implementation or termination of each level, and the declaration shall remain in effect until the City Manager, or designee, so otherwise declares. If a conservation level declaration is made, the declaration shall be published at least once in a newspaper of general circulation.
6. The City will develop and/or implement appropriate communication protocols and applicable response actions.

Figure 1. Annual Assessment Approximate Timeline



[a] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

1.4 Standard Water Shortage Levels

This section is consistent with CWC Section 10632(a)(2) and describes the City's water shortage levels. New to the 2020 UWMP, water suppliers must now consider six standard water shortage levels. Shortage levels indicate the gap between supply and demand compared to normal-year conditions. DWR standardized six shortage levels to provide a consistent regional and statewide approach to measure water supply shortage conditions. The six shortage levels correspond to 10%, 20%, 30%, 40%, 50%, and greater than 50% shortage in supplies compared to demands under normal conditions. However, a water supplier may use its own shortage levels if a crosswalk is included, relating its existing shortage levels to the six standard levels.

The City has elected to keep the previously established four water shortage stages from the 2016 WSCP and add a fifth stage to classify supply shortage greater than 50%. A crosswalk between the City's stages and DWR's standard levels is shown in **Figure 2**.

Figure 2. Water Shortage Stages Crosswalk

City of Fresno Shortage Stage	Percent Shortage Range	Standard WSCP Level	Percent Shortage Level
1	10%	1	10%
2	10 - 25%	2	20%
3	25 - 35%	3	30%
4	35 - 50%	4	40%
5	>50%	5	50%
		6	>50%

Although the water shortage stages are classified by the same percentages as the 2015 UWMP, the City has reevaluated the supply conditions and criteria to enter that stage to better reflect its supply portfolio in comparison to demand. **Table 2** lists the water shortage stages and the conditions that would trigger each stage. Any stage listed within the WSCP may be enacted by the City Manager, or designee, as deemed appropriate based on the water shortage condition.

Table 2. Water Shortage Contingency Plan Levels (DWR 8-1)

SHORTAGE LEVEL	PERCENT SHORTAGE[a]	WATER SHORTAGE CONDITION
0		No water shortage condition. Corresponds with year-round water use measures listed in Section 1.5.1 and d
1	0-10%	Stage 1 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **100%** of projected demand available water supplies, infrastructure constraints, projected demand, and operational buffer will be estim as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage C procedures for the annual assessment; or • After having been in a Stage 2 classification from drought conditions, the upcoming water year USBR and • After having been in a higher classification as a result of emergency, original trigger for a previous higher the above conditions for this stage.
2	10-25%	Stage 2 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **90%** of projected demand available water supplies, infrastructure constraints, projected demand, and operational buffer will be estim as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage C procedures for the annual assessment; or • After having been in a Stage 3 classification from drought conditions, the upcoming water year USBR and • After having been in a higher classification as a result of emergency, original trigger for a previous higher the above conditions for this stage.
3	25-35%	Stage 3 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **75%** of projected demand available water supplies, infrastructure constraints, projected demand, and operational buffer will be estim as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage C procedures for the annual assessment; or • After having been in a Stage 4 classification from drought conditions, the upcoming water year USBR and • After having been in a higher classification as a result of emergency, original trigger for a previous higher the above conditions for this stage.
4	35-50%	Stage 4 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **65%** of projected demand available water supplies, infrastructure constraints, projected demand, and operational buffer will be estim as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage C procedures for the annual assessment; or • After having been in a Stage 5 classification from drought conditions, the upcoming water year USBR and • After having been in a higher classification as a result of emergency, original trigger for a previous higher the above conditions for this stage.

1.5 Shortage Response Actions

The Fresno Municipal Code (FMC) contains sections on water conservation that are to take place under normal water supply conditions. Regulations in place under normal water supply conditions encourage smart water use and help the City manage its water supply. Some of those regulations include year-round outdoor water schedules; turf type restrictions; turf irrigation methods; and prohibition of willful or negligent water wasting, flood irrigating, washing hardscape with potable water, and frequent draining of pools. Additional details of these regulations can be found in FMC Section 6-520(a) (**Attachment 2**). These restrictions are mandated year-round by the City and must be observed. In addition to the normal restrictions on water usage, the City developed shortage response actions to implement during a water shortage on the City level and consumer level in order to reduce demands that are described in **Section 1.5.2** and detailed in **Table 3**.

In the event of a potential water shortage, the City will evaluate the cause of the shortage to help inform which response actions should be implemented. Depending on the nature of the water shortage, the City can elect to implement one or several response actions to mitigate the shortage and reduce gaps between supply and demand. The City has identified actions that fall within the demand reduction, supply augmentation, operational changes, and additional mandatory restrictions, as stated by DWR. It should be noted that all prohibitions listed for Stage 1 will apply to Stage 2 and, likewise, all restrictions that apply to Stage 2 will apply to Stage 3 and so on, until Stage 5 is reached. Also, due to the City's diverse supply portfolio, Stage 1 imposes only voluntary consumer reductions, while Stages 2–5 all include mandatory reduction actions. If necessary, the City may adopt additional actions not listed here in extreme circumstances.

1.5.1 Year-Round Measures

FMC Section 6-520(a) lists actions that are prohibited at all times, whether or not there is a shortage condition and include:

- Use of potable water to irrigate or water outdoor landscaping in a manner that causes runoff.
- Keep, maintain, operate, or use any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage.
- Willfully or negligently waste water as defined in FMC Section 6-501.
- Sprinkle or irrigate any yard, ground, premise, or vegetation except as set forth in the City's Outdoor Water Use Schedule.
- Sprinkle or irrigate any yard, ground, premise, or vegetation, unless watering device used is controlled by a shutoff device or a person is in immediate attendance of the hose or watering device.
- Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground, or other hard-surfaced areas, except where necessary for public health or safety.
- Use potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.
- Irrigation of ornamental turf on public street medians with potable water, except where the turf serves a community or neighborhood function, there is incidental irrigation by an irrigation system designed to irrigate trees, or the turf is irrigated with recycled water.

- Irrigating outdoor landscapes with potable water during and within 48 hours after measurable rain.
- Serve drinking water other than upon request in eating or drinking establishments, including but not limited to, restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served or purchased.
- Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
- Automatically changing towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily.
- Drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer.
- Prohibit filling new or refurbished swimming pools without obtaining a pool fill permit from the City.
- Refill (top off) established swimming pools except during times when outdoor water use is allowed at the property address pursuant to the Outdoor Water Use Schedule

The City may update these year-round restrictions in the future as needed. For the latest permanent restrictions refer to FMC Section 6-520(a) (**Attachment 2**) and the latest WSCP Resolution (**Attachment 3**).

1.5.2 Demand Reduction

The City has identified a variety of demand reduction actions to offset supply shortages. Demand reduction measures are strategies intended to decrease water demand to close the gap between supply and demand. Demand reduction actions available to the City that may be considered during water shortage conditions are summarized in **Table 3**. Although it is difficult to estimate the volume of savings for each action, the City expects to meet required reductions through a combination of response actions in conjunction with outreach and communication efforts to the extent necessary to mitigate any impacts from a water shortage.

Table 3. Demand Reduction Actions by City (DWR 8-2)

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?[(a)]	ADDITIONAL EXPLANATION OR REFERENCE
All	Expand Public Information Campaign	Not Applicable	Community outreach includes classroom presentatio water tours. Increase communication as drought sta
All	Improve Customer Billing	Not Applicable	Water bills show customer usage vs. average usage customer notifications of high water use based on a drought stages increase.
All	Offer Water Use Surveys	Not Applicable	Use water leak surveys with all community member
All	Provide Rebates for Landscape Irrigation Efficiency	Not Applicable	The City offers rebates for micro-irrigation conversio controller, and rain sensors to improve efficiencies.
All	Provide Rebates for Turf Replacement	Not Applicable	The City provides rebates for community members drought-resistant garden.
All	Provide Rebates on Plumbing Fixtures and Devices	Not Applicable	The City offers rebates on a variety of high-efficienc toilets, and urinals.
All	Decrease Line Flushing	Not Applicable	The City uses NO-DES for regular pipe flushing to e
All	Reduce System Water Loss	Not Applicable	The City has a comprehensive system water loss re to correct water system losses as drought stages in
1	Decrease Line Flushing	0 to 100% of shortage gap	For dead-end flushing where the NO-DES truck can
1	Increase Water Waste Patrols	0 to 100% of shortage gap	Increase monitoring of AMI reporting and communic based on public input.
1	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Voluntary limits: Summer: three days/week Winter: one day/week
2	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: three days/week Winter: one day/week
3	Landscape — Limit landscape irrigation to	0 to 100% of shortage gap	Summer: two days/week

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?[a]	ADDITIONAL EXPLANATION OR REFERENCE
4	Other — Prohibit vehicle washing except at facilities using recycled or recirculating water	0 to 100% of shortage gap	Prohibit washing cars, boats, trailers, aircraft, or oth vehicle-washing facilities using water recycling equi
4	Pools and Spas - Require covers for pools and spas	0 to 100% of shortage gap	Require covers for swimming pools when not in use
4	Other	0 to 100% of shortage gap	Prohibit use of potable water for sewer system main prior approval by the City manager.
4	Other	0 to 100% of shortage gap	Prohibit use of outdoor misters.
5	Landscape — Prohibit all landscape irrigation	0 to 100% of shortage gap	Prohibit outdoor irrigation year-round.
5	Moratorium or Net Zero Demand Increase on New Connections	0 to 100% of shortage gap	The City will temporarily limit or ban new water servi

[a] Reduction in the shortage gap is estimated and can vary significantly.
[b] Refer to Section 1.7 for Penalties for Water Wastage.

1.5.3 Supply Augmentation

Given the consistent supply of groundwater through pumping, the City has no immediate plan to augment supply. However, the City could purchase additional USBR or FID surface water, if available. Also, the Cities of Fresno and Clovis have an agreement for interconnection of their potable water systems to provide service during emergencies and other times of hardship in either community. Although these options are discretionary and quantifying their ability to reduce the shortage gap can vary significantly, they are readily available if needed, as indicated in **Table 4**.

Table 4. Supply Augmentation & Other Actions (DWR 8-3R)

SHORTAGE LEVEL	SUPPLY AUGMENTATION METHODS AND OTHER ACTIONS BY WATER SUPPLIER	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE
1 to 5	Transfers	As Needed	Purchase or exchange available USBR or FID surface water
1 to 5	Other Purchases	As Needed	Interconnection with City of Clovis for use in emergencies

1.5.4 Operational Changes

Operational changes to address a short-term water shortage may be implemented based on the severity of the reduction goal. The City can maximize its supply by implementing operational strategies and demand reduction measures. As part of the Annual Assessment process, the City will consider their operational procedures at the time of a shortage to identify changes that can be implemented to address water shortage on a short-term basis, including but not limited to:

- Utilization of a SWTF to treat pumped groundwater to offset lack of surface water supply
- Expansion of public information campaign to educate and inform customers of the water shortage emergency and required water savings
- Decrease line flushing to only on a compliant basis strictly using the currently operational NO DES truck
- Use water patrols and increase frequency of meter reading by recruiting staff from other departments if necessary
- Offer water use surveys
- Implementing or modifying drought rate structure or surcharge or water emergency tiered pricing, pursuant to the requirements of Proposition 218 and in accordance with California Law
- Prohibit any new permits for hydrant-construction or temporary construction meters.
- Monitoring construction meters and fire hydrant meters for efficient water use in the event that a meter identified wastes water.

- Moratorium on issuing any new building permit unless the: (a) Project is found by the City Manager, or designee, to be necessary for public health, safety. (b) Project will use recycled water for construction. (c) Project will not result in a net increase in non-recycled water use. (d) Project has adequate Conservation Offsets
- Suspending the consideration of annexation to its service area unless the annexation increases the water supply available more than the anticipated demands of the property to be annexed
- Reducing overhead in the short-term and mid-term by deferring non-critical Capital Improvement Plan projects and major maintenance expenditures, and in the long-term by adjusting operational and staffing levels and retail water rate structures to incorporate the reality of lower retail water sales than previously anticipated.
- Decrease in the level or, if need be, even a total interruption in the expenditures for the agency's facility replacement program. Non-critical replacement projects will have little or no impact on the agency or its customers and would only extend the master planned replacement schedule.

1.5.5 Emergency Response Plan

In addition to responding to drought conditions, the City's WSCP can be used to respond to emergency or catastrophic conditions that impact the availability of the City's water supplies, and/or the ability to deliver water within the City's service area. Potential events are listed below:

- Loss of surface water supply
- Loss of groundwater supply
- Area-wide electrical power failure
- Natural disaster — earthquake or flood

In the event of a supply interruption, there are several measures that could be taken that would mitigate the overall negative impacts of a water shortage. The following discussion indicates possible events and actions to maintain water service to the service area.

The City has an agreement with the City of Clovis that discusses an intertie system between the two cities that could provide service during emergencies and other times of hardship in either community. The agreement covers interconnections, including apportionment of capital costs, at two locations: Leonard Avenue at the Gould Canal alignment and Behymer Avenue at Willow Avenue. The Leonard interconnection was constructed and remains in place for emergency uses through manual operation. The agreement also provided for temporary deliveries from Fresno to northern Clovis through the Behymer connection through 2015. However, the Behymer interconnection has yet to be constructed.

The City also cooperates with the County of Fresno's Office of Emergency Services, and the WSCP is included in the County's Disaster Plan. The goal during any emergency scenario is to maintain water supply such that the health and safety of the community is protected.

In the event of contamination of either the surface or ground water supplies, the non-impacted water supply could be used more heavily or the intertie with the City of Clovis could be activated. Additionally, overall demand reduction and the use of other wells or treated surface water would help meet demands.

If a regional power outage were to occur, the City could use backup power generators to operate wells. This measure, in conjunction with demand reduction, could supply sufficient water for health and safety purposes. The City has more than 35 wells with backup power sources. The

City has budgeted for the installation of a backup generator for the Northeast Wastewater Reclamation Facility. The Southeast SWTF and T-3 SWTF are also equipped with backup power generators.

If a natural disaster occurs, in addition to the actions discussed above, the City will isolate any areas of the system that were compromised for emergency repairs and, potentially, use of the intertie with the City of Clovis. Implementing the WSCP could also occur to reduce demands.

For more information on actions during an emergency, refer to the City of Fresno's Risk and Resilience Assessment Report finalized in September 2020 (AARC Consultants, LLC, 2020) and the City of Fresno Emergency Response Plan finalized in March 2020 (AARC Consultants, LLC, 2020).

1.5.6 Seismic Risk Assessment and Mitigation Plan

Refer to Fresno County Multi-Jurisdictional Hazard Mitigation Plan implemented in May 2018, Annex E: City of Fresno attached in **Attachment 4**, for appropriate Seismic Risk Assessment and Mitigation Plan procedures.

1.5.7 Shortage Response Action Effectiveness

The City of Fresno has assessed its overall water reduction by evaluating the water usage trends that were discussed in SBX7-7 in conjunction with the American Water Works Association water loss calculator. See Chapters 5 and 4 of the 2020 UWMP, respectively, for additional information.

The overall decrease of water use per capita and compliance with the 2020 per capita water use target indicate that the reduction measures have been effective in the community. All of the City's customers are metered and the City will use these devices to monitor actual reductions in water use during enacted shortage levels compared to normal year conditions. This data allows the City to determine the effectiveness of the implemented shortage response actions. If reduction goals are not being met, the City Manager, or designee, can make the necessary decisions for corrective action to be taken.

1.6 Communication Protocols

The City's Department of Public Utilities (DPU) currently has a contract with JP Marketing to manage communication and outreach to the customers. The firm's services include strategic planning, creative concepts, public relations, marketing, promotion, research, advertising, media design, copywriting, event creation, and online services. The City also has a public information officer and communications team whose purpose is to communicate water shortage procedures or general utility information effectively and efficiently to the customers.

During normal supply conditions, the Water Division implements informational campaigns to customers that emphasize user-level changes in water use and overall mindfulness of water waste while promoting voluntary conservation. Over the past few years, DPU has increased use of social media to communicate with customers quickly and organically. The City uses Facebook, Twitter, and Instagram to promote water saving tips, notify of shortage conditions, and spotlight DPU employees to foster a sense of community centered around the water supply. The City strives to be proactive in communicating work strategy and conservation efforts with customers.

This WSCP includes a staged plan to communicate the declaration of a shortage stage, inform restrictions, and provide updates during a water shortage emergency. A summary of actions the City could potentially take during a specific shortage stage is outlined in **Table 5**.

Table 5. Communication Protocol During Water Shortage Conditions

SHORTAGE STAGE	ACTION
1	Information posted on the City's website
1	Social media posts (Facebook, Twitter, Instagram, and Nextdoor)
2	Information included in utility bill inserts on a regular basis
2	Promotion of rebates and water conservation services
2	Letters, postcards, and flyers mailed to customers impacted by water use regulations
2	Targeted outreach and technical assistance to highest water users in each use class
2	Engage City councilmembers with resources to share with constituents
3	Increased paid advertising — print, online, radio, TV, streaming, social media, etc.
3	Messaging printed directly on utility bills
3	Press releases to local media (online and print newspapers, TV, radio, etc.)
3	Assembly and promotion of the speaker's bureau for water shortage presentations for neighborhood groups, gardening clubs, homeowners' associations, churches, senior centers, neighborhood associations, business associations, community groups, property management companies, etc.
4	Increased coordination with the local landscaping industry, including water shortage information in their newsletters, publications, and facilities; local wholesale and retail nurseries; and irrigation supply stores
4	Signage posted at nurseries and irrigation supply stores
4	Outreach materials and drought notices mailed to the hospitality industry, including restaurants and lodging

Note: If a water shortage progresses through multiple stages all measures in the previous stage(s) are implemented in addition to current stage actions.

1.7 Compliance and Enforcement

The City has penalties for violation of the water use restrictions in **Table 3**. The City tracks customer usage through advanced metering infrastructure (AMI) in order to enforce water wastage during shortage conditions as detailed in **Section 1.10**. The fines are noted in **Table 6**. Penalties for water waste are based on FMC, Section 6-520(e).

Table 6. Penalties for Water Wastage

INCIDENT MONTH[(a)]	PENALTY AND FINE
1	$0 – Issued a Notice of Water Waste
2	$25
3	$50
4-12	$100
6	If a customer has more than six incident months of water wastage within a one-year period, the City may implement any or all of the following measures: • Require the customer to get a landscape evaluation, lawn water audit, and water budget, as appropriate, in order to learn efficient water use. This work shall be completed at the customer's expense by landscape irrigation auditors certified by the Irrigation Association. • Installation by the City of flow restrictors or termination of water service. • Require a customer to repair any defects in their watering system within 14 days of notice by the City.

Note:
[a] Number of incident months are based on a calendar year.

1.8 Legal Authorities

CWC Section 375 provides the City with the statutory authority to adopt and enforce water conservation restrictions, and CWC Sections 350 et seq. authorize the City to declare a water shortage emergency and impose water conservation measures when it is determined that the City may not be able to satisfy ordinary demands without depleting supplies to an insufficient level.

If necessary, the City will declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1. Once having declared a water shortage, the City is provided with broad powers to implement and enforce regulations and restrictions for managing a water shortage. For example, CWC section 375(a) provides the following:

> *"Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity."*

Water Code Section 375(a). CWC Section 375(b) grants the City with the authority to set prices to encourage water conservation.

Under California law, including CWC Chapter 3.3 and Chapter 3.5 of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the City is authorized to implement the water shortage actions outlined in this WSCP. Prior to enacting a shortage level, the resolution providing the Council with authority to enact each level of the WSCP will be adopted. Resolutions to enact the WSCP can be adopted at any meeting of the City Council. The resolution providing the City Manager, or designee, with authority to enact each stage of the WSCP is included in **Attachment 6**.

The City shall also coordinate with any city or county within which it provides water supply services, as listed below, for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558).

1.9 Financial Consequences of WSCP

This section is in accordance with CWC Section 10632(a)(8) and describes the financial consequences of implementing the WSCP and potential mitigation strategies. The City anticipates reduced revenue while implementing the WSCP because of decreased water use by its customers and additional costs associated with implementing water use restrictions and associated reduction actions. The incurred cost may vary depending on the shortage stage and duration of the water shortage emergency. The cost of compliance may be tracked when a shortage is declared. The City may track the staff time and resources used to implement the WSCP, including reduced revenue, implementation and enforcement of shortage response actions, and communication and outreach efforts. Impacts of implementing the WSCP include:

- Impact of quantity of water sales on revenue
- Increased staff, salaries, and overtime required for implementing and enforcing restrictions
- Increased costs of new supplies, transfers, or other exchanges

In 2015, the mandatory conservation goal for the City was 28%, however the corresponding revenue reductions were less than 28% due to the City having a two-component water rate structure that includes the fixed “water meter service charge” for all service connections and a volumetric-based “water quantity charge.” Therefore, the reduction in revenues was affected by a lesser percentage than the overall total reduction in water use. In general, revenue impacts specified in the WSCP would be offset with a combination of the following:

- An increase in water commodity and service charges
- A reduction in annual operating expenses due to decreased demands
- Reserves currently earmarked for long range capital
- General tax fund revenues currently earmarked for future capital improvements

Methods to mitigate revenue/expenditure impacts are discussed in detail below.

1.9.1 Drought Rate Structures and Surcharges

At present, the City does not have in place a drought rate structure. The City plans to hire a rate consultant to review existing water rates and, if appropriate, develop new future water rates. As an additional task to this effort, the consultant will review, develop, and recommend a drought rate structure for the City’s consideration. With such a rate structure in place, should a water shortage take place, the City will be able to institute an alternate water rate structure that may

apply and change depending on the stage of drought that the community is experiencing. At this time, there are no details as to how the rate structure will be developed, but conceptually each of the five stages specified in the WSCP would have a water rate increase associated with it.

The use of this type of structure during a drought will minimize expenditure impacts that are incurred during a drought. The effects of the decrease in revenue due to the drought, with a corresponding increase in expenditure, will allow for the City to function without going into debt.

1.9.2 Use of Financial Reserves

The City of Fresno Water System maintains two reserve funding sources that can be used to meet a portion of the utility's revenue requirements during emergency or drought conditions. They are as follows:

- **Water Operating Reserves** – This is cash set aside in the Water Enterprise Fund that provides a "rainy day savings account" for unexpected cash flow shortages and large, unexpected expenses or losses. Normally, these reserves are not intended to be used to make up income shortfalls. However, in an emergency situation, they can be transferred to the Water Rate Stabilization Fund (see below) for transfer back to the Water Enterprise Fund to meet revenue requirements, including debt coverage ratios.
- **Water Rate Stabilization Fund** – Indentures from previous bond issuances required the establishment of the Water Rate Stabilization Fund. These funds can be drawn on to meet a portion of the utility's revenue requirements through unexpected low-revenue periods and may be applied to debt coverage ratio calculations to help avoid technical default of bond covenants and loan agreements.

In addition, the City maintains funding in the Emergency Reserve Fund for the purpose of meeting unforeseen emergencies (see Section 1212 of the City's Charter for more information). This funding may be used by an affirmative vote of at least five members of the City Council upon presentation of a statement declaring the reason for use of the funding. This funding would be used only if the Water System reserves were insufficient to meet revenue requirements.

1.9.3 Other Measures

If the funding mentioned above is not sufficient to compensate for loss of revenue during a water shortage, the City may temporarily suspend components of its operations and maintenance activities.

1.10 Monitoring and Reporting

As described in **Section 1.3**, the City will track its supplies and project demands annually as part of the Annual Water Supply and Demand Assessment, and, if conditions described in **Table 2** are projected, the City will enact its WSCP. Monitoring demands is essential to ensure the WSCP response actions are adequately meeting reductions and decreasing the supply/demand gap. This will help to analyze the effectiveness of the WSCP or identify the need to activate additional response actions.

The City currently has AMI technology to monitor customer water usage and uses its AMI system to automatically enforce demand reduction measures and restrictions. The AMI system is currently set up to monitor and enforce outdoor watering restrictions. The program monitors customer meter flows against an "excessive use" flowrate, which will vary based on the WSCP stage. The system flags customer meters exceeding the excessive use flowrate during a

day/time outside of permitted outdoor watering hours as excessive use and an incident of water waste. If a customer has one or more incidents of water waste during a month, the customer shall be issued a Notice of Water Waste and, if applicable, be charged fines and penalties. The City may expand this monitoring program in the future to monitor other uses beyond outdoor watering restrictions.

The City can also use the detailed water usage data to monitor customers' response and demand reduction due to restrictions for each stage in the WSCP. The many restrictions and prohibitions assigned to each stage in **Table 3** are inherently flexible so the City can implement certain the restrictions, monitor customer usage, and implement additional restrictions if the demand reductions are not sufficient to close the supply and demand gap. The City also intends to provide reporting to the State based on forthcoming regulations for monthly reporting of water production and other water uses, along with associated enforcement metrics.

1.11 WSCP Refinement Procedures

The City intends to use this WSCP as an adaptive management plan to respond to foreseeable and unforeseeable water shortages. The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. To maintain a useful and efficient standard of practice in water shortage conditions, the requirements, criteria, and response actions need to be continually evaluated and improved on to make sure the WSCP provides the tools to maintain reliable supplies and reduce the impacts of supply shortages.

This 2020 WSCP accounts for the latest analysis of the City's robust supply portfolio in relation to demand and adjusted percentage reduction stages to reflect a more appropriate supply shortage that should trigger stages. This is a process that should be reevaluated annually and updated as necessary. Potential changes to the WSCP that would warrant an update include any changes to shortage level triggers, changes to the shortage level structure, and changes to the response actions. Any prospective changes to the WSCP would need to be presented at a public hearing; staff would obtain any comments and adopt the updated WSCP. The steps to formally amend the WSCP are discussed in **Section 1.13**.

Potential refinements will be documented and integrated into the next WSCP update. If new response actions are identified by staff or the public, these could be advertised as voluntary actions until they are formally adopted as mandatory.

1.12 Special Water Feature Distinction

CWC Section 10623 (b) requires that suppliers analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code. As listed in **Table 3 and Section 1.5.1**, there are separate requirements for decorative water features — including decorative fountains, lakes, or ponds — and for pools and spas. The City has separate response actions, enforcement actions, and monitoring programs for both decorative water features and pools and spas. Non-pool or non-spa water features may use or be able to use recycled water, whereas pools and spas must use potable water for health and safety considerations. Limitations to pools and spas may require different considerations compared to non-pool or non-spa water features.

1.13 Plan Adoption, Submittal and Availability

This WSCP update was prepared in tandem with the 2020 UWMP. The City held a public hearing and adopted the 2020 WSCP on July 15, 2021. A copy of the published Notice of Public Hearing is included in **Attachment 5** and a copy of the adopting resolution is included in **Attachment 6**. Before the public hearing, notices were published notifying the public of the date and time of the hearing.

Once the 2020 WSCP has been adopted, a copy will be submitted to DWR, the State Library, and the County of Fresno. Also, a hard copy will be made available for public reference at the City of Fresno Department of Public Utilities office at City Hall (located at 2600 Fresno Street) and the Water Division office (located at 1910 E. University Avenue). Additionally, an electronic copy will be uploaded to the City of Fresno website[1] and made available for public reference.

Based on DWR's review of the WSCP, the City will make any amendments in its adopted WSCP, as required and directed by DWR. If the City revises its WSCP after the UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

[1] www.fresno.gov/Government/DepartmentDirectory/PublicUtilities/Watermanagement/importantdocuments.htm

References

AARC Consultants, LLC. (2020). *City of Fresno Department of Public Utilites Risk and Resilience Assessment for the America's Water Infrastructure Act 2018.* Fresno, California.

AARC Consultants, LLC. (2020). *City of Fresno Water Divsion All Hazards Emergency Response Plan.*

Attachment 1
Preliminary Annual Assessment Template

DWR ASSESSMENT TABLE TEMPLATE - EXAMPLE VALUES FOR 2021 SHOWN

City of Fresno
DWR Annual Water Supply and Demand Assessm
Supply and Demand Estimates

Current Year: <YEAR>
Updated: <DATE>

	Current Year	Following Year	
Demand Use Type	**2021**	**2022**	**Notes**
Single Family	60,666	61,272	1% annual increase from 2020
Multi-Family	19,030	19,221	1% annual increase from 2020
Commercial	17,141	17,312	1% annual increase from 2020
Industrial	5,786	5,844	1% annual increase from 2020
Landscape	9,583	8,680	1% annual increase from 2020; Reduced by increased recycled water use
Other	343	347	1% annual increase from 2020
Losses	9,664	9,760	1% annual increase from 2020
Recycled Water	1,912	2,911	Estimates per 2020 UWMP Table 7-4
M&I Demand Subtotal	**124,125**	**125,347**	
Operational Buffer (10%)	12,410	12,530	To account for supply and demand uncertainties
M&I Demand Total	**136,535**	**137,877**	
Groundwater Recharge	-	-	No recharge assumed due to low surface water supply availability
Total Demand	**136,535**	**137,877**	

Supply	**2021**	**2022**	
Groundwater, Sustainable Yield	73,062	73,644	Sustainable groundwater yield per 2020 UWMP Table 6-1
Groundwater, Allocated from Storage	-	-	Groundwater in storage built up over time from recharge and reduced pumping; Not used since supply is greater than demand
USBR Contract Allocation	17,612	19,025	Current Year: USBR Allocation = 20% plus 5,612 AF of carryover Following Year: Average of "Critical" year per 2020 UWMP Table 6-2
FID Contract Allocation	51,580	61,000	Current Year: FID Kings River Allocation = 26% Following Year: Average of "Critical" year per 2020 UWMP Table 6-3
Recycled Water, RWRF	1,802	2,801	Estimates per 2020 UWMP Table 6-6
Recycled Water, NFWRF	110	110	Estimates per 2020 UWMP Table 6-6
Total Supplies	**144,166**	**156,580**	

Supply vs. Demand	**2021**	**2022**
Supply minus Demand (AF)	**7,631**	**18,703**
Supply divided by Demand (%)	**106%**	**114%**

WATER SHORTAGE STAGE TEMPLATE - EXAMPLE VALUES FOR 2021 SHOWN

City of Fresno
DWR Annual Water Supply and Demand Assessment
Water Shortage Stage Comparison

Current Year: <YEAR>
Updated: <DATE>

2021 Water Supplies (AFY)

Supplies	Maximum Available Supplies	Projected Available Supplies
GW, Sustainable Yield	73,062	73,062
GW, from Storage	*Not Used*	
Surface Water	176,055	69,192
Recycled Water	1,912	1,912
Total	**251,029**	**144,166**

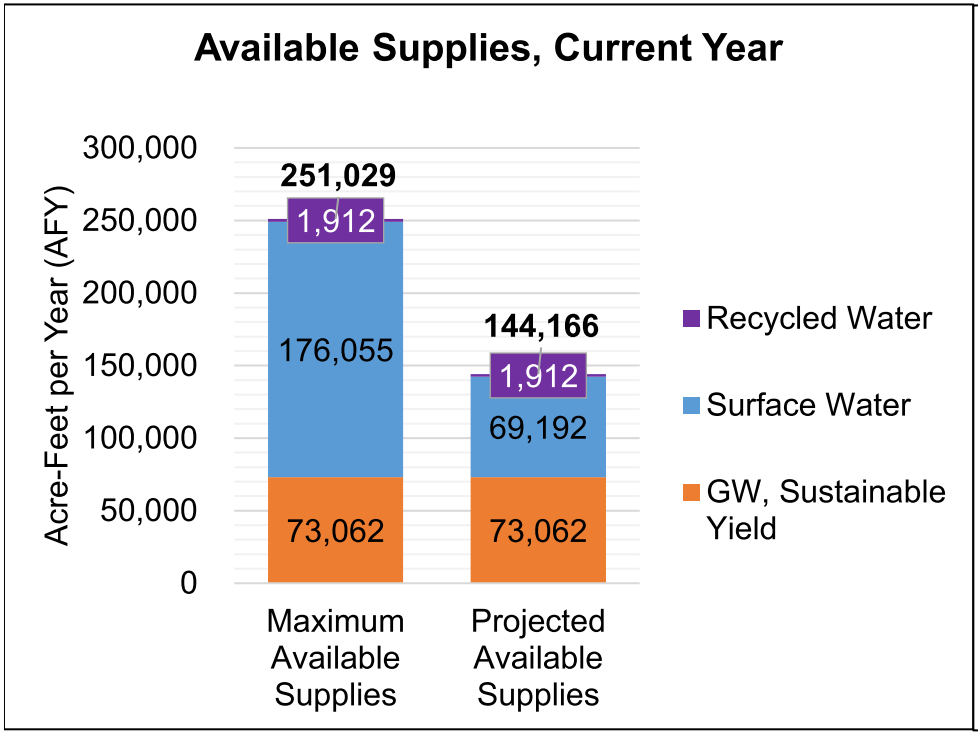
2021 Water Demands (AFY)

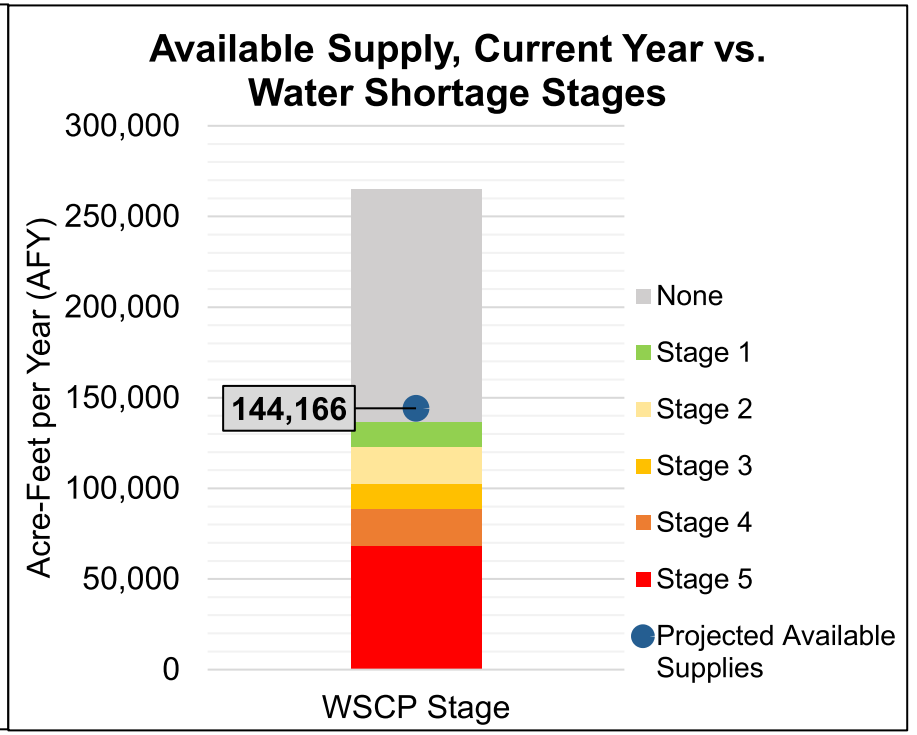
Demand Type	Estimated Demands
M&I	124,125
Buffer	12,410
Retail Subtotal	**136,535**
Recharge	0
Total	**136,535**

Water Shortage Stages

WSCP Stage	Reduction Upper End	Reduction Lower End	(AFY) Upper End	(AFY) Lower End
None				136,500
Stage 1	0%	10%	136,500	122,900
Stage 2	10%	25%	122,900	102,400
Stage 3	25%	35%	102,400	88,700
Stage 4	35%	50%	88,700	68,300
Stage 5		> 50%	68,300	

Note: Refer to seperate Supply and Demand projections table for assumptions.





Attachment 2
City of Fresno Municipal Code Chapter 6-520

SEC. 6-520. - WATER CONSERVATION.

(a) In the use of potable water supplied by the city, no customer shall do or permit any of the following:

(1) Use potable water to irrigate or water outdoor landscaping in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures,

(2) Keep, maintain, operate, or use any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage,

(3) Willfully or negligently waste water,

(4) Flood any part of the premises of another,

(5) Sprinkle the premises of another so as to prevent the normal use thereof or unreasonably wet objects thereon which should not be subjected to a spray of water except as naturally caused by the elements or by action of the owner of the object,

(6) Sprinkle or irrigate any yard, ground, premise, or vegetation except as set forth in the City's Outdoor Water Use Schedule,

(i) Annual Exemptions. The following properties may submit an application for a one-year exemption to the Outdoor Water Use Schedule in effect at the time of the application:

a. Properties with multiple addresses, and

b. Properties with turfed or landscaped areas of two acres or larger, and

c. Properties without street addresses.

The owners of such properties shall submit a proposed modified Outdoor Water Use Schedule in writing to the Director or designee for approval or modification. The Director may approve a modified Outdoor Water Use Schedule for with more frequent watering or different watering days than allowed by the Outdoor Water Use Schedule in effect at the time the application for an exemption is submitted for consideration. If the Director determines the proposed exemption will adversely impact system water pressures in the service area, the proposed exemption will be denied. All Annual Exemptions approved by the Director shall automatically expire on December 31 of each year, and the property owners must re-apply for an exemption to the Outdoor Water Use Schedule.

(ii) Short-term Exemptions. The following properties may submit an application for an exemption from the Outdoor Water Use Schedule for a specific time period not to exceed one month.

a. Properties with new lawns not yet established.

b. Properties seeking to use water for a bona fide use, such as solar panel cleaning or other use necessary for health or preservation of property.

The owners of such properties shall submit a proposed modified Outdoor Water Use Schedule in writing to the Director or designee for approval or modification no less than 48 hours before the proposed non-compliant water usage. The Director may approve a modified Outdoor Water Use Schedule that may provide for more frequent outdoor water use or different outdoor water use days than allowed by the Outdoor Water Use Schedule in effect at the time the application for an exemption is submitted for consideration. If the Director determines the proposed exemption will adversely impact system water pressures in the service area, the proposed exemption will be denied. All Short-term Exemptions approved by the Director shall automatically expire on the date set forth on the Short-Term Exemption permit.

(7) Sprinkle or irrigate any yard, ground, premise, or vegetation unless the watering device used is controlled by an shut-off device, or a person is in immediate attendance of the hose or watering device,

(8) Wash any privately owned motor vehicle, trailer, or boat except from a bucket or in a commercial car wash, provided a hose equipped with a shut-off nozzle may be used for a quick rinse without causing water to flow onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures,

(9) Wash or rinse with a hose or watering device any sidewalk, driveway, parking area, tennis court, patio, or any other exterior paved area, except for public health and safety reasons at public gathering places, or

(10) Use potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.

(11) Irrigate ornamental turf on public street medians with potable water, except where:

(i) The turf serves a community or neighborhood function, including but not limited to, recreational uses and civic or community events;

(ii) The turf is irrigated incidentally by an irrigation system primarily intended to irrigate trees;

(iii) The turf is irrigated with recycled water.

This prohibition does not include trees and shrubs on public medians, which may be irrigated.

(12) Irrigate outdoor landscapes with potable water during and within 48 hours after measurable rainfall.

(13) Serve drinking water other than upon request in eating or drinking establishments, including but not limited to, restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served or purchased.

(14) Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.

(15) Automatically change towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

(16) Drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer. Residents with private swimming pools shall file a written application for a permit with the City of Fresno Water Division at least 48 hours prior to draining the pool. Any customer whose swimming pool is drained by order of the Department of Health for failure to maintain it properly will also be issued a notice of violation of the City of Fresno Municipal Code. The draining of pools for reasons of health and safety hazards as determined by the City of Fresno Water Division and/or the Department of Health is permitted. The application shall include the results of a pool water test conducted by an independent testing organization which shows a cyanuric acid level above 100 parts per million, total dissolved solids over 2,500 parts per million, or calcium over 450 parts per million, or stating the nature and duration of repairs to be made and the date on which the pool will be drained.

(17) Fill newly constructed or refurbished swimming pools without a pool fill permit from the City of Fresno Water Division.

(18) Refill (top off) established swimming pools except during times when outdoor water use is allowed at the property address pursuant to the Outdoor Water Use Schedule.

(b) Notwithstanding the foregoing, drip irrigation of community and residential fruit and vegetable gardens and fruit tr permitted any day of the week; for this subsection, "drip irrigation system" means a non-spray, low-pressure, and lc volume irrigation system in good working order utilizing emission devices with a flow rate of less than four gallons p hour, designed to slowly apply small volumes of water at or near the root zone of plants, when used primarily for ir of fruit and vegetable gardens and fruit trees; should any city water customer be cited for excessive water use, the customer may contact the Water Division and request an exemption from the Outdoor Water Use Schedule for a hc community garden that is irrigated with a drip irrigation system. Upon being contacted, the Water Division will sche visit to the subject property to inspect the garden and the drip irrigation system used to irrigate the garden. The Wa Division shall grant an exemption for home or community garden with the following conditions:

(1) The property must limit water use to an amount equal to, or less than, the average monthly water use for the single-family residential customer class. The monthly average water use for the single-family residential customer class is printed on monthly utility bills issued by the City.

(2) The drip irrigation system must be in good working order with no leaks, line breaks, or other deficiencies that will contribute to water waste. Exemptions shall be withheld until corrective action is taken to address system deficiencies.

(3) The drip irrigation system must be used primarily for the home or community garden, and not for other landscape on the property- Exemptions shall be withheld until the drip irrigation system for the home or community garden can be isolated from other landscape on the property.

(4) No flood irrigation will be allowed with the drip irrigation system, and water must remain on the subject property with no runoff to sidewalks, driveways, pavements, or adjacent properties.

(5) The home and community garden exemption is provided exclusively for drip irrigation systems only, and will not be allowed for other types of irrigation systems.

(6) This exemption shall only apply to properties ¼ acre or smaller. For properties greater than ¼ acre, the property owner may apply to the Director or designee for an exemption.

(c) Lawn sprinkling systems shall be properly designed, installed, maintained, and operated to prevent waste of water.

(d) Repealed.

(e) The provisions of this section are conditions of service.

(1) Each incident of Excessive Use as defined in section 6-501, or use of water inconsistent with the provisions of this section, is an incident of water waste.

(2) If a customer has one or more incidents of water waste during a month, as observed by City staff or as recorded by the City's water meter reading system, the customer shall be issued a Notice of Water Waste and, if applicable, charged a fine as set forth in the Master Fee Schedule. Such fines shall be added to the customer's monthly utility bill and shall be due and payable with that utility bill and subject to the FMC 6-106, Late Payment of Municipal Service Bills.

(3) Incident counts for water waste shall be monitored, recorded, documented and enforced on a monthly basis during the calendar year for individual customers, and the incident counts shall be reset January 1 of each year.

(4) If a customer performs or permits incidents of water waste more than six consecutive months, the water service to the customer may be terminated unless in the opinion of the Director such termination would result in an unreasonable risk to the health and safety of persons. If water service is terminated for

successive incident of water waste, the water service may only be restored upon execution of an agreement with the customer to adhere to the conditions of service described in this section.

(5) If a customer objects to a fine imposed for an incident of water waste pursuant to this section, the following appeal process may be used.

Step 1.

(a) Within thirty days of issuance of the utility bill including the fine, the customer may contact the Water Conservation Program to appeal an incident of water waste resulting in a fine with the staff person who initiated the enforcement measure. The staff person shall gather the facts about the incident.

(b) The customer may provide staff with evidence there was no incident of water waste, or of a bona fide reason for the incident of water waste, including evidence of a water leak, or another reasonable justification for the water use, within ten business days of the customer's first communication with the Water Conservation Program regarding the alleged incident of water waste.

(c) Within ten business days of the initiation of an appeal, staff shall provide the customer with documentation demonstrating the incident of water waste, if applicable.

(d) The staff will provide the facts and evidence related to the appeal to the Water Conservation Program Supervisor, who will determine whether to rescind the enforcement measure. The Water Conservation Program Supervisor will provide a written decision to the customer within fifteen business days of the customer's appeal, or receiving any applicable evidence from the customer, whichever comes later.

Step 2. If the customer is not satisfied with the decision of the Water Conservation Program Supervisor, they may appeal to the Director or designee within ten business days of the date of the Water Conservation Program Supervisor's decision. The Director or designee shall review the appeal and any evidence the customer previously submitted, and provide a written decision within thirty days of receiving the appeal.

Step 3. If the customer is not satisfied with the decision of the Director of Public Utilities, the customer may appeal to the City's Administrative Hearing Officer in the manner provided in Chapter 1, Article 4 of this code. Such decision shall be final.

(Orig. Ord. 4481; Am. Ord. 6486, 1964; Am. Ord. 73-120, § 6, eff. 8-16-73; Am. Ord. 77-99, § 1, eff. 9-23-77; Am. Ord. 78-74, §§ 1, 2, eff. 5-26-78; Am. Ord. 80-115, § 149, eff. 8-8-80; Am. Ord. 89-48, §§ 1, 2, eff. 4-18-89; Am. Ord. 89-77, § 1, eff. 6-7-89; Am. Ord. 89-102, § 1, eff. 9-22-89; Am. Ord. 90-72, § 1, eff. 8-24-90; Am. Ord. 90-97, § 1, eff. 10-12-90; Am. Ord. 91-104, § 1, eff. 10-18-91; Am. Ord. 91-112, § 1, eff. 11-22-91; Am. Ord. 93-14, § 1, eff. 2-23-93; Am. Ord. 93-20, § 2, eff. 4-30-93; Am. Ord. 2015-13, § 1, eff. 5-21-15; Am. Ord. 2015-29, § 1, eff. 8-27-15; Am. Ord. 2017-56, § 3, eff. 11-19-17; Am. Ord. 2018-45, § 1, eff. 8-10-18; Am. Ord. 2019-011, § 3, eff. 5-31-19).

Editor's note— The provisions in subsection 6-520(e) regarding the enforcement program for incidents of water waste are effective January 1, 2018.

Attachment 3
Water Shortage Resolution

RESOLUTION NO. 2019-073

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO AMEND THE WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the Urban Water Management Planning Act requires the City of Fresno (City) to describe its water conservation measures within its Water Shortage Contingency Plan (WSCP);

WHEREAS, the City adopted its current WSCP on June 23, 2016, as part of the City's 2015 Urban Water Management Plan (UWMP);

WHEREAS, the City Council adopted amendments to the WSCP on October 12, 2017;

WHEREAS, in response to water conservation mandates from the State of California and to provide flexibility to its customers, the City has prepared further amendments to the WSCP to update water conservation requirements and watering restrictions in different water conservation stages in the City of Fresno.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Fresno as follows:

1. The City hereby adopts the amended Water Shortage Contingency Plan, as attached in Tables 1-3 of Exhibit A herein.

2. Resolution 2018-253 shall be repealed on the effective date of this Resolution.

* * * * * * * * * * * * * *

Date Adopted: 4/11/2019
Date Approved: 4/16/2019
Effective Date: 4/16/2019

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, YVONNE SPENCE, MMC CRM, City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 11th day of April, 2019.

AYES : Arias, Bredefeld, Chavez, Esparza, Soria, Caprioglio
NOES : None
ABSENT : None
ABSTAIN : None

Mayor Approval: April 16th, 2019
Mayor Approval/No Return: N/A, 2019
Mayor Veto: N/A, 2019
Council Override Vote: N/A, 2019

YVONNE SPENCE, MMC CRM
City Clerk

By: Yvonne Spence
Deputy

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

By: Amanda Freeman 04/18/19
Amanda B Freeman Date
Senior Deputy City Attorney

Attachment:
Exhibit A – Revised Water Shortage Contingency Plan, Tables 1-3

EXHIBIT A

Revised Water Shortage Contingency Plan

Table 1: Stages of Water Shortage Contingency Plan (WSCP)

Stage	Percent Supply Reduction	Water Supply Condition
1	10%	Stage 1 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the second of two consecutive years, the volume of surface water available to the City through USBR and FID is projected to be less than the long-term average and the reduction in supply, averaged over the consecutive years, is equal to 10% or greater, or • Groundwater contamination conditions exists (DDW required the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 10% loss in water production capacity, or • Localized groundwater cones of depression develop exceeding historic low water levels and, to avoid possible litigation with responsible parties of point source contaminant plumes, the City must shut down existing wells that result in a 10% loss in groundwater production capacity, or • A combination of the above mentioned circumstances or a disaster reduced the City's overall water supply or production capabilities by 10% or more. • After having been in a Stage 2 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10 - 25%	Stage 2 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the third of three consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the three consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 25% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 25% of the long-term average, or • One-year change in average groundwater level in 30 key City wells exceeds 3 feet or two-year change in average groundwater level in 30 key City wells exceeds 6 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 25% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities

Stage	Percent Supply Reduction	Water Supply Condition
		by 25% or more. • After having been in a Stage 3 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point consistent with the above conditions for this stage.
3	25 to 35%	Stage 3 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the fourth of four consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the four consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 35% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 35% of the long-term average, or • One-year change in average groundwater level in 30 key City wells exceeds 5 feet or two-year change in average groundwater level in 30 key City wells exceeds 10 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 35% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 35% or more. • After having been in a Stage 4 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.

Stage	Percent Supply Reduction	Water Supply Condition
4	35 - 50%	Stage 4 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the fifth of five consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the five consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 50% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 50% of the long-term average, or • One-year change in average groundwater level in 30 key wells exceeds 7.5 feet or two-year change in average groundwater level in 30 key City wells exceeds 12 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 50% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 50% or more.

Table 2: Restrictions and Prohibitions on End Uses

(#)	Stage	Restrictions and Prohibitions	Additional Explanation or Reference	Penalty, Charge or Other Enforcement
a	1-4	Landscape – Limit landscape irrigation to specific times (Outdoor Water Use Schedule)	See Outdoor Water Use Schedule, Table 2a.	Yes See Table 3
b	1-3	Other	Prohibit car washing except with a bucket only (a hose equipped with a shut off nozzle may be used for a quick rinse)	Yes See Table 3
c	1-4	Other – Prohibit use of potable water for washing hard surfaces	Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas except where necessary for public health or safety	Yes See Table 3
d	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit irrigating outdoor landscapes with potable water during and within 48 hours after measurable rainfall	Yes See Table 3
e	1-4	Landscape – Prohibit certain types of landscape irrigation	Sprinkle or irrigate any yard, ground, premise, or vegetation unless the watering device used is controlled by an automatic shut-off device, or a person is in immediate attendance of the hose or watering device	Yes See Table 3
f	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit using potable water to irrigate or water outdoor landscaping in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures	Yes See Table 3
g	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit irrigation of ornamental turf on public street medians with potable water, except where the turf serves a community or neighborhood function, it's irrigated incidentally by an irrigation systems designed to irrigate trees, or the turf is irrigated with recycled water	Yes See Table 3

h	4	Other	Prohibit car washing	Yes See Table 3
i	1-4	Other – Restaurants may only serve water upon request	No restaurant, hotel, café, cafeteria, or other public place where food is sold is served or offered for sale, shall serve drinking water to any customer unless expressly requested	Yes See Table 3
j	1-4	Landscape – Prohibit certain types of landscape irrigation	Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development	Yes See Table 3
k	1-4	Water Features – Restrict water use for decorative water features, such as fountains	Prohibit use of potable water to clean, fill or maintain decorative fountains, lakes, or ponds unless such water is reclaimed	Yes See Table 3
l	4	Other – Prohibit use of potable water for construction and dust control	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, building wash down where non-potable or recycled water is sufficient	Yes See Table 3
m	1-4	Other – Prohibit automatic linen service in hotels and motels	Prohibit automatically changing towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily	Yes See Table 3
n	4	Other	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City Manager	No
o	4	Other – Customers must repair leaks, breaks, and malfunctions in a timely manner	Prohibit allowing potable water to escape from breaks within the customer's plumbing system for more than twenty-four (24) hours after the customer is notified or discovers the break	Yes See Table 3

p	4	Other – Prohibit vehicle washing except at facilities using recycled or recirculating water	Prohibit washings cars, boats, trailers, aircraft, or other vehicles except to wash such vehicles at commercial or fleet vehicle washing facilities using water recycling equipment	Yes See Table 3
q	1-4	Swimming Pools – Prohibit draining swimming pools more than once every three years	Prohibit draining swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer	Yes See Table 3
r	1-4	Swimming Pools – Limit filling new or refurbished pools by requiring a pool fill permit	Prohibit filling new or refurbished swimming pools without obtaining a pool fill permit from the City	Yes See Table 3
s	1-4	Swimming Pools – limit filling (topping off) established pools to times and days permitted by the Outdoor Water Use Schedule	Prohibit filling (topping off) swimming pools during times when outdoor irrigation is allowed according to the Outdoor Water Use Schedule	Yes See Table 3
t	4	Pools and Spas – Require covers for pools and spas	Require covers for swimming pools when not in use	No
u	4	Other	Prohibit Use of Outdoor Misters	No

Table 2a: Outdoor Water Use Schedule

Stage	Summer (April 1 – October 31)	Summer Outdoor Water Use days	Winter (November 1 – March 31)	Winter Outdoor Water Use days	Outdoor Water Use Times
1	3 days/week recommended	Even addresses: Wednesday, Friday, Sunday Odd addresses: Tuesday, Thursday, Saturday	1 day/week recommended	Even addresses: Sunday Odd addresses: Saturday	Outdoor Water Use allowed 12:00 AM – 9:59 AM & 6:00 PM – 11:59 PM Outdoor Water Use is prohibited all days 10:00 AM – 6:00 PM
2	3 days/week	Even addresses: Wednesday, Friday, Sunday Odd addresses: Tuesday, Thursday, Saturday	1 day/week	Even addresses: Sunday Odd addresses: Saturday	
3	2 days/week	Even: Wednesday and Sunday Odd: Tuesday and Saturday	1 day/week	Even addresses: Sunday Odd addresses: Saturday	
4	1 day/week	Even addresses: Sunday Odd addresses: Saturday	No outdoor water use		

Table 3: Penalties for Incidents of Water Waste

Incident Month	Incident Fine	Enforcement Schedule
1	$0	The first month an incident of water waste is recorded during the calendar year, the City shall issue a Notice of Water Waste to the customer for the incident observed by City staff or as recorded directly by the City's water meter reading system.
2	$25	The second month an incident of water waste is recorded is recorded for a customer during the calendar year, the City shall assess a fine of $25 to the customer, and the fine shall be applied to the customer's monthly utility bill.
3	$50	The third month an incident of water waste is recorded for a customer during the calendar year, the City shall assess a fine of $50 to the customer, and the fine shall be applied to the customer's monthly utility bill.
4	$100	The fourth month an incident of water waste is recorded for a customer during the calendar year, the City shall assess a fine of $100 to the customer, and the fine shall be applied to the customer's monthly utility bill.
5 -12	$100	For the fifth month an incident of water waste is recorded during the calendar year, and every month thereafter for the remainder of the calendar year during which an incident of water waste is recorded, the City shall assess a fine of $100 to the customer, and the fine shall be applied to the customer's monthly utility bill.
After 6	N/A	If a customer has more than six consecutive months of documented water waste incidents, the water service to the customer may be restricted or terminated unless in the opinion of the Director such restriction or termination would result in an unreasonable risk to the health and safety of persons. If water service is terminated for excessive violations of the water waste provisions as defined herein, the water service may only be restored upon execution of an agreement with the customer to adhere to the conditions of service described in this section.

April 12, 2019

Council Adoption: 4/11/19
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR LEE BRAND

FROM: YVONNE SPENCE, MMC
City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of 4/11/19, Council adopted the attached Resolution No. 2019-073, entitled **Amending the City of Fresno Water Shortage Contingency Plan.** Item No. 3-B (3), File ID19-1472, by the following vote:

Ayes	:	Arias, Bredefeld, Caprioglio, Chavez, Esparza, Soria
Noes	:	None
Absent	:	None
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before April 22, 2019. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval

****

Thank you.

APPROVED/NO RETURN: ____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 4-16-19
Lee Brand, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

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CITY OF FRESNO
CITY CLERK'S OFFICE

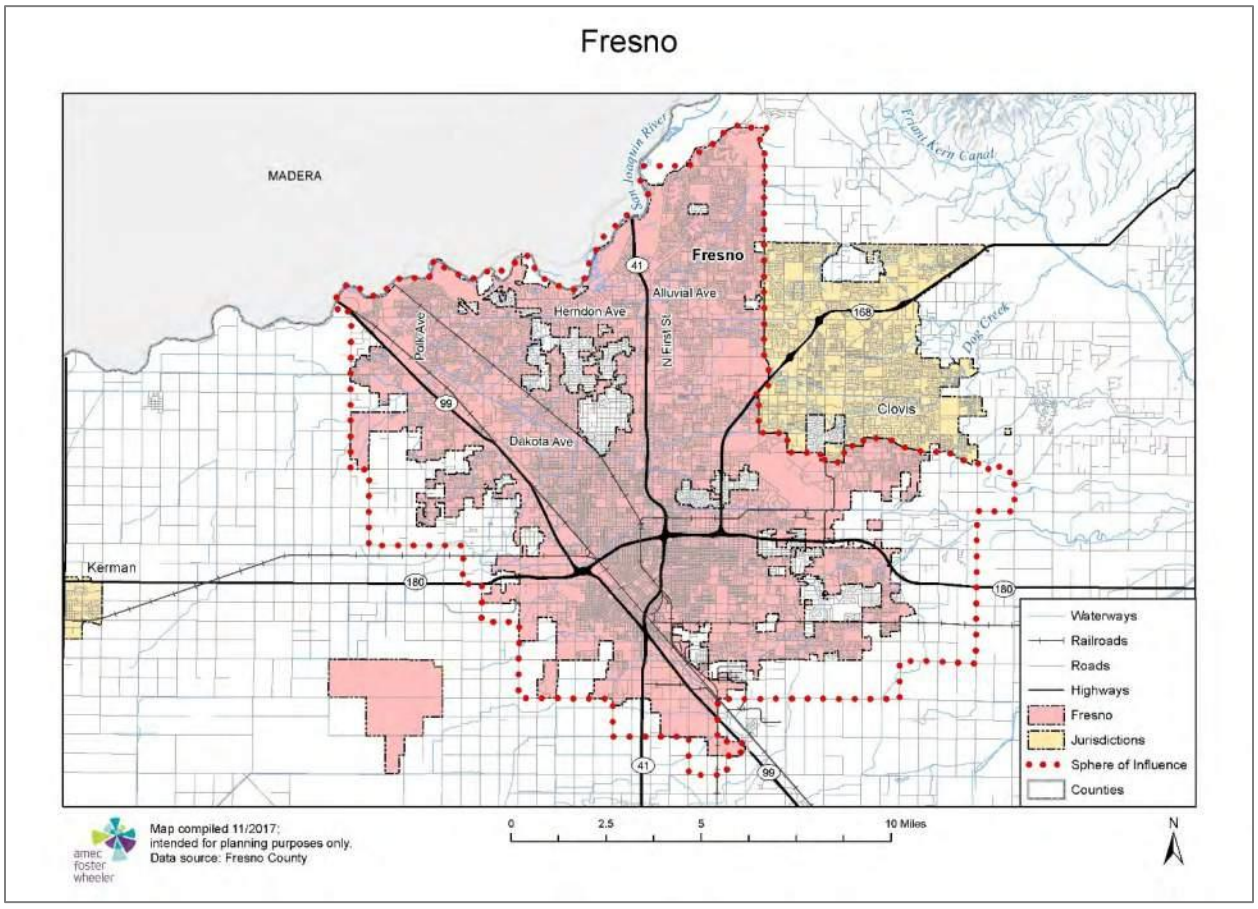
Attachment 4
Fresno County Multi-Jurisdictional Hazard Mitigation Plan, Annex E: City of Fresno

Reference the complete Fresno County Multi-Jurisdictional Hazard Mitigation Plan online:
https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/12/FresnoCountyHMPFinal.pdf

E.1 Community Profile

Figure E.1 displays a map and the location within Fresno County of the City of Fresno and its Sphere of Influence.

Figure E.1: The City of Fresno



E.1.1 Geography and Climate

The City of Fresno and its Sphere of Influence encompass a 100,400-acre area in central Fresno County. Over the past decade, the City has expanded into the northern, northwestern, and eastern reaches of its Sphere of Influence. Except for the deep channel of the San Joaquin River at the northern boundary of the City, Fresno's topography is generally level and slopes gently to the southwest. The upper San Joaquin River lies at the City's northerly boundary and has carved a deep channel, confining the river between steep bluffs that range from 20 to approximately 100 feet in height.

Fresno has a Mediterranean climate, averaging over 262 sunny days per year and little or no measurable precipitation from June through September. Annual rainfall typically totals 12-14 inches in episodic events lasting up to a few days at most. Fresno's prevailing winds are typically light and from the northwest.

Storms with strong weather disturbances (lightning and very agitated winds) may occur from autumn months through the spring, with the strength of the storm dependent upon temperature gradients between moving weather fronts.

Winter mornings in December and January approach freezing but only rarely reach as low as, or below, 32ºF; winter daytime high temperatures almost always approach or exceed 40ºF. Snowfall is an extremely rare and transient phenomenon; the last recorded snowfall in Fresno was ½ inch on December 20, 1998. The Tule fog, a thick ground fog that settles in the San Joaquin Valley from late fall through early spring, is the leading cause of weather-related accidents in California. In addition to causing visibility issues, "black ice" from precipitated fog may temporarily affect some roadways and bridges during the winter.

Summer daytime peak temperatures are high in Fresno. Some heat waves last over a week with daytime highs well over 100ºF and issuance of health advisories. Summer evenings provide for some cooling of 10-15ºF with the early morning daybreak hours cooling by 20-30ºF, depending on humidity (low humidity allows for more radiant cooling).

Geography and climate combine to create a general accumulation of air pollutants in the San Joaquin Valley (and in the City of Fresno) that occasionally result in unhealthy air quality conditions. Air quality problems are exacerbated by dust storms, human activities (e.g., vehicle emissions and fireplace and wood stove use), atmospheric photochemical processes, and forest fires from local and regional fires. The City has chronically failed to attain some of the national and state ambient air quality standards, but due to the efforts of the California Air Resources Board and the regional San Joaquin Valley Unified Air Pollution Control District, progress toward attainment of ozone (oxidant) and particulate matter standards is being made. Carbon monoxide standards were deemed to have been attained in the 1990s.

E.1.2 History

Development of what today is the City of Fresno began in 1871, when the Central Pacific Railroad chose the Fresno Station for its San Joaquin Valley rail line. The City soon became the County seat and the shipping and distribution hub for the region's agricultural industry. An economic boom across California in the 1880s helped transform Fresno from a village to a city, and helped drive its incorporation in 1885. Today, the City of Fresno is the center of trade, commerce, finance, and transportation for the San Joaquin Valley.

E.1.3 Economy

The most comprehensive economic data available for the City of Fresno comes from the U.S. Census Bureau by way of the American Community Survey (ACS). Select estimates of economic characteristics for the City of Fresno are shown in Table E.1.

Table E.1: City of Fresno's Economic Characteristics, 2015

Characteristic	City of Fresno
Families below Poverty Level	24.4%
All People below Poverty Level	29.8%
Median Family Income	$45,806
Median Household Income	$41,531
Per Capita Income	$19,465
Population in Labor Force	231,332
Population Employed*	198,113
Unemployment	14.3%

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/
*Excludes armed forces

Tables E.2 and E.3 show how the City of Fresno's labor force breaks down by occupation and industry based on 5-year estimates from the 2015 American Community Survey.

Table E.2: City of Fresno's Employment by Occupation, 2015

Occupation	# Employed	% Employed
Management, Business, Science and Arts Occupations	57,374	29.0
Management, Business, and Financial Occupations	*(20,767)*	*(10.5)*
Computer, Engineering, and Science Occupations	*(6,018)*	*(3.0)*
Education, Legal, Community Service, Arts, and Media Occupations	*(20,262)*	*(10.2)*
Healthcare Practitioner and Technical Occupations	*(10,327)*	*(5.2)*
Sales and Office Occupations	49,752	25.1
Service Occupations	41,528	21.0
Production, Transportation, and Material Moving Occupations	26,738	13.5
Natural Resources, Construction, and Maintenance Occupations	22,721	11.5
Total	**198,113**	**100.00**

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/

Table E.3: City of Fresno's Employment by Industry, 2015

Industry	# Employed	% Employed
Educational Services, and Health Care, and Social Assistance	48,557	24.5
Retail Trade	23,337	11.8
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	20,643	10.4
Professional, Scientific, and Management, and Administrative and Waste Management Services	16,742	8.5
Manufacturing	14,869	7.5

Industry	# Employed	% Employed
Public Administration	12,030	6.1
Finance and Insurance, and Real Estate and Rental and Leasing	10,875	5.5
Other Services, Except Public Administration	10,710	5.4
Construction	10,586	5.3
Agriculture, Forestry, Fishing and Hunting, and Mining	10,446	5.3
Transportation and Warehousing, and Utilities	9,476	4.8
Wholesale Trade	7,158	3.6
Information	2,684	1.4
Total	**198,113**	**100.00**

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/

With the depressed real estate and construction market and economic recession toward the end of the 2000-2010 decade, unemployment rates increased to a peak of 18.0 percent in 2010. Since then, the unemployment rate has steadily decreased. The most recent annual data from the State of California Employment Development Department indicates that in 2016 there were 238,400 people in the City of Fresno labor force. Of these, 214,000 were employed; 24,400 were not. The unemployment rate was 10.2 percent.

E.1.4 Population

According to the California Department of Finance, Fresno's population was estimated to be 520,778 in 2016. Select demographic and social characteristics for the City from the U.S. Census Bureau's 2015 American Community Survey 5-year estimates are shown in Table E.4.

Table E.4: City of Fresno's Demographic and Social Characteristics, 2015*

Characteristic	City of Fresno
Gender/Age	
Male	49.2%
Female	50.8%
Median age	30.0
Under 5 years	8.9%
Under 18 years	29.5%
65 years and over	9.9%
Race/Ethnicity**	
White	52.2%
Asian	13.0%
Black or African American	7.9%
American Indian/Alaska Native	1.1%
Hispanic or Latino (of any race)	48.5%
Education	
High school graduate or higher	75.2%
Disability Status	
Population 5 years and over	11.75%

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/
*Based on a 2015 estimated population of 510,451
**Of the 95.4% reporting one race

For information about how some of these demographics affect social vulnerability and how they compare to other Fresno County jurisdictions, California, and the United States, see "Social Vulnerability" in Section 4.3.1 Fresno County Vulnerability and Assets at Risk of the main plan. A more in-depth look at the population of the City of Fresno, including the City's special needs populations, is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement).

E.2 Hazard Identification and Summary

The City of Fresno's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Fresno (see Table E.5). In the context of the plan's planning area, there are no hazards unique to Fresno.

Table E.5: City of Fresno—Hazard Summaries

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance
Agricultural Hazards	Limited	Highly Likely	Critical	Low
Avalanche	N/A	N/A	N/A	N/A
Dam Failure	Significant	Unlikely	Limited	Medium
Drought	Significant	Likely	Critical	High
Earthquake	Extensive	Occasional	Critical	Medium
Flood/Levee Failure	Significant	Occasional	Critical	High
Hazardous Materials Incident	Significant	Likely	Critical	High
Human Health Hazards:				
Epidemic/Pandemic	Extensive	Occasional	Critical	Medium
West Nile Virus	Limited	Highly Likely	Negligible	Low
Landslide	Limited	Unlikely	Negligible	Low
Severe Weather				
Extreme Cold/Freeze	Significant	Occasional	Negligible	Low
Extreme Heat	Extensive	Highly Likely	Limited	Medium
Fog	Extensive	Likely	Limited	Medium
Heavy Rain/Thunderstorm/ Hail/Lightning	Extensive	Highly Likely	Limited	Low
Tornado	Extensive	Occasional	Negligible	Low
Windstorm	Extensive	Likely	Limited	Medium
Winter Storm	Extensive	Highly Likely	Negligible	Low
Soil Hazards:				
Erosion	No Data	Likely	No Data	Low
Expansive Soils	No Data	Occasional	No Data	Low
Land Subsidence	Limited	Occasional	No Data	Low
Volcano	Extensive	Unlikely	Negligible	Low
Wildfire	Extensive	Highly Likely	Critical	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths

Probability of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.	Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid **Significance** Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact

E.3 Vulnerability Assessment

The intent of this section is to assess the City of Fresno's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide, which was distributed to each participating municipality or special district to complete during the original outreach process in 2009. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and identify related vulnerabilities unique to each jurisdiction. In addition, the City of Fresno's HMPC team members were asked to validate the matrix that was originally scored in 2009 based on the experience and perspective of each planning team member relative to the City of Fresno.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan (See Table 4.1). However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See Table E.5). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Note: The hazard "Significance" reflects overall ranking for each hazard, and is based on the City of Fresno's HMPC member input from the Data Collection Guide and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table E.5 reflect the hazards that could potentially affect the City. Those of Medium or High significance for the City of Fresno are identified below. The discussion of vulnerability for each of the following hazards is located in Section E.3.2 Estimating Potential

Losses. Based on this analysis, the priority hazards (High Significance) for mitigation include drought, flood/levee failure, and hazardous materials incidents.

- dam failure
- drought
- earthquake
- epidemic/pandemic
- extreme heat
- flood/levee failure
- fog
- hazardous materials incidents
- wildfire
- windstorm

Other Hazards

Hazards assigned a Significance rating of Low and which do not differ significantly from the County ranking (e.g., Low vs. High) are not addressed further in this plan, and are not assessed individually for specific vulnerabilities in this section. In the City of Fresno, those hazards ranked Low are as follows:

- agricultural hazards*
- human health hazards: West Nile Virus
- landslide
- severe weather: heavy rain/thunderstorm/hail/lightning, tornado
- soil hazards
- volcano
- extreme cold
- winter storm

Note on Agricultural Hazards*: Agricultural hazards are ranked Low in the City of Fresno than for the County overall (ranked High) because very little land in the City is used for agricultural purposes.

Additionally, the City's Committee members decided to rate several hazards as Not Applicable (N/A) to the planning area due to a lack of exposure, vulnerability, and no probability of occurrence. **Avalanche** is considered Not Applicable (N/A) to the City of Fresno.

E.3.1 Assets at Risk

This section considers Fresno's assets at risk, including values at risk; critical facilities and infrastructure; historic, cultural, and natural resources; economic assets; and growth and development trends.

Values at Risk

The following data on property exposure is derived from the Fresno County 2017 Parcel and Assessor data. This data should only be used as a guideline to overall values in the City as the

information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is likely low and does not reflect current market value of properties. It is also important to note that in the event of a disaster it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. Table E.6 shows the 2017 values at risk broken down by property type for the City of Fresno.

Table E.6: 2017 Property Exposure for the City of Fresno by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Agricultural	76	53	$2,887,304	$2,887,304	$5,774,608
Commercial	6,110	24,004	$5,471,778,084	$5,471,778,084	$10,943,556,168
Exempt	1,012	3,881	$0	$0	$0
Industrial	2,575	5,630	$1,420,216,900	$2,130,325,350	$3,550,542,250
Multi-Residential	5,793	52,504	$2,416,885,833	$1,208,442,917	$3,625,328,750
Open Space	1	1	$150,882	$150,882	$301,764
Residential	113,468	117,771	$15,122,142,902	$7,561,071,451	$22,683,214,353
Unknown	2	2	$530,082	$530,082	$1,060,164
Total	**129,037**	**203,846**	**$24,434,591,987**	**$16,375,186,070**	**$40,809,778,057**

Source: Fresno County 2017 Parcel and Assessor data

Since the 2009 Plan, the City of Fresno has experienced notable increases in agricultural, commercial, and residential properties and property values at risk. Compared to improved values from the Fresno County Assessor's Office's 2007 Certified Roll Values, agricultural improved value has increased by 254.2 percent, commercial improved value has increased by 299.8 percent and total residential improved value has increased by 265.8 percent. Part of this dramatic increase in exposure of commercial and residential properties can be attributed to annexations of previously unincorporated County land that have occurred within the last decade.

Critical Facilities and Infrastructure

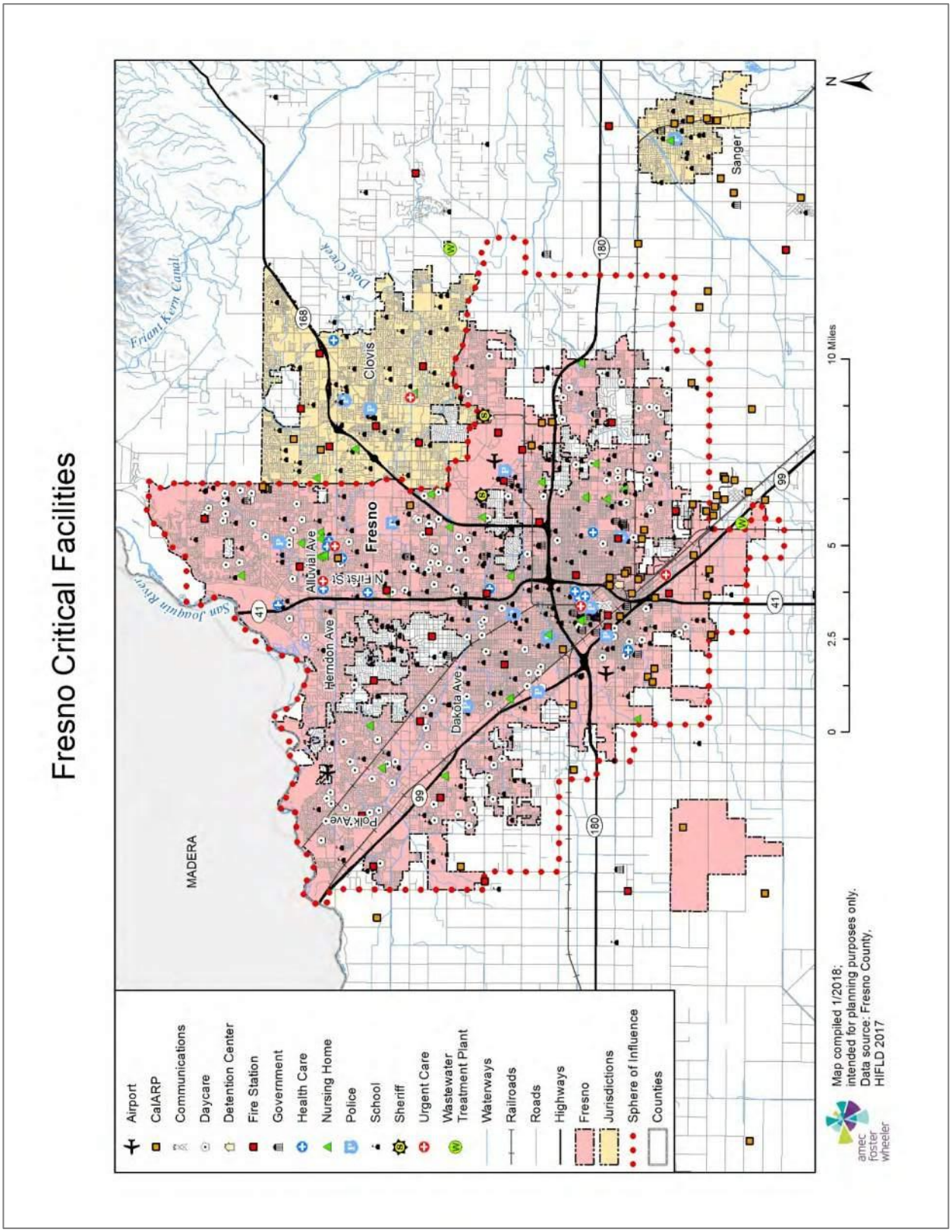
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Fresno from Fresno County GIS is provided in Table E.7 and mapped in Figure E.2.

Table E.7: City of Fresno's Critical Facilities

Critical Facility Type	Number
Airport	3
Behavioral Health	4
CalARP	28
Colleges & Universities	14
Communications	1
County Government	4
Courthouse	1
Daycare	155
Department of Agriculture	2
Department of Public Health	4
Department of Public Works	1
Department of Social Services	9
Detention Center	4
District Attorney	2
Fire Station	21
General Services	3
Health Care	12
Nursing Home	27
Police	10
School	183
Sheriff	3
Supplemental College	4
Urgent Care	4
Total	**499**

Source: Fresno County, HIFLD 2017

Figure E.2: City of Fresno's Critical Facilities



The list of specific critical facilities and community assets is maintained by the City of Fresno Police Department. The Fresno Urban Area Critical Infrastructure List is considered confidential and may be accessed through the Fresno Police Department Homeland Security Division.

Historic, Cultural, and Natural Resources

Historic and Cultural Sites

The Cultural Resource Facility located on the California State University, Bakersfield campus maintains a database, maps, and descriptive surveys of prehistoric sites in the Fresno area. Details of the locations are kept confidential due to the risk of theft or vandalism of artifacts. The general location of these sites is along the San Joaquin River and its bluffs, where permanent Native American settlements were established near a permanent water supply and seasonal salmon fishery.

The City of Fresno maintains a local official register of historic resources (available from the historic preservation officer in the City's Planning and Development Department). There are approximately 284 properties on the register. Twenty-one of the properties were demolished or destroyed by fire after being placed on the list, and three other properties have been relocated to sites outside the City of Fresno. The local register includes 31 properties that are on the National Register of Historic Places (see Table E.8).

Table E.8: City of Fresno's Properties on the National Register of Historic Places

Property Name	Address	Date Listed
Azteca Theater	836-840 F Street	4/21/2017
Bank of Italy	1015 Fulton Mall	10/29/1982
Brix, H. H., Mansion	2844 Fresno Street	9/15/1983
Einstein House	1600 M Street	1/31/1978
Forestiere Underground Gardens	5021 W. Shaw Avenue	10/28/1977
Fresno Bee Building	1555 Van Ness Avenue	11/1/1982
Fresno Brewing Company Office and Warehouse	100 M Street	1/5/1984
Fresno County Hall of Records	2281 Tulare Street	12/22/2011
Fresno Memorial Auditorium	2425 Fresno Street	5/10/1994
Fresno Republican Printery Building	2130 Kern Street	1/2/1979
Fresno Sanitary Landfill	West and Jensen Avenues	8/7/2001
Holy Trinity Armenian Apostolic Church	2226 Ventura Street	7/31/1986
Hotel Californian	851 Van Ness Avenue	4/21/2004
Kearney, M. Theo, Park and Mansion	7160 Kearney Boulevard	3/13/1975
Kindler, Paul, House	1520 E. Olive Avenue	10/29/1982
Maulbridge Apartments	2344 Tulare Street	5/6/1982
Meux House	1007 R Street	1/13/1975
Old Administration Building, Fresno City College	1101 University Avenue	5/1/1974
Old Fresno Water Tower	2444 Fresno Street	10/14/1971
Pantages, Alexander, Theater	1400 Fulton Street	2/23/1978
Physicians Building	2607 Fresno Street	11/20/1978

Property Name	Address	Date Listed
Rehorn House	1050 S Street	1/8/1982
Romain, Frank, House	2055 San Joaquin Street	1/11/1982
San Joaquin Light & Power Corporation Building	1401 Fulton Street	1/3/2006
Santa Fe Hotel	935 Santa Fe Avenue	3/14/1991
Santa Fe Passenger Depot	2650 Tulare Street	11/7/1976
Southern Pacific Passenger Depot	1033 H Street	3/21/1978
Tower Theatre	1201 N. Wishon Avenue	9/24/1992
Twining Laboratories	2527 Fresno Street	3/26/1991
Warehouse Row	722, 744, and 764 P Street	3/24/1978
YWCA Building	1660 M Street	9/21/1978

Source: National Register of Historic Places, www.nps.gov/nr/

Other historic resources in the City of Fresno include the following historic districts:

- The Porter Tract Historic District (45 homes)
- The Chandler Field/Fresno Municipal Airport Historic District (four historic structures)
- The Wilson Island Historic District (78 homes)
- The Huntington Boulevard Historic Districts (81 homes)

As comprehensive as the City's register may be, it does not include all properties in the City with potential historic or cultural significance. The list is continually being expanded as sites are discovered through routine analysis of proposed development areas and through proposed new listings of historic districts. The pool of potentially historic properties also changes through time, since federal law provides for a 50-year retrospective review, which now encompasses the post-World War II building boom era. Ten properties that were recommended for the City's register but were denied inclusion by the Fresno City Council are still recognized for their historic/cultural significance (heritage properties), which is taken into account when any actions are undertaken on them pursuant to provisions of the California Environmental Quality Act. (Three of these properties have been since been demolished.)

While a detailed assessment of seismic and flood risks for the listed properties in Fresno is currently beyond the available staff resources of the City's Historic Preservation Office, it can be generally assumed that most of the structures have not been seismically reinforced and that their masonry is vulnerable to strong ground shaking.

While many of the structures are in Fresno's old downtown and were built when this area was largely within the 100-year floodplain of the Fresno Stream Group, efforts by the Fresno Metropolitan Flood Control District in conjunction with the U.S. Army Corps of Engineers and the City of Fresno have provided for flood detention structures and ponding basins that have greatly reduced the size and extent of the floodplain in the downtown, helping to preserve these historic resources.

Natural Resource Areas

San Joaquin River Corridor

While the City maintains many community and neighborhood parks, its natural resources are primarily along the San Joaquin River. Owing to the year-round presence of water, the river bottom and bluffs host the richest aquatic and riparian forest biota in the City. It is in this area where migratory waterfowl and federally and state-listed endangered wildlife are most likely be encountered. These species include the valley elderberry longhorn beetle, the giant garter snake, and the American bald eagle (recently recommended for delisting from the National Endangered Species list).

Over past decades, land in the river corridor has been purchased and aggregated by state agencies (Department of Fish and Game, San Joaquin River Conservancy), by nonprofit groups (San Joaquin River Parkway Trust, Fresno Sportsmen's Club), and by the City and County (the City's Woodward Park and Milburn Unit, the County's Lost Lake Park). The ultimate goal of the San Joaquin River Conservancy Plan is to fashion a regional parkway with continuity of wildlife corridors and to manage it for joint recreational, habitat conservation, and floodplain protection uses.

Due to its location, this natural resource area is flood-prone. In some areas, this risk has been increased due to removal of massive amounts of sand and gravel (from mining), which lowered the ground surface over past decades. While the native riparian plants and animals have largely evolved with coping mechanisms for periodic severe flooding, any developed recreation facilities would be at risk. The face of the bluff is also very vulnerable to wildfire because of its vegetative overgrowth and nearly vertical slopes. Fire prevention efforts are difficult here because the soils are too unstable for vegetative removal projects or for irrigation that would keep the plants well-watered.

Vernal Pool Areas

In the northerly parts of the City, outside the river corridor, certain clay soils have the capacity to form impermeable hardpans and layers that do not allow rapid percolation of rainwater. During the rainy season, shallow vernal pools form that are populated by a host of specialized plants and animals. Many species associated with vernal pools are federally and state-listed species (e.g., the California tiger salamander, various types of fairy shrimp crustaceans, orcutt grass, button celery species, meadowfoam, and owl clover). Vernal pools are also heavily utilized by nonlisted species, such as migratory waterfowl, rodents, furbearing predators, and raptors that prey on other animals.

Wildfire is not considered a major risk to these natural communities, because they evolved with dry season fires as a common occurrence (the plants have very resistant seeds and the crustaceans and amphibians go into protected parts of their life cycles such as deep dormancy). Human encroachment through agriculture and land development is the greatest risk to vernal pool areas. If the clay layers are disrupted by "deep ripping" plowing, water cannot accumulate on the surface and the pools will not form. If the land is subjected to year-round irrigation, specially adapted

vernal pool species will be out-competed by other species. Conversion of land to urban development with structures, paving, lawns, pets, and people will destroy vernal pool natural communities.

Economic Assets

The City of Fresno's economic sector includes both private and public entities that have been compiled into clusters in order to identify key economic assets. These ten clusters, known as the Regional Job Initiative (RJI) clusters, are Advanced Manufacturing, Clean Energy, Construction, Food Processing, Healthcare, Info Processing (Call Centers, Logistics, and Distribution), Software Development, Tourism, and Water Technology. Among these clusters are major employers like Saint Agnes, Pelco, Gottschalks, and Ruiz Foods that both boost Fresno's economic growth and provide employment opportunities.

If a disaster struck the City, it could have a severe impact on Fresno's economic assets. Sectors of greatest concern include all the RJI clusters, but in particular Food Processing, which includes the agricultural industry, and Healthcare.

Growth and Development Trends

The City of Fresno is growing at a rapid pace. Its expansion from incorporation in 1885 to the present day (August 2017) is illustrated in Figure E.3. Even more growth is anticipated in the years to come, based on current trends.

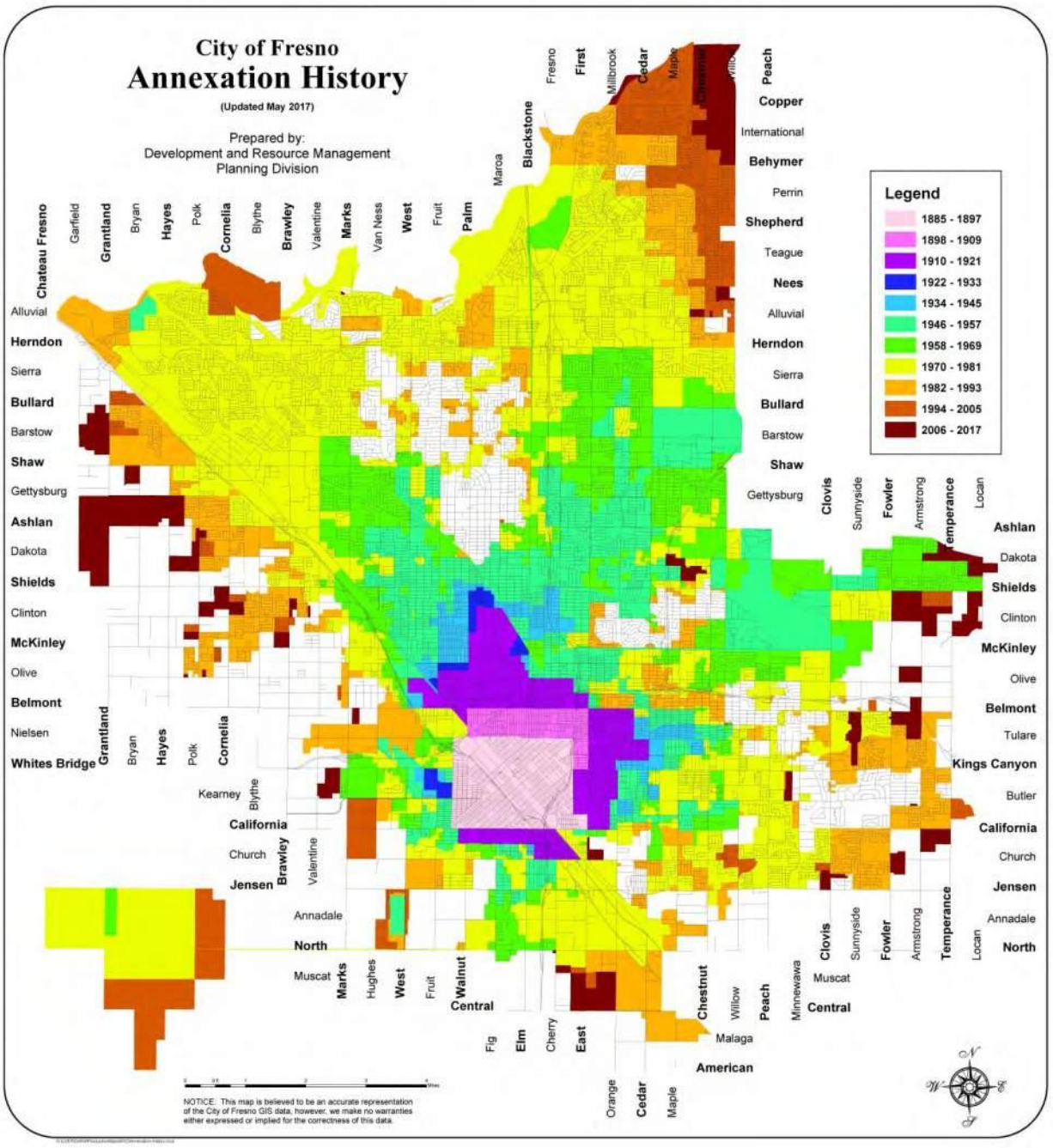
Table E.9 illustrates how the City has grown in terms of population and number of housing units between 2011 and 2017 alone.

Table E.9: City of Fresno's Change in Population and Housing Units, 2011-2017

2011 Population	2017 Population Estimate	Estimated Percent Change 2011-2017	2011 # of Housing Units	2017 Estimated # of Housing Units	Estimated Percent Change 2011-2017
498,664	525,832	+5,49	172,171	178,819	+3.86

Source: California Department of Finance, www.dof.ca.gov/Forecasting

Figure E.3: City of Fresno's Annexation History



Source: City of Fresno Development Department. This map is believed to be an accurate representation of the City of Fresno GIS data, however, we make no warranties either expressed or implied for the correctness of this data.

By December 31, 2035 (the "Horizon" year of the most recent Fresno General Plan), it is estimated that 771,000 people will reside in the Fresno Metropolitan Area (which would include County islands and areas inside the City's Sphere of Influence but not yet annexed). This figure of 771,000 would be 64 percent of the projected 2035 Fresno County population of 1,201,416 (State of California Department of Finance population projections).

As of August of 2017, the City of Fresno comprised 115.3 square miles of annexed (incorporated) land within its 161.8-square mile Sphere of Influence. Development had reached the natural and political northerly boundary of the City, the San Joaquin River, and began expanding to the west and southeast through conversion of rural residential and agricultural land. Within the Sphere of Influence, there continued to be "County islands" and partially urbanized fringe areas. An urban unification annexation program may reduce the numbers and sizes of these enclaves in the coming decade.

The Fresno General Plan made a concerted effort to revitalize the City's downtown by balancing new growth areas to geographically recenter the downtown. With construction of a major sewer trunk along the Grantland Avenue alignment and proposed construction of new wastewater and water treatment plants in the southeastern area, the City's future growth is expected to concentrate primarily to the west and southeast.

The Fresno Metropolitan Flood Control District (FMFCD) has commenced major flood control facility construction on Fancher Creek in the eastern portion of the City's Sphere of Influence. Since the Fresno General Plan was completed in December 2014, the FMFCD will compile technical studies and update its master service plan in conjunction with the City's land use plan for this new growth area.

The Fresno General Plan also directed that new development be more compact and that single-family residential densities be higher than the City's traditional 4± dwelling units/acre pattern for subdivisions. The recently adopted Fulton Corridor Specific Plan and Downtown Neighborhoods Community Plan and other plan amendments and projects in process (and proposed in the future) feature smaller lots, multi-story housing, multi-family units, and reduced setbacks.

Unless the cost of manufactured housing units would provide a substantial savings over site-built homes, it is not expected that the proportion of manufactured housing in the City of Fresno will greatly increase. It is possible that there will be some increase as producers of these units create models with appropriate roof pitches and other features to meet the City's design review standards.

More information about the City of Fresno's growth and current housing stock is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement). More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Fresno County Vulnerability and Assets at Risk of the main plan.

E.3.2 Estimating Potential Losses

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Table E.6 above shows Fresno's exposure to hazards in terms of number and value of structures. Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern day building codes. No further information on vulnerable structures is available. Impacts of past events and vulnerability to specific hazards are further discussed below (see Section 4.1 Hazard Identification for more detailed information about these hazards and their impacts on Fresno County).

Agricultural Hazards

Agricultural hazards are ranked with a Low significance in the City of Fresno; lower than for the County overall (ranked High) because very little land in the City is used for agricultural purposes. Agricultural losses due to hazard events have greater economic impact on the small communities and rural areas of the County than on the City of Fresno. However, ornamental and garden plants in the City, and pets and incidental livestock kept within City limits, may become involved in any countywide responses to crop pests or infectious agents, because these urban plants and animals provide reservoirs for the diseases and crop pests that threaten the County's agriculture.

Dam Failure

The National Inventory of Dams lists five dams located in the City of Fresno, including the Redbank Creek Detention basin, Fancher Creek Detention, Friant Millerton Road Embankment A, Redbank, and Friant Dike 3.

Drought

Annual rainfall in the City of Fresno is typically 12-14 inches. This makes the region vulnerable to episodic drought and to chronic drawdown of aquifer levels (the U.S. Environmental Protection Agency has designated the groundwater below Fresno as a sole source aquifer). Water in this aquifer has historically flowed through permeable strata from north and northeast toward the south and west, but the aquifer has been so affected by drawdown that a "cone of depression" has been created, reversing the historic flow directions (the "groundwater gradient") in portions of west and south Fresno.

In the last 10 years the City of Fresno has made strides to reduce dependence on groundwater by setting a course to implement water plans, which include the Urban Water Management Plan, Recycled Water Waster Plan, and the recently adopted Water Capital Program. A surface water treatment plant is currently under construction in Southeast Fresno and should be completed by 2018. When operational, the plant will maximize use of Fresno's surface water allocations during

normal years and allow the City to reduce overuse of groundwater. Recycled water use will also grow in Fresno with the new recycled water mains now being constructed. The City has plans to use 25,000 acre-feet per year of recycled water for irrigating open spaces, parks, street medians and golf courses.

Earthquake

The seismic hazard in the City of Fresno is low relative to California coastal and mountain communities and is lower than in the Sierra and western areas of Fresno County. There are no known earthquake faults underlying Fresno, and the City has never been the epicenter of a known seismic event. However, Fresno is considered to have a moderate risk of earthquake damage due to the presence of major fault systems to the west, south, and east and due to Fresno's large population and number of buildings, critical facilities, and infrastructure and other development that could be vulnerable to more severe ground shaking.

Historically, Fresno has sustained very little damage from major earthquakes occurring on California's major faults: the Owens Valley earthquake of 1872 toppled an unreinforced masonry (brick) church steeple. More recent major earthquakes in the past four decades (with epicenters near Coalinga and the Bay Area) have resulted in perceptible tall building swaying in Fresno, minor injuries (attributable to shelved items falling), and slight damage (e.g., minor cracked plaster, etc.). To date, no soil liquefaction has been observed in Fresno from any seismic event.

The most serious impacts of an earthquake in Fresno would probably arise from damage to large dams in the Sierra Nevada on the upper reaches of the San Joaquin River very close to active Long Valley Caldera-related faults. Should either of the two most easterly (and largest) dams in this area be severely damaged or breached, the resulting sequential dam failures could cause floodwaters to overtop Friant Dam northeast of the City. While the dam failure inundation map for Friant shows that most of the flooded area would be expected in the northwest part of town (where the confining river bluffs are not as high), there are some residences and important infrastructure in the river channel itself that would be inundated and gravely damaged (or destroyed), including highway bridges and the inlet of the Friant-Kern Canal, which supplies Bureau of Reclamation surface water to the Fresno area and to other communities in the southern San Joaquin Valley.

Epidemic/Pandemic

Fresno's population includes many residents who have limited access to health care, with causes related to low household income levels, lack of insurance coverage, a limited number of primary health care facilities and acute care beds, a low ratio of public health and medical professionals to population, and language barriers. Highly communicable diseases tend to affect a large percentage of the City, perhaps due to large household size and the mobility of the population. If a highly communicable disease outbreak occurred that caused serious or life-threatening illness for most infected persons, health care and other public service systems would experience disruption or breakdown and would require outside intervention with resources from other communities, the state, or the federal government.

Extreme Cold/Freeze

Freeze events occur occasionally in Fresno, but impacts are greater to the agriculture industry in the County than to the City. In January 2007, overnight minimum temperatures fell below freezing between January 6 and 10. The event led to a presidential disaster declaration due to the estimated $710 million in agricultural damage in the Central and South Valley. The 2007 event occurred in another eight-year interval after the devastating citrus freezes of 1998 and 1990. The event caused frozen pipes in Fresno but little other property damage. The City also has a plan for freezing temperature events and opens warming centers. These centers are primarily geared toward the homeless population.

Extreme Heat

Fresno uses a local version of the California State Plan for Extreme Heat. This plan was used during the extreme heat event during the summer of 2006 and worked well. The City operates cooling centers, which are primarily geared toward the homeless. Public notification for extreme heat events is conducted through the Public Affairs office in coordination with Fresno County.

Expansive Soils

These types of soils occur in northern Fresno in the far northeastern portions of its Sphere of Influence (in the "Copper River" area). Expansive clay soils can cause cavitation over time and require special construction standards for foundations.

Flood

As noted in the preceding section, there is some flood risk to the City from San Joaquin River major dam failure inundation, but the more common flood risk, repetitively experienced in Fresno, is that of shallow "sheet" flooding from major precipitation events. Except for the San Joaquin River, streams in the Fresno-Clovis Metropolitan Area originate in the Sierra foothills to the east and extend into the valley floor west of State Route 99 by way of dual-use irrigation and storm runoff channels and disperse into numerous smaller irrigation canals. Overflow from these canals and urban stormwater from intense precipitation events is sent back to the San Joaquin River or to farmland southwest of Fresno via spillway channels.

In the City of Fresno, these canals and channels are under control of the Fresno Irrigation District, an independent public agency, but their use during storm events is shared by another independent district, the Fresno Metropolitan Flood Control District (FMFCD). The FMFCD was created to develop flood control facilities to prevent further repetitive losses created by the Fresno Stream Group and to provide an urban drainage network. This District is responsible for administering a Storm Drainage and Flood Control Master Plan. The City's municipal code supports these efforts by including a Drainage Fee Ordinance to ensure that grading and development comply with the FMFCD's Master Plan and standards and provide proportionate shares of storm drain and ponding basin infrastructure.

The City of Fresno's Floodplain Ordinance further coordinates and supports FMFCD efforts. This ordinance and the Fresno General Plan Safety Element policies require conformance to FEMA floodplain management policies and to those of California's Central Valley Flood Prevention Board (which regulates the designated floodway along the San Joaquin River channel). Still, in areas not completely developed to urban standards, areas where the urban drainage network is not yet completed, and in some County "island" areas (land within the City that the County has authority over), stormwater drainage facilities may not prevent localized shallow flooding during intense runoff events.

According to FEMA's 2016 Flood Insurance Study (FIS), the following major canals and ditches run through the City:

- **Central Canal** flows southwest through the southeastern part of the City of Fresno.
- **Dry Creek Canal** begins at the confluence of Mill Ditch and Herndon Canal, just downstream of North Millbrook Avenue, and flows southwest through the southwestern portion of the City.
- **Fancher Creek Canal** flows southwest along the eastern corporate limits of the City of Fresno and joins Central Canal at the southeast corner of the City.
- **Herndon Canal** begins at the confluence of Mill Ditch and Dry Creek Canal. It flows west through the center of the City of Fresno, then flows northwest through the northwestern part of the City.
- **Mill Ditch** flows west along East McKinley Avenue to its confluence with Herndon and Dry Creek Canals.

The FIS details the City of Fresno's flood history as follows:

In February 1884, flood flows from streams of the Fresno-Clovis group inundated the business section of the City of Fresno. Frequent flooding was a problem in the City throughout the 1880. Suburban areas of the City were flooded in spring 1920; the downtown area was inundated in 1923; flooding occurred in the Fig Garden area in 1936; and parts of the City, especially in the northeast section, were flooded in March 1938. Since the 1938 flood, which had an estimated discharge of 2,700 cubic feet per second (cfs) on Dry Creek at the Big Dry Creek Dam site, high flows occurred on that stream in December 1955 (3,800 cfs), January 1969 (5,700 cfs), and February 1969 (4,500 cfs). During December 1955, approximately 500 acres of agricultural and suburban land were flooded by overflow from irrigation canals, and damage, mostly to public facilities, totaled approximately $50,000. The largest and most damaging flood period was January and February 1969, when the combined discharges of Dry, Dog, Redbank, Fancher, and Mud Creeks flooded an estimated 14,500 acres and caused almost $4.7 million in damage. Most of the flooding was in the eastern and northeastern parts of the City. It occurred because many of the streams in the Fresno-Clovis group discharged floodwater into various irrigation canals, causing them to overflow.

Values at Risk

Following the methodology described in Section 4.3.2 Vulnerability of Fresno County to Specific Hazards, a flood map for the City of Fresno was created (see Figure E.4). Tables E.10 and E.11 summarize the values at risk in the City's 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Figure E.4: City of Fresno's 100- and 500-Year Floodplains

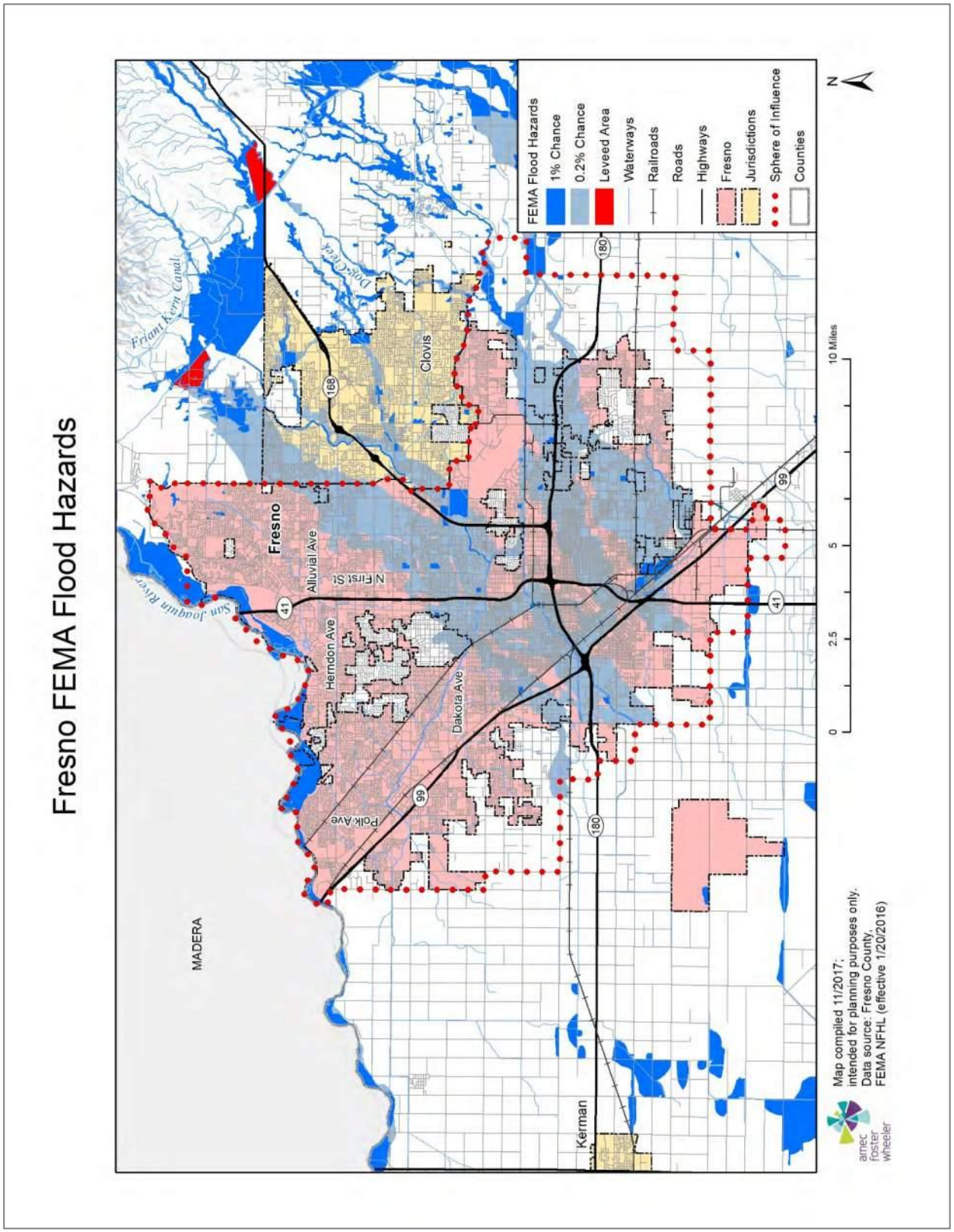


Table E.10: City of Fresno's FEMA 1% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	1	0	$60,933	$60,933	$121,866	$30,467
Commercial	23	210	$6,222,246	$6,222,246	$12,444,492	$3,111,123
Exempt	29	35	$0	$0	$0	$0
Industrial	70	107	$30,681,072	$46,021,608	$76,702,680	$19,175,670
Multi-Residential	11	84	$2,529,983	$1,264,992	$3,794,975	$948,744
Residential	97	120	$23,269,875	$11,634,938	$34,904,813	$8,726,203
Total	**231**	**556**	**$62,764,109**	**$65,204,716**	**$127,968,825**	**$31,992,206**

Sources: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

Table E.11: City of Fresno's FEMA 0.2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	29	29	$746,974	$746,974	$1,493,948	$373,487
Commercial	2,814	9,030	$1,574,492,657	$1,574,492,657	$3,148,985,314	$787,246,329
Exempt	381	1,404	$0	$0	$0	$0
Industrial	745	1,435	$309,126,790	$463,690,185	$772,816,975	$193,204,244
Multi-Residential	2,299	20,013	$797,001,401	$398,500,701	$1,195,502,102	$298,875,525
Residential	31,581	32,817	$2,677,387,750	$2,677,387,750	$5,354,775,500	$1,338,693,875
Total	**37,849**	**64,728**	**$5,358,755,572**	**$5,114,818,267**	**$10,473,573,839**	**$2,618,393,460**

Sources: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

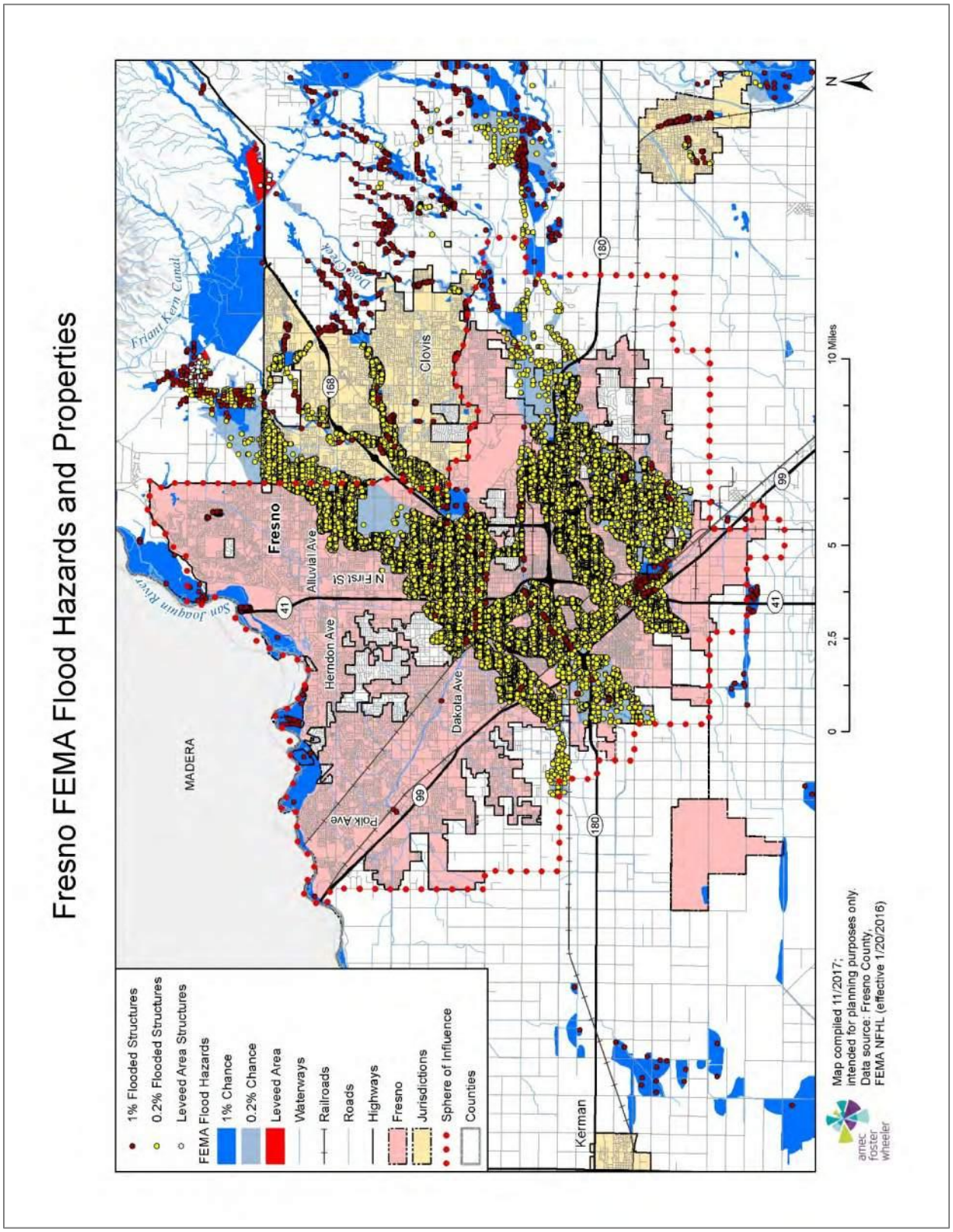
Based on this analysis, the City of Fresno has significant assets at risk to the 100-year and greater floods. There are 231 improved parcels within the 100-year floodplain for a total value of roughly $128 million, including building and content value. An additional 37,849 improved parcels valued at roughly $10.5 billion fall within the 500-year floodplain.

Applying the 25 percent damage factor as described in Section 4.3.2, there is a 1 percent chance in any given year of a 100-year flood causing roughly $32.0 million in damage in the City of Fresno and a 0.2 percent chance in any given year of a 500-year flood causing roughly $2.65 billion in damage (combined damage from both floods).

Properties at risk to flooding are shown in relation to the mapped floodplains in Figure E.5.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Figure E.5: City of Fresno's Properties at Risk in the 100- and 500-Year Floodplains



In addition to the 100-year and 500-year floodplains mapped by FEMA, the California Department of Water Resources maintains Best Available Maps (BAM) which include the floodplains in the Sacramento and San Joaquin River Basins, based on a study performed in 2002 by the U.S. Army Corps of Engineers (USACE). Though limited to the San Joaquin River as a flood source and thus not as comprehensive as the FEMA FIRM, the USACE study shows additional differentiation in flood risk by modeling the 200-year floodplain (the flood with a 0.5 percent annual chance of occurring). Table E.12 summarizes the values at risk by property type within the 200-year floodplain and loss estimates to the 200-year storm using the same methodology described above.

Table E.12: City of Fresno's FEMA 0.5% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	1	0	$60,933	$60,933	$121,866	$30,467
Commercial	3	139	$4,322,495	$4,322,495	$8,644,990	$2,161,248
Exempt	5	5	$0	$0	$0	$0
Residential	18	19	$12,103,507	$6,051,754	$18,155,261	$4,538,815
Total	**27**	**163**	**$16,486,935**	**$10,435,182**	**$26,922,117**	**$6,730,529**

Sources: Fresno County 2017 Parcel and Assessor data; CA DWR BAM; USACE

Based on this analysis, there are 27 parcels within the 200-year floodplain valued at nearly $10.5 million. Applying the 25 percent damage factor, there is a 0.5 percent annual chance of a 200-year flood causing $6.73 million in damage in the City of Fresno.

Insurance Coverage, Claims Paid, and Repetitive Losses

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. In addition to providing insurance for properties at risk of flooding, the program collects and publishes statistics on flood-related losses in participating jurisdictions.

NFIP insurance data for the City of Fresno indicates that as of March 30, 2017, there were 323 flood insurance policies in force in the City with $99,316,700 in coverage. This coverage represents a decline of nearly 200 policies over the last decade. Of the 323 policies, 277 were residential (267 for single-family homes) and 46 were nonresidential. 56 of the policies were in A zones (including A01-30, AE, AO, and AH), and the remaining 267 policies were in B, C, and X zones. Policies in B, C, and X zones have increased slightly over the past decade, while policies in the 100-year floodplain have dramatically declined.

There have been 81 historical claims for flood losses totaling $765,183; 73 were for residential properties; 37 were in A zones and 36 were in B, C, or X zones; and 54 were pre-FIRM structures (17 of the 19 post-FIRM structures with reported losses were in a B, C, or X zone). According to the FEMA Community Information System accessed 9/17/2018 there was one Repetitive Loss and no Severe Repetitive Loss properties located in the jurisdiction.

Population at Risk

Using parcel data from the County, the digital flood insurance rate map, population at risk was calculated for the 100-year and 500-year floods based on the number of residential properties at risk and the U.S. Census Bureau 2016 estimate for the average number of persons per household (3.17). The following are at risk to flooding in the City of Fresno:

- 100-year flood—342 people
- 500-year flood—107,400 people
- **Total flood**—107,742 people

Critical Facilities at Risk

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. Table E.13 lists the critical facilities in the City's 100- and 500-year floodplains.

Table E.13: Critical Facilities in the 100- and 500-Year Floodplains: City of Fresno

Critical Facility Type	100-Year Floodplain	500-Year Floodplain
Airport	-	1
Behavioral Health	-	1
CalARP	1	12
Colleges & Universities	-	5
Communications	-	1
County Government	-	2
Daycare	-	52
Department of Agriculture	-	2
Department of Public Health	-	2
Department of Social Services	-	6
District Attorney	-	1
Fire Station	-	7
General Services	-	3
Health Care	-	1
Nursing Home	-	12
Police	-	5
School	-	68
Urgent Care	-	2
Total	**1**	**183**

Source: Fresno County, HIFLD 2017

Hazardous Materials Incident

The following are the primary concerns for the City of Fresno related to hazardous materials release:

- Train derailments

- Kinder-Morgan pipeline
- Chevron petroleum pipelines
- Storage facilities

There are 28 CalARP hazardous materials facilities located in the City of Fresno. As detailed in Table E.14, there are 62 critical facilities located within a half mile of a CalARP facility.

Table E.14: Critical Facilities within ½ mile of CalARP Facility: City of Fresno

Critical Facility Type	Count
Colleges & Universities	1
Communications	1
County Government	4
Courthouse	1
Daycare	11
Department of Public Health	2
Department of Social Services	4
Detention Center	4
District Attorney	2
Fire Station	4
Health Care	3
Nursing Home	4
Police	1
School	17
Sheriff	1
Supplemental College	1
Urgent Care	1
Total	**62**

Source: Fresno County, HIFLD 2017

For more information on this hazard please refer to the main plan, Section 4.

Severe Weather: Fog

The risk and vulnerability factors for fog in the City is not unique from the County at large. Please refer to the main plan's discussion of the fog hazard in section 4.

Severe Weather: Windstorm

Fresno's prevailing winds are typically light and from the northwest. High wind conditions are occasionally created by strong weather fronts. Occasionally, there are funnel clouds of low intensity. Past structural damage has been light, infrequent, and very limited in geographic extent. Injuries have been extremely rare. Most of this damage has occurred secondary to large trees being blown over. The City's design wind load, the level of wind force that new structures are required to be engineered to withstand, is 70 mph.

Soil Hazards: Land Subsidence

Despite long-term over-drafting of groundwater that has lowered the static water table under Fresno by as much as 100 feet over the past century, ground level subsidence has not been noted in the vicinity of the City (this is probably due to the geologic strata underlying the City, which features layers of clay and hardpan interleaved with sand and gravel layers).

Wildfire

Similar to many areas of the County, Fresno has high temperatures in the summer with low rainfall creating fire hazard conditions. There is some wildfire risk in the San Joaquin River Bluff area in northern Fresno due to vegetation and steep slopes.

Following the methodology described in Section 4.3.2 Vulnerability of Fresno County to Specific Hazards, a wildfire map for the City of Fresno was created (see Figure E.6). An analysis was performed using GIS software to determine where populations, values at risk, and critical facilities are located within wildfire threat zones. Table E.15 shows the values at risk in the moderate wildfire threat zone (there are no values at risk in the high or very high threat zones). There are not any critical facilities in wildfire threat zones in the City of Fresno.

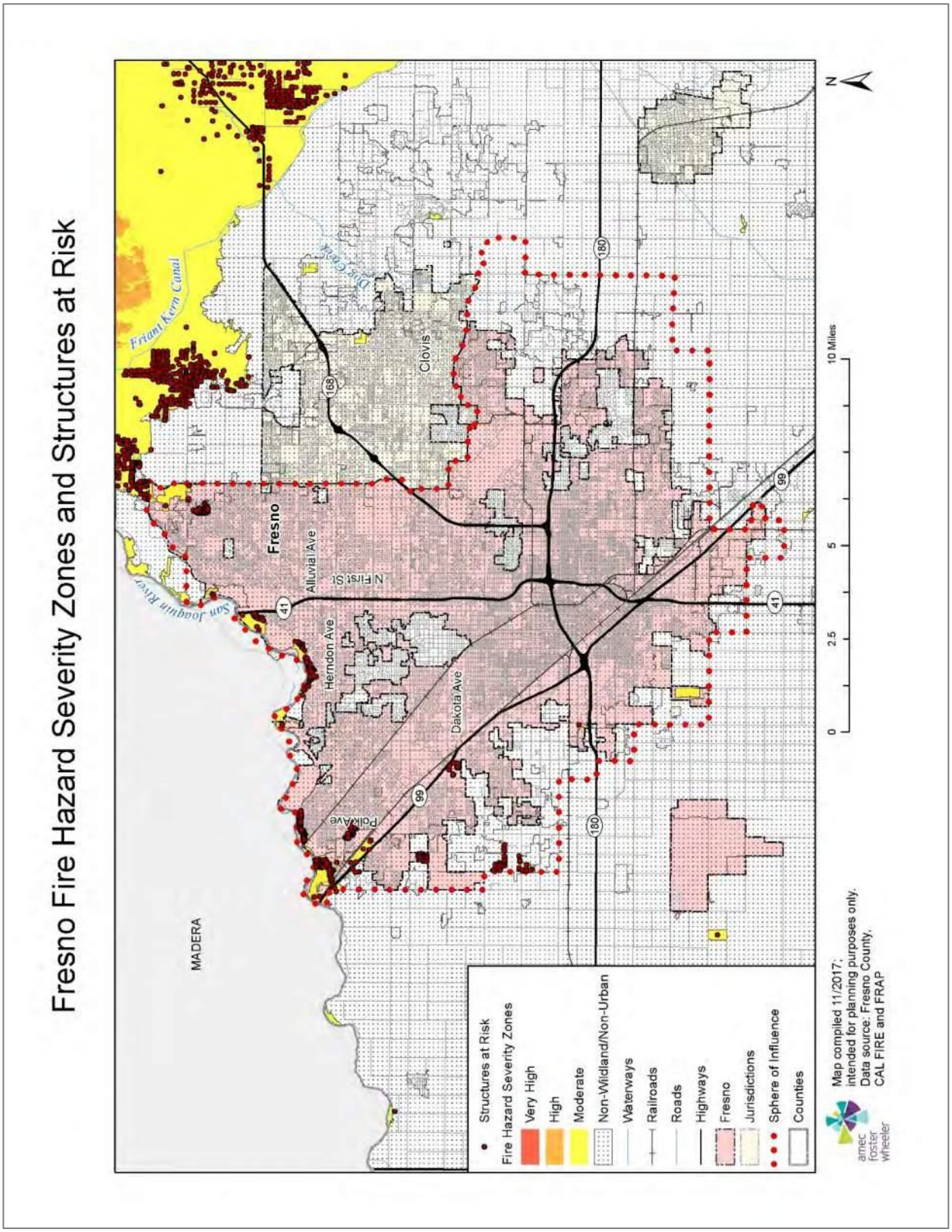
Table E.15: Values at Risk to Wildfire (Moderate Threat) in the City of Fresno

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Agricultural	1	0	$60,933	$60,933	$121,866
Commercial	13	36	$24,379,836	$24,379,836	$48,759,672
Exempt	12	13	$0	$0	$0
Industrial	4	4	$2,105,480	$3,158,220	$5,263,700
Multi-Residential	1	16	$255,200	$127,600	$382,800
Residential	772	779	$180,172,709	$90,086,355	$270,259,064
Total	**803**	**848**	**$206,974,158**	**$117,812,944**	**$324,787,102**

Sources: Fresno County 2017 Parcel and Assessor data

Based on this analysis, the City of Fresno's moderate wildfire threat affects 2,450 people and 803 improved parcels valued at roughly $324,787,102. Almost all of the parcels at risk are in the San Joaquin River corridor, where development is very restricted due to flood risk and bluff instability. Other parcels are in industrial areas along the western edge of the City, where the City's weed abatement ordinances (requiring vegetation control by April) would reduce the wildfire risk.

Figure E.6: City of Fresno's Wildfire Threat



E.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Amec Foster Wheeler consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Fresno's updated capabilities are summarized below.

E.4.1 Regulatory Mitigation Capabilities

Table E.16 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fresno.

Table E.16: City of Fresno's Regulatory Mitigation Capabilities

Regulatory Tool	Yes/No	Comments
General Plan	Yes	The Fresno General Plan has a Noise and Safety Element with policies for wildland fire hazards, seismic/geologic hazards, storm drainage and flood control, hazardous materials, airport safety, and emergency response
Zoning Ordinance	Yes	Fresno Municipal Code Chapter 15; Zoning Ordinance has requirements related to health and safety (e.g., dwelling unit density controls, building setbacks for fire protection, masonry walls along major streets)
Subdivision Ordinance	Yes	Fresno Municipal Code Chapter 15 requires multiple points of access for ingress/egress, fire protection provisions, etc.
Development Permit (formerly Site Plan Review) requirements	Yes	Required for all nonresidential development projects and multi-family projects over two units; required for duplexes in some zone districts; plot plan review required for even single-family residential construction
Growth Management Ordinance	Yes	Fresno Municipal Code Chapter 12 provides for extension of urban infrastructure and services including sewer treatment, water supply, and fire protection
Floodplain Ordinance	Yes	Fresno Municipal Code Chapter 13 (local building codes) includes the Flood Damage Prevention Ordinance
Other special purpose ordinance (stormwater, water conservation, wildfire)	Yes	- Within the Zoning Ordinance, there is a Bluff Preservation Overlay district with requirements for soil stability analysis and setbacks from the San Joaquin bluff edge

Regulatory Tool	Yes/No	Comments
		- Pretreatment Ordinance and environmental control program for wastewater system to prevent and abate any hazardous material releases
Building Code	Yes	Version: 2016 California Building Code with a few City modifications: fire sprinkler ordinance, swimming pool ordinance, and security ordinance
Fire Department ISO Rating	Yes	Rating: 3
Erosion or Sediment Control Program	Yes	The Bluff Preservation Ordinance, as well as grading plan review and stormwater pollution prevention plans, which are required for all development projects through project conditions and CEQA review
Stormwater Management Program	Yes	In conjunction with Cal-EPA, Regional Water Quality Control Board, and Fresno Metropolitan Flood Control District
Capital Improvements Plan	Yes	Public Works Department and Department of Public Utilities formulate and administer these plans
Economic Development Plan	Yes	Fresno Redevelopment Agency and Economic Development Division of the Planning and Development Department
Local Emergency Operations Plan	Yes	Ratified by City Council in 2005 and last updated in 2015
Flood Insurance Study or other engineering study for streams	Yes	FEMA Flood Insurance Study, 2005

Fresno General Plan (Adopted December 18, 2014)

The Fresno General Plan is a blueprint of how the City anticipates directing and managing growth while minimizing potential impacts for existing and future generations. It provides long-range planning strategies for the continued development, enhancement, and revitalization of the Fresno Metropolitan Area. The plan goals are the guiding principles and provide the framework for the objectives and policies that can be found in the plan elements. The following general plan goals directly or indirectly mitigate hazards identified in this plan:

- **Goal 9**—Promote a city of healthy communities and improve quality of life in established neighborhoods.
  - *Emphasize supporting established neighborhoods in Fresno with safe, well maintained, and accessible streets, public utilities, education and job training, proximity to jobs, retail services, health care, affordable housing, youth development opportunities, open space and parks, transportation options, and opportunities for home grown businesses.*
- **Goal 12**— Resolve existing public infrastructure and service deficiencies, make full use of existing infrastructure, and invest in improvements to increase competitiveness and promote economic growth.
  - *Emphasize the fair and necessary costs of maintaining sustainable water, sewer, streets, and other public infrastructure and service systems in rates, fees, financing and public investments to implement the General Plan. Adequately address accumulated deferred maintenance, aging infrastructure, risks to service continuity, desired standards of service to meet quality-of-life goals, and required infrastructure to support growth, economic competitiveness and business development.*
- **Goal 16**— Protect and improve public health and safety.

Some of the elements of the General Plan also contain objectives and policies relevant to protecting human health and safety (e.g., supporting objectives and policies in the Public Utilities and Services Element direct that amendments to construction and fire codes to reduce the level of risk to life and property from fire commensurate with the City's fire suppression capabilities and that fire and police services be provided). Because the Noise and Safety Element is the portion of the General Plan most relevant to hazard mitigation, select objectives and policies are extracted and included below.

The Noise and Safety Element

The Noise and Safety Element seeks to reduce deaths, injuries, illnesses, damage to property, and economic and social dislocation that could result from hazards. Of specific relevance to this plan, it addresses seismic and geologic conditions, flooding, hazardous materials, and emergency response.

Seismic and Geologic Hazards

NS-2. Objective: Minimize risks of property damage and personal injury posed by geologic and seismic risks.
NS-2-a. Policy: Seismic Protection. Ensure seismic protection is incorporated into new and existing construction, consistent with the Fresno Municipal Code.
NS-2-b. Policy: Soil Analysis Requirement. Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.
NS-2-c. Policy: Landfill Areas. Require proposed land uses on or near landfill areas to be designed and maintained to comply with California Code of Regulations, Title 27, Section 21190, Post Closure Land Use.
NS-2-d. Policy: Bluff Preservation Overlay Zone. Per the requirements of the Bluff Preservation Overlay Zone District and Policy POSS-7-f (Chapter 5, Parks and Open Space), the following standards shall be applicable for property located within the Bluff Preservation zone: • Require proposed development within 300 feet of the toe of the San Joaquin River bluffs to undertake an engineering soils investigation and evaluation report that demonstrates that the site is sufficiently stable to support the proposed development, or provide mitigations to provide sufficient stability; and • Establish a minimum setback of 30 feet from the San Joaquin River bluff edge for all buildings, structures, decks, pools and spas (which may be above or below grade), fencing, lighting, steps, etc. o An applicant may request to reduce the minimum setback to 20 feet from the bluff edge if it can be demonstrated, to the satisfaction of the City's Building Official and the Planning Director, that the proposed building, structure, deck, pool and/or spas (which may be above or below grade), fencing, steps, etc., will meet the objectives of the Bluff Preservation Overlay Ordinance. In no case shall the setback be reduced to less than 20 feet.

Flooding Hazards

NS-3. Objective: Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.
NS-3-a. Policy: Stormwater Drainage and Flood Control Master Plan. Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.

NS-3-b. Policy: Curb and Gutter Installation. Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.
NS-3-c. Policy: Dual Use Facilities. Support multiple uses of flood control and drainage facilities as follows: • Use, wherever practical, FMFCD facilities for groundwater management and recharge; and • Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.
NS-3-d. Policy: Landscaped Buffer. City will support the development of FMFCD ponding basins including the landscaping and irrigation for the top one third of the side sloped areas consistent with the FMFCD Basin Design Criteria.
NS-3-e. Policy: Pollutants. Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.
NS-3-f. Policy: Flooding Emergency Response Plans. Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin river bottom.
NS-3-g. Policy: Essential Facilities Siting Outside of Floodplains. Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.
NS-3-h. Policy: Runoff Controls. Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed the capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.
NS-3-i. Policy: New Development Must Mitigate Impact. Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project. *Commentary: The City recognizes the expertise and significant role of the FMFCD, and will give the highest deference to its recommendations for mitigation measures, consistent with applicable law.*
NS-3-j. Policy: National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements. Review NFIP maps periodically to determine if areas subject to flooding have been added or removed and make adjustments to the Land Use Diagram Figure LU-1.
NS-3-k. Policy: 100-Year Floodplain Policy. Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.
NS-3-l. Policy: 200-Year Floodplain Protection. Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin river bottom.
NS-3-m. Policy: Flood Risk Public Awareness. Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.
NS-3-n. Policy: Precipitation Changes. Work with FMFCD to evaluate the planned and existing stormwater conveyance system in light of possible changes to precipitation patterns in the future.

Hazardous Materials

NS-4. Objective: Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.
NS-4-a. Policy: Processing and Storage. Require safe processing and storage of hazardous materials, consistent with the California Building Code and the Uniform Fire Code, as adopted by the City.
NS-4-b. Policy: Coordination. Maintain a close liaison with the Fresno County Environmental Health Department, Cal-EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining

hazardous material business plans, inventory statements, risk management prevention plans, and contingency/emergency response action plans.
NS-4-c. Policy: Soil and Groundwater Contamination Reports. Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or groundwater contamination is identified or could be encountered during site development.
NS-4-d. Policy: Site Identification. Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.
NS-4-e. Policy: Compliance with County Program. Require that the production, use, storage, disposal, and transport of hazardous materials conform to the standards and procedures established by the County Division of Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.
NS-4-f. Policy: Hazardous Materials Facilities. Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.
NS-4-g. Policy: Hazmat Response. Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.
NS-4-h. Policy: Household Collection. Continue to support and assist with Fresno County's special household hazardous waste collection activities, to reduce the amount of this material being improperly discarded.
NS-4-i. Policy: Public Information. Continue to assist in providing information to the public on hazardous materials.

Emergency Response

NS-6. Objective: Foster an efficient and coordinated response to emergencies and natural disasters.
NS-6-a. Policy: County Multi-Jurisdiction Hazard Mitigation Plan. Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex. *Commentary: The federal Disaster Mitigation Act of 2000 requires that cities, counties, and special districts have a Local Hazard Mitigation Plan to be eligible to receive FEMA hazard mitigation funds. Cities and counties can adopt and use all or part of a regional multi-jurisdictional plan, such as the one prepared by Fresno County, in lieu of preparing all or part of a Local Hazard Mitigation Plan.*
NS-6-b. Policy: Disaster Response Coordination. Maintain coordination with other local, State, and Federal agencies to provide coordinated disaster response.
NS-6-c. Policy: Emergency Operations Plan. Update the City's Emergency Operations Plan periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.
NS-6-d. Policy: Evacuation Planning. Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies. Commentary: The evacuation plan will be flexible in order to consider many scenarios and multiple modes of transportation beyond private automobiles. It will provide special provisions for disadvantaged populations, such as those with physical disabilities or those with low or very low incomes, and for areas with fewer resources through neighborhood emergency preparedness programs.
NS-6-e. Policy: Critical Use Facilities. Ensure critical use facilities (e.g. City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and other structures that are important to protecting health and safety in the community remain operational during an emergency. • Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions. • Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.
NS-6-f. Policy: Emergency Vehicle Access. Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

NS-6-g. Policy: Emergency Preparedness Public Awareness Programs. Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

Fresno Flood Plain Ordinance

The City of Fresno's Flood Plain Ordinance was revised in the late 1990s and formally adopted by the Fresno City Council on September 20, 2005. (In late 2007, the Fresno Municipal Code was republished with its chapters somewhat reorganized. There was no change in the text of the Flood Plain Ordinance at that time, but due to the reorganization of its content, its most recent adoption effective date is January 17, 2008.) The Fresno Flood Plain Ordinance is Article 6 of Chapter 11 of the Fresno Municipal Code.

The purpose of this ordinance is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;
- Ensure that potential buyers are notified that property is in an area of flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, the ordinance includes the following methods and provisions:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- Control filling, grading, dredging, and other development which may increase flood damage
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood water or which may increase flood hazards in other areas
- Control the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters

This ordinance applies to all areas of special flood hazards within the jurisdiction of the City as identified by FEMA's Flood Insurance Study for Fresno County, California and incorporated areas dated September 30, 2005, with accompanying Flood Insurance Rate Maps, and all subsequent amendments and/or revisions. It appoints the building official to administer, implement, and enforce the ordinance by granting or denying development permits in accord with its provisions.

This ordinance includes the following standards of construction related to special flood hazard areas:

- Anchoring
- Construction materials and methods
- Elevation and floodproofing
- Residential construction
- Nonresidential construction
- Flood venting
- Standards for utilities
- Standards for subdivisions
- Standards for manufactured homes
- Standards for recreational vehicles
- Floodways
- Standards for storage of materials and equipment

In conjunction with Fresno's Drainage Fee Ordinance (Fresno Municipal Code Chapter 12, Article 19), which requires local grading and development to conform to the Fresno Metropolitan Flood Control District Master Drainage Plan and to provide proportionate shares of drainage infrastructure, the Fresno Flood Plain Ordinance and its preceding Flood Damage Prevention Ordinance have reduced flood damage losses in the City.

National Flood Insurance Program/Community Rating System

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. It has been a member of the Community Rating System (CRS) since October 1, 1992. The City's Floodplain Administrator duties are assigned to the building official. The Building and Safety Division of the Planning and Development Department works to improve the City's CRS rating, which determines the price paid for flood insurance policies issued in the jurisdiction. The rating is based on detailed biannual audits conducted by FEMA and/or a designee agency (currently, the California Department of Water Resources). The primary means of improving and maintaining a good CRS rating is through administration of the Fresno Flood Plain Ordinance. As part of its efforts to improve its community rating, the City of Fresno has hosted periodic FEMA Region IX NFIP/CRS training.

The City's current CRS rating from October 2016 is Class 8, which reflects the loss of two class levels in the most recent audit.

San Joaquin River Bluff Preservation Ordinance, 1980

After an interagency San Joaquin River Reconnaissance Plan was completed in the late 1970s, the City of Fresno adopted the San Joaquin River Bluff Specific Plan to preserve this important open space and habitat feature and to safeguard the bluff face, which is the most unstable geologic feature in the City. The San Joaquin River Bluff Specific Plan was later subsumed by the 1988 Bullard Community Plan, which carried forward protective policies for this area of Fresno.

The regulation of land use, development, and grading in this portion of Fresno is ongoing pursuant to the Bluff Preservation Ordinance. This ordinance, part of the City's zoning regulations, delineates an overlay zone district along the river bluff (the Bluff Preservation Overlay District), established allowable and prohibited land uses, and set forth conditions and requirements for using or modifying property in the district. The regulations of the district are deemed to be necessary for the preservation of the special qualities of the bluffs and for the protection of the health, safety, and general welfare of owners and users of property in the area.

The Bluff Preservation Ordinance is administered by the Fresno Development and Resource Management Department through its special permit process and grading plan checks. Anyone applying for a building permit is required to submit a site plan review with accompanying soil investigation and evaluation report (prepared by an appropriately licensed professional engineer or registered geologist). The Department's Code Enforcement Division also conducts periodic surveillance of bluff properties for grading and construction done without permits and institutes abatement actions when these conditions are discovered.

Hazardous Material Incident Safeguards

The Fresno Fire Department works with Fresno County Environmental Health to review hazardous material business plans that detail flammable, explosive, toxic, and otherwise hazardous materials used by businesses in the City. The Fire Department has its own permitting requirement for liquid and gaseous fuel tanks to ensure that they are installed and maintained safely. The City's Hazardous Materials Response Unit (housed in a City fire station) maintains the capability to quickly characterize material releases and spills, to evaluate risks to life and property, and to implement appropriate controls and evacuation measures.

Fire Prevention Policy

The City of Fresno has some of the most progressive and effective fire prevention policies and regulations in the nation relating to water supply (fire flow) required for development, ingress and egress from developed buildings and subdivisions, on-site automatic fire suppression systems (sprinkler and on-site private hydrants), building addressing to facilitate rapid emergency response, marking of unsafe buildings (those older structures with hazardous conditions or a lack of water supply), and instant aid/mutual aid with adjacent fire departments belonging to Fresno County special districts and the City of Clovis.

In addition to its extensive network of well-trained and well-equipped firefighting stations, the Fresno Fire Department has a Fire Prevention Bureau, under supervision of the City's fire marshal, to administer regulations adopted and referenced by the Fresno Municipal Code Chapter 6, Article 5 relating to fire prevention. The Fire Prevention Bureau carries out these responsibilities by conducting routine inspections of all public and commercial buildings, performing detailed development permit and construction plan checks, and investigating arson.

Another component of the City's overall fire protection program is the administration of its public nuisance ordinances to require properties to be kept clean and free of flammable debris and to annually abate weeds and overgrown vegetation before these materials can dry out in the spring to pose a wildfire hazard (Fresno Municipal Code Chapter 10, Article 6 relating to public nuisance abatement). The Planning and Development Department Code Enforcement Division and Department of Public Utilities Community Sanitation Division coordinate their efforts to enforce the nuisance abatement regulations and provide cleanup services when property owners do not take care of matters themselves.

City of Fresno Emergency Operations Plan, 2015, Updated 2015

The City of Fresno Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, excessive heat/cold, power outages, and national security emergencies in or affecting the City of Fresno. The Plan, which was updated in 2015, does the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the City of Fresno.
- Identifies the policies, responsibilities, and procedures required to protect the health and safety of City communities, public and private property, and the environment from natural or technological disasters.
- Establishes the operational concepts and procedures associated with initial response operations to emergencies, the extended response operations, and the recovery process.

The EOP is designed to establish the framework for implementation of the California Standardized Emergency Management System/National Incident Management System for the City of Fresno, which is located within the California Governor's Office of Emergency Services' Mutual Aid Region V. It is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly between the City of Fresno and the Fresno County Operational Area, including special districts and state agencies, in emergency operations. This plan will be used in conjunction with the Fresno County EOP and the State of California Emergency Plan. The plan is designed to guide the reader or user through each phase of an emergency: preparedness, response, recovery, and mitigation.

Other Plans and Policies

Other hazard mitigation-related policies and plans in place in and observed by the City of Fresno include the following:

- California Code of Regulations Title 23 administrative law for development and use of land in designated floodway areas along the San Joaquin River administered by the Central Valley Flood Protection Board, staffed by the California Department of Water Resources.
- Standards for constructing and maintaining drainage basins and ponds to prevent mosquito breeding and to provide for mosquito control district access for inspection and abatement activities (jointly promulgated by the Planning and Development Department and Public Works Department in fall of 2005).
- Dam failure inundation plans prepared and administered by the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, Fresno Metropolitan Flood Control District, Southern California Edison, and Pacific Gas and Electric Company.
- The California Environmental Quality Act, overseen by the Fresno City Attorney's Office and administered by several City departments, requires consideration of health and safety impacts as they may relate to projects, which are defined as any action that may result in a change in the physical environment and that would include public facilities, and private development, and even adoption/amendment of land use plans and ordinances. An analysis of every project is conducted by the appropriate City department (the Development and Resource Management Department does the bulk of these analyses). Inquiries regarding project sites and features are distributed to departments and outside agencies that may have knowledge of, or which may regulate, aspects of the proposed project. The information obtained from these requests for comment and from other staff research is compiled into an informational document for decision-makers and the public. The information is also used to develop a list of mitigation actions to reduce or abate potential adverse impacts of the project. For those projects which may involve federal funds or require federal approvals, a parallel National Environmental Policy Act assessment is also prepared by the City.
- The Development and Resource Management Department administers regulations in the California Building Code and in Uniform Electrical, Plumbing, and Mechanical Codes as those codes are modified through adoption by the state and City. Plan check and inspection activities of the Department ensure structural soundness and compliance with seismic and other regulations.

E.4.2 Administrative/Technical Mitigation Capabilities

Table E.17 identifies the personnel responsible for activities related to mitigation and loss prevention in Fresno.

Table E.17: City of Fresno's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	Yes	Planning and Development Department (planners), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Planning and Development Department (engineers), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Planner/engineer/scientist with an understanding of natural hazards	Yes	Planning and Development Department (planners and engineers), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Personnel skilled in GIS	Yes	Planning and Development Department, Department of Public Utilities, Public Works Department, Information Services Department
Full time building official	Yes	Planning and Development Department
Floodplain administrator	Yes	Planning and Development Department
Emergency manager	Yes	Fresno Fire Department
Grant writer	Yes	Planning and Development Department, Police Department, Public Works Department, Fire Department
Other personnel	Yes	California registered geologist (Department of Public Utilities), California registered environmental health specialist (Planning and Development Department), licensed water and wastewater treatment operators
Warning systems/services (Reverse 9-11, outdoor warning signals)	Yes	State Emergency Alert System is coordinated by emergency management team through the National Weather Service
Other	Yes	Emergency notification of San Joaquin River bottom residents in conjunction with the U.S. Bureau of Reclamation and Fresno County

E.4.3 Fiscal Mitigation Capabilities

Table E.18 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table E.18: City of Fresno's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Geographically restricted to designated portions of Fresno based on area income
Capital improvements project funding	Yes	Budgeted out of utility fees and often related to issuance of bonds; City also obtains grants, shares of state gas tax and sales taxes, ballot measure tax revenue, etc.
Authority to levy taxes for specific purposes	Yes	Subject to California Proposition 218 restrictions on new and increased assessments
Authority to levy fees and fines, and to recover costs through lien processes, for nuisance abatement	Yes	Subject to an appeal process that involves administrative law judges retained by the City
Fees for water, sewer, gas, or electric services	Yes	Water, sewer, solid waste, code enforcement (cleanup)

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Impact fees for new development	Yes	Master Fee Schedule as originally chartered under the City's Urban Growth Management Ordinance
Incur debt through general obligation bonds	Yes	Would need vote of the taxpayers to enact.
Incur debt through special tax bonds	Yes	Special Assessment Districts that issue debt and incur the debt but the City only administers
Incur debt through private activities	Yes	The City has the capability of doing them and have in the past
Withhold spending or public infrastructure investment in hazard prone areas	Yes	The Department of Public Utilities retains jurisdiction over water and sewer services and determines its appropriate service areas with risk to facilities being one of the factors leading to a decision not to extend services to River bottom properties

E.4.4 Mitigation Outreach and Partnerships

The Fresno Department of Public Utilities, in conjunction with other agencies, provides water conservation and stormwater quality protection public information programs. The Fire Department provides personal preparedness outreach for heat and freeze emergencies and shelter-in-place information for hazardous materials emergencies. Additionally, the City has developed public service announcements for smoke detector battery life, canal safety, and fireworks safety.

The City's Joint Information System disseminates information in Spanish, and the City can obtain translation services for other languages when necessary. A Joint Information Center plan is an annex to the City of Fresno Emergency Operations Plan and provides comprehensive guidance for early warning notification in all languages and specifically the Americans with Disabilities Act (ADA) community.

Preparedness Exercises afford the opportunity to include the City of Fresno ADA Committee. Members of the committee and volunteers from the ADA community role play for realistic first responder training.

E.4.5 Other Mitigation Efforts

- The City is a certified StormReady community through the National Weather Service.
- The Fire Department, Police Department, and Solid Waste Division are nationally accredited.
- The City has installed security systems for the wastewater treatment facility and for its surface water treatment plant. Generators are installed in critical groundwater pumping stations and these facilities are secured.

E.4.6 Opportunities for Enhancement

Based on the capabilities assessment, the City of Fresno has several existing mechanisms in place that already help to mitigate hazards. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect

the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City of Fresno will lead to more informed staff members who can better communicate this information to the public. In addition, the City could work to improve the CRS rating through additional floodplain management program enhancements. This could further lower the cost of flood insurance for residents.

E.5 Mitigation Strategy

E.5.1 Mitigation Goals and Objectives

The City of Fresno adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

Incorporation into Existing Planning Mechanisms

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Public Works Department may utilize the hazard information when implementing Capital Improvement projects and the Planning and Development Department may utilize the hazard information when reviewing a site plan or other type of development applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Fresno will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

Continued Compliance with the National Flood Insurance Program

In addition to the mitigation actions identified herein the City will continue to comply with the National Flood Insurance Program as specified in General Plan Policy NS-3-j: *"National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements."*

E.5.2 Completed 2009 Mitigation Actions

The City of Fresno did not complete any of the mitigation actions identified in the 2009 plan. However, implementation is in progress for several of these actions and will be continued as part of the mitigation strategy for this plan update.

E.5.3 Mitigation Actions

The planning team for the City of Fresno identified and prioritized the following mitigation actions based on the risk assessment. Background information as well as information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are also included.

In addition to implementing the mitigation actions below the City of Fresno will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in

partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see Section 5.3.3 Multi-Jurisdictional Mitigation Actions, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

1. Establish Post-Disaster Action Plan for City Continuity of Operations Plan

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: Establish a post-disaster action plan to be part of the City of Fresno Continuity of Operations Plan (COOP) that will include the following elements:

- Procedures for public information
- Post-disaster damage assessment
- Grant writing
- Code enforcement
- Redundant operations

The plan will also include annexes from local businesses and large employers to improve economic and employment recovery. The plan will also identify a mechanism for the City to help businesses without COOPs develop a COOP to be incorporated, as an annex, into the City's Emergency Operations Plan.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: $150,000

Potential Funding: Local funds, grants

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-planning. A City COOP and local business COOPs will reduce the impact of a disaster to the local economy and employment.

Schedule: Long term

Status: 2009 project, implementation in progress

2. Improve the City's Capabilities for Sheltering Animals in a Disaster

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: During a disaster, not only do people need to be rescued, but their pets do also. Hurricane Katrina showed the nation that shelters do not typically allow pets, so pets may be left behind when their owners evacuate. The care of the animals left behind falls to local animal shelters. Currently, the SPCA Animal Shelter does not have the supplies to handle a large scale animal emergency. The City has approximately 18,000 licensed dogs. If a disaster occurred, they would only be able to house a small percentage of them. Overcrowding of animals usually causes diseases and loss of animal life. Purchasing new cages would alleviate some of the overcrowding created by a disaster.

Other Alternatives: Ask other agencies for supplies, if they have them available.

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: $50,000

Potential Funding: General fund

Benefits (Avoided Losses): This will cut down on the spread of disease and animal loss during an emergency or disaster.

Schedule: Short term

Status: 2009 project, implementation in progress

3. Train and Certify City Inspectors to Conduct Post-Disaster Damage Assessment

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: City inspectors play a vital role in post-disaster building assessment and damage assessment. Pre-training and certification is vital in response and recovery to reduce loss of life, relocate populations, and ensure the rebuilding of local economies.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): High

Cost Estimate: $250,000

Potential Funding: Grants

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-training and certification of individuals responsible for performing assessment of structures and facilities impacted by disasters. Certification will also allow qualified staff to mobilize with the State of California Office of Emergency Services (Region 5) Urban Search and Rescue Task Force.

Schedule: Long term

Status: 2009 project, implementation not yet started

4. Implement a Flood Awareness Program for the Public

Hazard(s) Addressed: Flood

Issue/Background: The City needs a program to educate flood-prone property owners along the San Joaquin River and in frequent annual flooding areas about the flood threat and how best to prepare, mitigate, and insure their properties.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): Medium

Cost Estimate: $15,000/year

Potential Funding: General fund, grants

Benefits (Avoided Losses): This will prevent the loss of human life and economic and property losses.

Schedule: Long term

Status: 2009 project, implementation not yet started

5. Southwest Fresno – Recycled Water Distribution System Construction

Hazard(s) Addressed: Drought

Issue/Background: In 2009, the State of California adopted a recycled water policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and an additional 300,000 acre-feet per year by 2030. The Recycled Water Master Plan prepared by the City of Fresno, Department of Public Utilities (DPU), identifies opportunities to assist with compliance of this law by reducing groundwater pumping and replacing groundwater with recycled water for non-potable purposes (i.e. outdoor irrigation, dust control, fountains, etc.). On April 11, 2013, the Council adopted the Recycled Water Master Plan and associated environmental documents.

In 2017, the DPU commissioned a 5 MGD Tertiary Treatment Facility at the Fresno-Clovis Regional Wastewater Treatment Facility. DPU is currently constructing a Recycled Water Distribution System in Southwest Fresno to deliver recycled water to parks, cemeteries, schools, agricultural uses, etc., to offset potable water irrigation demands. This will help mitigate drought by enabling the use of recycled water for certain uses instead of tapping potable water supplies.

Other Alternatives: DPU has a Water Shortage Contingency Plan (WSCP) which was updated in the City of Fresno's 2015 Urban Water Management Plan to manage water shortages including drought conditions. The WSCP consists of four stages allowing the City to ultimately reduce its water demand to a level commensurate with the water supplies available to a maximum reduction of 50 percent.

Responsible Office: City of Fresno Department of Public Utilities

Priority (High, Medium, Low): High

Cost Estimate: $75,000,000

Potential Funding: California State Water Resources Control Board – Clean Water State Revolving Fund

Benefits (Avoided Losses): Reduced ground water pumping by using recycled water for non-potable purposes.

Schedule: Ongoing with completion in 2019

Status: New project

6. Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation

Hazard(s) Addressed: Drought

Issue/Background: The Kings subbasin underlays the City of Fresno and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Fresno has become a joint power authority of the North Kings Groundwater Sustainability Agency, other members of the Agency include the County of Fresno, City of Kerman, City of Clovis, Biola Community Services District, Garfield Water District and International Water District. As a member of the North Kings GSA, the City of Fresno is required to participate in the development and implementation, no later than January 31, 2020, of a

Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the North Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Fresno.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City Engineer and North Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with grant funding opportunities from the State.

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR by January 31, 2020, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: New project in 2018

Attachment 5
Notice of Public Hearing

Notice of Public Hearing

City of Fresno

Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or Peter.Maraccini@Fresno.gov.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street

Bldg. A, Fresno, CA 93706, or by emailing at Peter.Maraccini@Fresno.gov. All written comments must be received no later than July 14, 2021, at 11:59 P.M.

Attachment 6
Resolution Approving the WSCP

RESOLUTION NO. 2021-197

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 WATER SHORTAGE CONTINGENCY PLAN AND AUTHORIZE THE CITY MANAGER TO DECLARE THE APPROPRIATE WATER CONSERVATION STAGES AND IMPLEMENT THE ASSOCIATED SHORTAGE RESPONSE ACTIONS

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, Water Code Section 10632 requires every urban water supplier to prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its UWMP; and

WHEREAS, the WSCP details intended City actions to respond to water shortages; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared a WSCP that complies with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 WSCP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library,

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 WSCP would be held in Council Chambers at which time public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 WSCP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Water Shortage Contingency Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Water Shortage Contingency Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

3. The City Manager, or designee, is hereby authorized to declare the appropriate Water Conservation Stages outlined in the 2020 Water Shortage Contingency Plan and implement the associated shortage response actions specified for the appropriate Water Conservation Stage in the Water Shortage Contingency Plan.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-197, entitled ***RESOLUTION – **Adopting 2020 Water Shortage Contingency Plan and authorizing the City Manager to declare the appropriate water conservation stages and implement the associated shortage response actions (Subject to Mayor's veto).** Item 10:05 A.M. (4), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

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CITY OF FRESNO
CITY CLERK'S OFFICE

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Outreach Events

2015 Outreach Events		
Date	Name of Event	Description
Jan	"Creating a Water-wise Landscape: Seven Steps to Follow our Climate"	Landscape Workshop by Susan Stiltz as SPEAKER for City employees at City Hall 2600 Fresno St 93721.Distribute literature E. Social media: sent email with flier to City employees. Contact: Melany Felton. LITERATURE
Jan	Fresno Chinese New Year Parade	Outreach booth providing water saving info & rebate information
March	Spring Festival - Clovis Botanical Garden	Outreach booth providing water saving info & rebate information
April	Home Depot - Riverpark Kid's Day Spring Event	Hands on activity for kids, drought tolerant plants planting, literature for adults
April	America's Party for the Planet	Outreach booth providing water saving info & rebate information
April	Sequoia Middle School Outdoor Club	Outreach booth providing water saving info & rebate information
May	Spring Fling - Master Gardener	Provided literature for event held at Garden of the Sun
May	Madden Library Water-wise Plant Exchange event	Water wise garden speaker, materials handed out
May	Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
June	Kids Water Camp	Large one day event, hands on activites, educational for kids 3rd grade (all elementary schools invited to participate)
July	Fresno Home Remodeling & Decorating Show	Fresno Fairgrounds 3 day event. Outreach booth with visual displays & information
Sept	Carnaval Children's Festival	Mosqueda Center Outreach booth, providing water saving information & rebates
Sept	Fresno State partnership	Susan Hawksworth extended education. Began planning for Feb classes with landscape specialists
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information
Nov	Fresno Fall Improvement Show	Inspiration Park Grand opening
Nov	Inspiration Park Grand opening	Outreach booth providing water saving info & rebate information

2016 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days

March	Spring Into Your Garden	Outreach booth providing water saving info & rebate information. Visual displays
April	Water Planet Day	Outreach booth providing water saving info & rebate information. Visual displays
April	8th Annual Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Dec	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Orchard St. & Grant Ave

2017 Outreach Events		
Jan	Hmong New Year	Outreach booth providing water saving info & rebate information. Hmong translator & printed materials in Hmong
Feb	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Hildago Elementary 3550 E Thomas 93702
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
March	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Leavenworth Elementary School, 4420 E Thomas

April	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Webster Elementary School, 2600 E Tyler 93701
April	9th Annual Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
April	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
May	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Slater Elementary school 4472 N Emerson 93705
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Make A Difference Day @ Chukchansi Park	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2018 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event
March	Spring Into Your Garden Festival	Outreach booth providing water saving info & rebate information. Visual displays
April	10th Annual Water Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days

Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual Display
Sept	Central California Women's Conference	Outreach booth providing water saving info & rebate information. Visual Display
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual Display
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2019 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event
March	Spring Into Your Garden Festival	Outreach booth providing water saving info & rebate information. Visual displays
April	Outreach booth @ Manchester Mall	Outreach booth providing water saving info & rebate information. Visual displays
April	Party for the Planet @ Chaffee Zoo	Outreach booth providing water saving info & rebate information. Visual displays
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
May	11th Annual Water Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2020 Outreach Events
All Outreach Suspended

L

Notification Letters

City of
FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Shay Bakman
Bakman Water Company
PO Box 7965
Fresno, CA 93747

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Bakman:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Scott Redelfs
City of Clovis Public Utilities
155 N. Sunnyside Ave
Clovis, CA 93611

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Redelfs:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
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Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Bill Stretch
Fresno Irrigation District
2907 South Maple Ave
Fresno, CA 93725

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Stretch:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Peter Sanchez
Fresno Metropolitan Flood Control District
5469 East Olive Ave
Fresno, CA 93727

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Sanchez:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Steven White
Fresno County Public Works
2220 Tulare St, 6th Floor
Fresno, CA 93721

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. White:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Jason Phillips
Friant Water Authority
4969 E. McKinley Ave, Suite 201
Fresno, CA 93727

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Phillips:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Nick Keller
Garfield Water District
PO Box 337
Clovis, CA 93613

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Keller:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
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Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Moises Ortiz
Malaga County Water District
3580 South Frank Street
Fresno, CA 93725-2511

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Ortiz:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Kassy D. Chauhan, PE
North Kings Groundwater Sustainability Agency
2907 S. Maple Avenue
Fresno, CA 93725

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mrs. Chauhan:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Jason Franklin
Pinedale County Water District
480 West Birch Ave
Pinedale, CA 93650

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Franklin:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Michael P. Jackson, PE
United States Bureau of Reclamation South-Central California Area Office
1243 N Street
Fresno, CA 93721-1813

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Jackson:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

Notice of Public Hearing

City of Fresno

Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or Peter.Maraccini@Fresno.gov.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street Bldg. A, Fresno, CA 93706, or by emailing at Peter.Maraccini@Fresno.gov. All written comments must be received no later than July 14, 2021, at 11:59 P.M.

McClatchy

Beaufort Gazette
Belleville News-Democrat
Bellingham Herald
Bradenton Herald
Centre Daily Times
Charlotte Observer
Columbus Ledger-Enquirer
Fresno Bee
The Herald - Rock Hill
Herald Sun - Durham
Idaho Statesman
Island Packet
Kansas City Star
Lexington Herald-Leader
Merced Sun-Star
Miami Herald
el Nuevo Herald - Miami
Modesto Bee
Raleigh News & Observer
The Olympian
Sacramento Bee
Fort Worth Star-Telegram
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The News Tribune Tacoma
The Telegraph - Macon
San Luis Obispo Tribune
Tri-City Herald
Wichita Eagle

AFFIDAVIT OF PUBLICATION

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Attention: City of

City of Fresno Dept. Public Utilities
2101 G Street Bldg A
Fresno, CA 93706

PUBLIC NOTICE

Notice of Public Hearing

City of Fresno
Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

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IPL0030763
Jul 1 2021

COUNTY OF DALLAS
STATE OF TEXAS

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.
The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 28, 1994, Action No. 520058-9.
The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

No. of Insertions: 1

Beginning Issue of: 07/01/2021

Ending Issue of: 07/01/2021

Isabel Capps

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: 07/01/2021

Amanda Grisham

Notary Public in and for the state of Texas, residing in Dallas County

AMANDA DAWN GRISHAM
My Notary ID # 132031326
Expires May 30, 2023

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Attention: City of

City of Fresno Dept. Public Utilities
2101 G Street Bldg A
Fresno, CA 93706

PUBLIC NOTICE

Notice of Public Hearing

City of Fresno
Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or **Peter.Maraccini@Fresno.gov**.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at **https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/**. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street Bldg. A, Fresno, CA 93706, or by emailing at **Peter.Maraccini@Fresno.gov**. All written comments must be received no later than July 14, 2021, at 11:59 PM.
IPL0031437
Jul 8 2021

COUNTY OF DALLAS
STATE OF TEXAS

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.
The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 28, 1994, Action No. 520058-9.
The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

No. of Insertions: 1

Beginning Issue of: 07/08/2021

Ending Issue of: 07/08/2021

Isabel Capps

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: 07/08/2021

Amanda Grisham

Notary Public in and for the state of Texas, residing in Dallas County

AMANDA DAWN GRISHAM
My Notary ID # 132031326
Expires May 30, 2023

Extra charge for lost or duplicate affidavits.
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M

Adopting Resolutions

RESOLUTION NO. 2021-196

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, the City adopted its current UWMP on June 23, 2016; and

WHEREAS, the requirements of an UWMP are to generally: (1) assess current and projected water supplies, (2) evaluate water demand and customer types, (3) evaluate reliability of water supplies, (4) compare demand and supply projections for a 20-year period, and (5) detail response actions in the event of a water shortage; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared the UWMP to comply with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 UWMP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library, Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 UWMP would be held in Council Chambers at which public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 UWMP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Urban Water Management Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-196, entitled ***RESOLUTION – Adopting 2020 Urban Water Management Plan (Subject to Mayor's veto).** Item 10:05 A.M. (3), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes :
Noes :
Absent :
Abstain :

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2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

RESOLUTION NO. 2021-197

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 WATER SHORTAGE CONTINGENCY PLAN AND AUTHORIZE THE CITY MANAGER TO DECLARE THE APPROPRIATE WATER CONSERVATION STAGES AND IMPLEMENT THE ASSOCIATED SHORTAGE RESPONSE ACTIONS

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, Water Code Section 10632 requires every urban water supplier to prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its UWMP; and

WHEREAS, the WSCP details intended City actions to respond to water shortages; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared a WSCP that complies with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 WSCP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library,

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 WSCP would be held in Council Chambers at which time public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 WSCP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Water Shortage Contingency Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Water Shortage Contingency Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

3. The City Manager, or designee, is hereby authorized to declare the appropriate Water Conservation Stages outlined in the 2020 Water Shortage Contingency Plan and implement the associated shortage response actions specified for the appropriate Water Conservation Stage in the Water Shortage Contingency Plan.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-197, entitled ***RESOLUTION – **Adopting 2020 Water Shortage Contingency Plan and authorizing the City Manager to declare the appropriate water conservation stages and implement the associated shortage response actions (Subject to Mayor's veto).** Item 10:05 A.M. (4), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

RECEIVED
2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

RESOLUTION NO. 2021-198

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT APPENDIX L - ADDENDUM TO THE CITY OF FRESNO'S 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, the City of Fresno (City) contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 acre-feet of Class 1 surface water; and,

WHEREAS, the CVP was developed through an agreement with the Exchange Contractors that have historic pre-1914 San Joaquin River water rights; and,

WHEREAS, the Exchange Contractors receive water from the Sacramento-San Joaquin River Delta (Delta) in exchange for the CVP Friant Division water; and,

WHEREAS, during times of severe drought when the Exchange Contractors don't receive their full allocations from the Delta, the Exchange Contractors can call on their historic pre-1914 San Joaquin River water rights to fulfill their allocations, which reduces CVP Friant Division allocations to the City; and,

WHEREAS, due to the indirect connection of the City's Class 1 surface water allocation from the CVP Friant Division to the Exchange Contractors allocation from the Delta, the City is required to demonstrate consistency with the Delta Plan established via the Sacramento-San Joaquin Delta Reform Act of 2009; and,

WHEREAS, Delta Plan Policy WR P1 requires urban water suppliers to demonstrate reduced Delta reliance in the 2015 and 2020 Urban Water Management Plans (UWMPs); and,

WHEREAS, the City's 2015 UWMP did not include information regarding Delta

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self -Reliance; and

WHEREAS, the City prepared the 2015 UWMP following the Department of Water Resources (DWR) UWMP Guidebook 2015, which made such reporting optional; and,

WHEREAS, the DWR UWMP Guidebook 2020 instructs urban water suppliers to amend 2015 UWMP with reporting on reduced Delta reliance if not already included; and,

WHEREAS, the City has prepared Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" that follows the instructions of the DWR UWMP Guidebook 2020, fulfills the requirements of the Delta Plan Policy WR P1, and complies with the requirements of the Urban Water Management Planning Act; and,

WHEREAS, the City desires to amend its 2015 UWMP to incorporate Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed;" and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft Appendix L – Addendum to the 2015 UWMP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library, Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021 and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft Appendix L – Addendum to the 2015 UWMP would be held in Council Chambers at which time public comment on the draft Addendum would be received, as required by Water Code Section 10642; and,

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the draft Appendix L Addendum to the 2015 UWMP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed."

2. The City Manager, or designee, is hereby authorized and directed to file Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-198, entitled ***RESOLUTION – Adopting Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan (Subject to Mayor's veto).** Item 10:05 A.M. (5), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

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CITY OF FRESNO
CITY CLERK'S OFFICE

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I.2 - Utilities Technical Study

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Southeast Development Area (SEDA)
Specific Plan
Water Technical Study

April 26th, 2023

Prepared for:

City of FRESNO

City of Fresno, California

Prepared by:

Blair, Church & Flynn
CONSULTING ENGINEERS

451 Clovis Avenue, Suite 200
Clovis, California 93612
Tel (559) 326-1400
Fax (559) 326-1500
www.bcf-engr.com



Date signed: 04/26/2023

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Appendix D – City of Fresno 2020 Urban Water Management Plan

CHAPTER 1
INTRODUCTION

1.1 Project Description and Background

The City of Fresno (City) is preparing a Specific Plan and Program Environmental Impact Report (PEIR) for the Southeast Development Area (SEDA). The SEDA Specific Plan Area (Plan Area), previously known as the Southeast Growth Area (SEGA), is an approximately 9,000-acre area in the southeast portion of the City of Fresno that is formally designated as a growth area in the City of Fresno General Plan (General Plan). The Plan Area is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jenson and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west; see Figure 1.1 for the Plan Area's location.

SEDA was approved for incorporation into the City by the Local Agency Formation Commission (LAFCo) in 2006, with a number of qualifying provisions, of which included the preparation of a Specific Plan and associated environmental documents before the land could be annexed to the City. Located in Growth Area II, SEDA was planned for development after other infill initiatives from the City's other planning efforts, and would be developed in phases. The General Plan established two levels of development – the General Plan Horizon and the General Plan Buildout. The General Plan Horizon is the level of development predicted to occur by the "Horizon Year," which was established as 2035, in accordance with the General Plan. General Plan Buildout is the level of development characterized by full occupancy of all developable sites in accordance with the General Plan; this was estimated to occur beyond 2035 (defined as past 2050).

As such, the General Plan defined development of SEDA under General Plan Horizon as a portion of the full buildout conditions – specifically, it assumed a residential development capacity of approximately 15,000 dwelling units, one third of the buildout capacity. Accordingly, the residential development capacity of SEDA under General Plan Buildout is approximately 45,000 dwelling units, and the General Plan assumed that the additional 30,000 dwelling units would not be developed until after 2035. However, though the General Plan was analyzed under the General Plan Horizon level, the associated MEIR (Master Environmental Impact Report) analyzed the environmental impacts of the General Plan under the buildout level of the Sphere of Influence (SOI), which encompasses other growth areas, including SEDA.

The Specific Plan for SEDA was developed for the buildout condition of the Plan Area of 45,000 dwelling units, and provides implementation mechanisms for development in the Plan Area that accommodate for increased density and accelerate housing production. As part of the City's General Plan, SEDA was designated with land use classifications as defined in the General Plan. The Specific Plan presents alternative land use classifications for SEDA, and seeks to propose how the Plan Area will develop over time to complete buildout conditions with these newly-defined land use categories.

As part of the Specific Plan process, a PEIR needs to be developed to evaluate the impacts associated with the proposed improvements to the Plan Area, and what, if any, mitigation measures are necessary to account for such impacts. This technical report will focus on the impacts of the SEDA Specific Plan on the water supply and distribution system proposed for the Plan Area.

1.2 Summary of Analysis

The City's General Plan assigned land use classifications to areas located within the SEDA Specific Plan Area. Each land use classification has a set of characteristics assigned to it with respect to a specific utility demand that have been determined and/or calculated by various contributing parties. The SEDA Specific Plan proposes new land use classifications for the Plan Area that may change the area's characteristics as it relates to utilities, e.g., water demand, wastewater generation, or storm water runoff, when compared to the General Plan. Additionally, some land uses have revised areas, which further alters those characteristics.

Changes in land use can affect a water distribution system's ability to supply, store, and distribute water to the City's residents. New development will require the construction of new water distribution facilities which may include water mains, valves, storage tanks, and booster pump stations, as well as potential new sources of water supply, such as new domestic water wells or surface water treatment plants. The City of Fresno's Metropolitan Water Resources Management Plan (Metro Plan)[1] and the Fresno General Plan Master Environmental Impact Report (MEIR)[2] include a number of proposed water facilities improvements to account for increased development and water demand based on the General Plan buildout conditions. The City of Fresno is currently developing an update to the Metro Plan, which includes an updated analysis of water demand factors for General Plan land uses developed by Akel Engineering Group, Inc,[3] which have been utilized in this analysis.

This technical study will focus on the analysis of water demand in the Plan Area, and how it may change based on Specific Plan development. The analysis to determine the change in water demands involved comparing the total demand determined for the Plan Area under both the General Plan and Specific Plan land use cases.

At the time of preparation of this study, the City was developing water demand factors for the new SEDA land use classifications. These factors were not available when completing the above stated analysis. Thus, a number of reasonable assumptions were made to correlate Specific Plan land uses with General Plan land uses in order to use the water demand factors prepared for the Metro Plan update.

This technical study focuses on specifically analyzing the change in water demand between the General Plan and the Specific Plan for SEDA in order to assist with the development of mitigation measures as needed.

[1] City of Fresno, "Metropolitan Water Resources Management Plan Update," Phase 1 – 2007, Phase 2 – 2011, Phase 3 – 2011, Phase 4 – 2014.
[2] City of Fresno, "Master Environmental Impact Report General Plan and Development Code Update," 2014.
[3] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update."

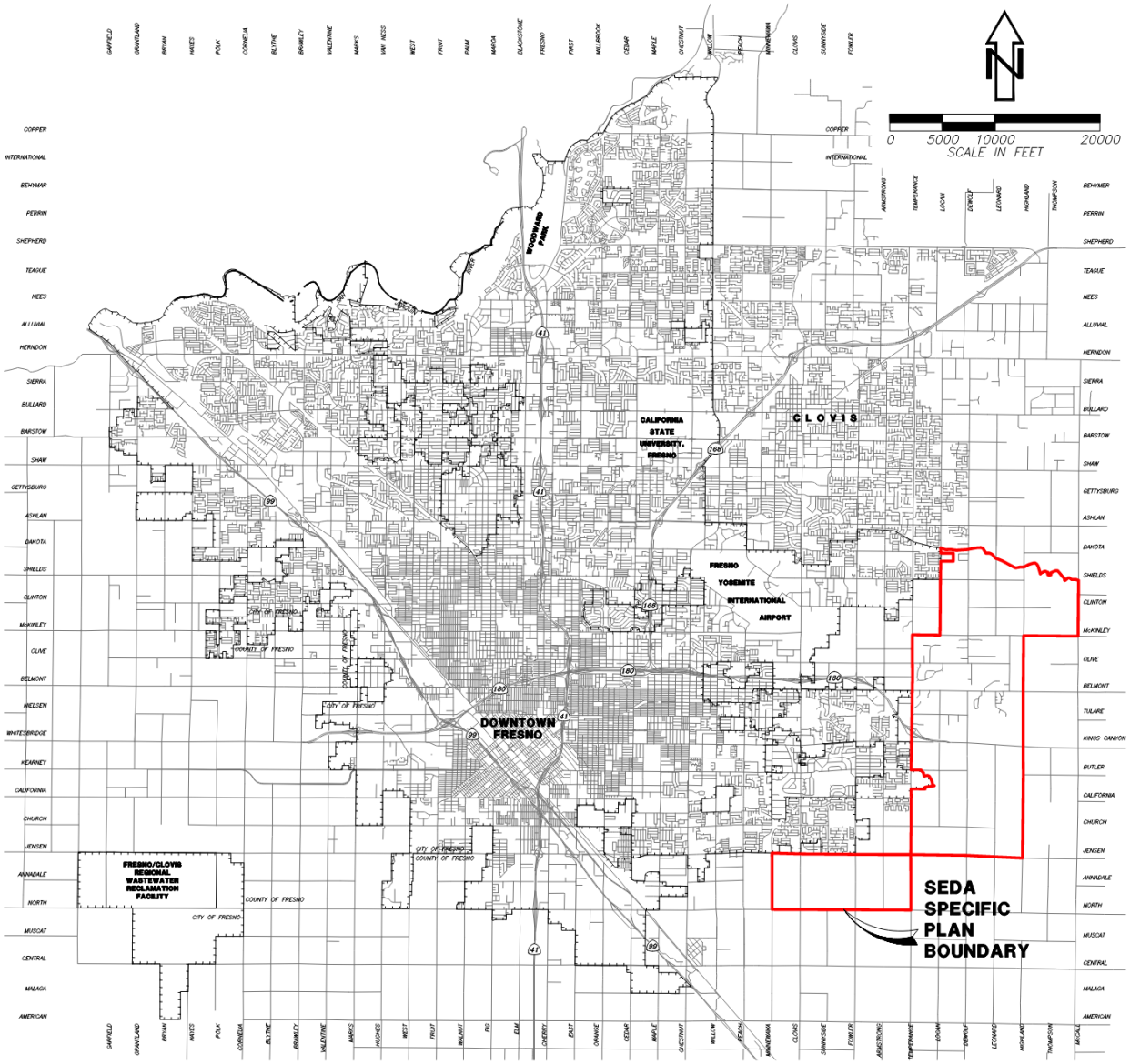


Figure 1.1 SEDA Specific Plan Location

CHAPTER 2
REGULATORY FRAMEWORK

2.1 General

The City of Fresno owns and operates the potable water distribution system that serves Fresno and other participating agencies, as well as the water supply sources and treatment facilities; specifically, the City Water Division manages the system. The City delivers potable water to urban residential, commercial, and industrial customers in over 115 square miles of the City, including many County islands and areas within the City's Sphere of Influence (SOI). Fresno's main sources of water include groundwater, treated surface water, and reclaimed water; groundwater is obtained through approximately 202 municipal supply wells located throughout Fresno; surface water is collected and treated at the Northeast Surface Water Treatment Facility (NESWTF), and the Southeast Surface Water Treatment Facility (SESWTF); reclaimed water is collected and treated at the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and the North Fresno Wastewater Reclamation Facility (NFWRF), and is mainly utilized for landscape irrigation.

There are a number of federal, state, and local regulations that must be adhered to when planning potable water facilities, many of which provide guidance and requirements for the handling and distribution of potable water, as well as regulations to safeguard water quality; several are discussed in the following sections.

2.2 Federal Regulations

Clean Water Act[4]

The Federal Water Pollution Control Act of 1972, commonly referred to as the Clean Water Act (CWA), regulates the discharge of pollutants into watersheds throughout the United States and quality standards for surface waters. It is the primary federal law regulating and governing water pollution, with the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA establishes the basic structure for regulating discharges of pollutants in waters of the United States and regulating quality standards for surface waters. Under the CWA, the Environmental Protection Agency (EPA) is tasked with developing national water quality criteria used as the basis for state water quality standards, and developing national water quality criteria recommendations for pollutants in surface waters. Water quality standards establish the designated use of a body of water (e.g., recreation, water supply, industrial, etc.), and a statement identifying the maximum concentrations of various pollutants that would not interfere with the designated use. Each state must set specific water quality standards, which serve as backup to federally set technology-based requirements. The City is responsible for monitoring water quality and conforming to the requirements of the CWA for all water sources.

Federal Safe Drinking Water Act[5]

The Federal Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designed for drinking, whether from above- or below-ground sources. The SDWA authorizes the EPA to establish national health-based minimum standards for drinking water to protect the public from naturally-occurring and man-made contaminants that may be found in drinking water. These standards, known as the National Primary Drinking Water Regulations, set enforceable maximum

[4] Clean Water Act, 33 U.S.C. §1251 et seq. (1972).
[5] Federal Safe Drinking Water Act, 42 U.S.C. §300f et seq. (1974).

contaminant levels for specific contaminants in drinking water, as well as required methods of treatment to remove said contaminants. The SDWA applies to all public water systems in the United States, except for private wells serving less than 25 people. In California, the Division of Drinking Water (DDW) within the State Water Resources Control Board (SWRCB) regulates public drinking water systems. If the water system does not meet the aforementioned standards, it is the responsibility of the water supplier to notify its customers.

2.3 State Regulations

California Porter-Cologne Water Quality Control Act[6]

The Porter-Cologne Water Quality Control Act is the principal law governing water quality in California, for both above- and below-ground supplies. This act designated the SWRCB as the statewide water quality planning agency, and gave authority to nine Regional Water Quality Control Boards (RWQCB) to oversee water quality on a day-to-day basis at both the local and regional levels. RWQCBs develop Regional Water Quality Plans (Basin Plans), regulate all pollutant or nuisance discharges that may affect either surface water or groundwater, and implement said water quality plans. The Central Valley RWQCB oversees the Fresno area.

California Urban Water Management Planning Act[7]

The Urban Water Management Planning Act updated the California Water Code (§10610-10656 and 10608) to include a requirement that all urban water suppliers within California prepare and adopt an Urban Water Management Plan (UWMP) and update it every five years. This applies to suppliers that provide either 3,000 acre-feet of water annually, or who serve more than 3,000 customers. UWMPs support suppliers' long-term resource planning to ensure that adequate water supplies are available to meet existing and future water demands. The Act is intended to encourage and support water conservation efforts, and ensure efficient use of available water supplies. UWMPs must assess the reliability of water sources over a 20-year planning time period, describe demand management measures and water shortage contingency plans, planning for single and multiple dry water years, and discuss the use and planned use of recycled water.

Senate Bills 610 and 221[8]

Senate Bill (SB) 610 and SB 221 amended state law in 2002 to ensure better coordination between local water supply and land use decisions, and to confirm that there is an adequate water supply for new developments. These two companion measures require authorities to demonstrate that adequate and reliable 20-year water supplies are available for any new development, as well as existing water users.

SB 610 requires the preparation of UWMPs and Water Supply Assessments (WSAs) for projects (as defined by Water Code §10912) which are subject to California Environmental Quality Act (CEQA) provisions. Projects required to prepare a WSA include:

- Residential developments of more than 500 dwelling units;
- Shopping centers or business establishments employing more than 1,000 persons or having more than 500,000 square feet of floor area;
- Hotels or motels, or both, having more than 500 rooms;

[6] California Porter-Cologne Water Quality Act, California Water Code Div. 7 §13000 et seq. (1969).
[7] California Urban Water Management Plan Act, California Water Code §10610-10656, 10608.
[8] SB 610 Water Supply Planning, Chapter 643, Statutes of 2001, Costa; SB 221 Land Use: Water Supplies, Chapter 642, Statutes of 2001, Kuehl.

- Industrial, manufacturing or processing plants, or industrial parks planned to employ more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area;
- Mixed-use projects that include one or more of the projects specified above;
- Projects that would demand an amount of water equivalent to, or greater than, the amount of water required for 500 dwelling units.

SB 221 establishes consultation and analysis requirements for water supply planning for residential subdivisions including more than 500 dwelling units. Written verification by the water supplier that sufficient water is available for the proposed plan is required before construction can begin.

California Groundwater Management Act of 1992[9]

The Groundwater Management Act was signed into law in 1992, and made groundwater management part of the California Water Code (Division 6, Part 2.75, Chapters 1-5, §10750-10755.4). First introduced as Assembly Bill (AB) 3030, the Act established specific procedures on how Groundwater Management Plans (GWMPs) are to be developed and adopted by local agencies. The intent of the Act is to encourage local agencies to work cooperatively to manage groundwater resources within their jurisdictions and to provide a methodology for developing a GWMP. The Act has since been modified by Senate Bill (SB) 1938 in 2002 and AB 359 in 2011.

- AB 3030 provided a systematic procedure for existing local agencies to develop GWMPs.
- SB 1938 modified the Act by requiring any public agency seeking State funds administered through the California Department of Water Resources (DWR) for the construction of groundwater projects to prepare and implement a GWMP.
- AB359 further modified the Act by requiring public agencies to prepare and implement GWMPs with an additional required component that focused on identifying groundwater recharge areas. It also included several plan adoption procedural changes, requires GWMPs to be submitted to DWR, and requires DWR to provide public access to this information.

Sustainable Groundwater Management Act of 2014 (SGMA)[10]

The Sustainable Groundwater Management Act (SGMA) includes a three-bill legislative package composed of AB 1739, SB 1168, and SB 1319. SGMA requires local agencies to form Groundwater Sustainability Agencies (GSAs) for high and medium priority basins, and develop and implement Groundwater Sustainability Plans (GSPs) to avoid and mitigate overdraft of groundwater within 20 years. SGMA places the authority of groundwater management with local agencies; it establishes a definition of sustainable groundwater management, establishes a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources, prioritizes basins with the greatest problems, and sets a 20-year timeline for implementation.

State Updated Model Water Efficient Landscape Ordinance (AB 1881) (2015)[11]

The Model Water Efficient Landscape Ordinance (MWELO) is a state regulation designed to prevent water from being wasted on irrigated landscapes. Created in 1993, the MWELO was updated in 2015 by Executive Order EO B-29-15. Land use authorities (Cities and Counties) must ensure MWELO compliance on development projects with landscaped areas of 500 square feet or more. This applies to residential, commercial, industrial and institutional projects that require a

[9] California Groundwater Management Act, California Water Code Division 6, Part 2.75, Chapters 1-5, §10750-10755.4.
[10] Sustainable Groundwater Management Act (SGMA), California Water Code Div. 6, Part 2.74 §10720-10737.8 (2014).
[11] Model Water Efficient Landscape Ordinance (MWELO), Title 23 CCR, Div. 2, Chap. 2.7 §490 et seq.

permit, plan check, or design review. The California DWR provides technical assistance in helping Land Use Authorities adhere to the ordinance. The Fresno Municipal Code includes local ordinances that are required to reduce water consumption and conserve water.

State Mandated Water Reductions[12]

On January 18, 2022, as a result of drought conditions in California, the California SWRCB adopted Emergency Regulation Requirements for water conservation. The Governor previously urged Californians to reduce water usage in 2021 by 15%, however actual reduction was only about 6%. Thus, the SWRCB has enacted emergency regulations that will remain in effect for one year unless the SWRCB acts to end, modify, or readopt it. These regulations were readopted in December 2022 for another year. The regulations prohibit certain wasteful water use practices statewide, and encourage Californians to monitor their water usage more closely. Emergency Regulation Requirements prohibit using potable water for:

- Outdoor watering that lets water run onto sidewalks and other areas (except incidental runoff)
- Washing vehicles without an automatic shutoff nozzle
- Washing hard surfaces, like driveways and sidewalks, that don't absorb water
- Street cleaning or construction site preparation
- Filling decorative fountains, lakes, or ponds
- Outdoor watering within 48 hours after it rains at least 1/4 inch of rainfall
- Watering ornamental turf on public medians

An additional emergency water conservation regulation was enacted in June 2022 that prohibits the use of potable water to water decorative grass in commercial, industrial, and institutional areas including common areas of homeowners' associations.[13] The regulation also requires urban water suppliers to implement all demand-reduction actions under "Level 2" of their Water Shortage Contingency Plans, which are actions meant to address a 10% to 20% water shortage. Additionally, urban water suppliers are required to fast-track their submissions of supply and demand assessments to plan for potential extended dry conditions. "Level 2" actions vary for each water supplier, but often include things like increasing communication about the importance of water conservation, limiting outdoor irrigation to certain days or hours, increasing patrolling to identify water waste, and enforcing water-use prohibitions.

CALGreen Building Code[14]

The California Building Standards Commission adopted the nation's first green building standards in 2008. The standards code (Part 11, Title 24 CCR, known as "CALGreen") was adopted to apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure, unless otherwise indicated in the CCR, throughout California. CALGreen established planning and design standards for sustainable site development including water conservation. CALGreen provisions became effective on January 1, 2011. The purpose of the CALGreen provisions is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of concepts having reduced negative impact or positive environmental impact and encouraging sustainable construction practices.

[12] State Water Resources Control Board Resolution No. 2022-0002, "To Adopt an Emergency Regulation to Supplement Voluntary Water Conservation," 2022.
[13] State Water Resources Control Board Resolution No. 2022-0018, "To Adopt an Emergency Regulation to Reduce Water Demand and Improve Water Conservation." 2022.
[14] California Green Building Standards Code (CALGreen), Title 24 CCR Part 11.

California Plumbing Code[15]

The California Plumbing Code (Part 5, Title 24 CCR) serves to prevent disorder in the industry and to consolidate plumbing codes utilized by local jurisdictions to reduce confusion and conflicts among varying practices. The Plumbing Code covers water fixtures, potable and non-potable water systems, and recycled water systems, among other topics. Potable water supply and distribution facilities shall comply with all applicable provisions of the current edition of the California Plumbing Code.

2.4 Local Regulations

Fresno General Plan

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of potable water service and facilities (Table 2.1):

Table 2.1 City of Fresno General Plan Objectives and Policies Relevant to Potable Water Supply

Objective/Policy Number	Objective/Policy Text
Objective PU-3	Enhance the level of fire protection to meet the increasing demand for services from an increasing population.
Policy PU-3-f	**Adequate Infrastructure.** Continue to pursue the provision of adequate water supplies, hydrants, and appropriate property access to allow for adequate fire suppression throughout the City.
Objective PU-8	Manage and Develop the City's water facilities on a strategic timeline basis that recognizes the long life cycle of the assets and the duration of the resources, to ensure a safe, economical, and reliable water supply for existing customers and planned urban development and economic diversification.
Policy PU-8-a	**Forecast Need.** Use available and innovative tools, such as computerized flow modeling to determine system capacity, as necessary to forecast demand on water production and distribution systems by urban development, and to determine appropriate facility needs.
Policy PU-8-b	**Potable Water Supply and Cost Recovery.** Prepare for provision of increased potable water capacity (including surface water treatment capacity) in a timely manner to facilitate planned urban development consistent with the General Plan. Accommodate increase in water demand from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law, and recognizing the differences in terms of quantity, quality and reliability of the various types of water in the City's portfolio.
Policy PU-8-c	**Conditions of Approval.** Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.
Policy PU-8-d	**CIP Update.** Continue to evaluate Capital Improvement Programs and update them, as appropriate, to meet the demands of both existing and planned development consistent with the General Plan.
Policy PU-8-f	**Water Quality.** Continue to evaluate and implement measures determined to be appropriate and consistent with water system policies, including prioritizing

[15] California Plumbing Code, Title 24 CCR Part 5.

Objective/Policy Number	Objective/Policy Text
	the use of groundwater, installing wellhead treatment facilities, and enhancing transmission grid mains to promote adequate water quality and quantity.
Policy PU-8-g	**Review Project Impact on Supply.** Mitigate the effects of development and capital improvement projects on the long-range water budget to ensure an adequate water supply for current and future users.
Objective RC-6	Ensure that Fresno has a reliable, long-range source of drinkable water.
Policy RC-6-a	**Regional Efforts.** Support cooperative, multi-agency regional water resource planning efforts and activities on developing and implementing the Upper Kings Basin Integrated Regional Water Management Plan.
Policy RC-6-b	**Water Plans.** Adopt and Implement ordinances, standards, and policies to achieve the intent of the City of Fresno Urban Water Management Plan, Fresno-Area Regional Groundwater Management Plan, and City of Fresno Metropolitan Water Resources Management Plan to ensure a dependable supply of water.
Policy RC-6-c	**Land Use and Development Compliance.** Ensure that land use and development projects adhere to the objective of the Fresno Metropolitan Water Resources Management Plan to provide sustainable and reliable water supplies to meet the demand of existing and future customers through 2025.
Objective RC-7	Promote water conservation through standards, incentives and capital investments.

Fresno Municipal Code – Model Water Efficient Landscape Ordinance (MWELO)

As stated, MWELO requires local agencies to implement water efficiency measures as part of its review of landscaping plans. Local agencies can either adopt the MWELO or incorporate provisions of the ordinance into its own code requirements for landscaping. Section 11 of Chapter 11, "Building Permits and Regulations," and Section 23 of Chapter 15, "Citywide Development Code," of the City Municipal Code include requirements for landscape design and incorporates the requirements of the California MWELO, among other state codes and regulations. For new landscaping projects of 2,500 square feet of more that require a discretionary or ministerial approval, the applicant is required to submit a detailed "Landscape Documentation Package" that discusses water efficiency, soil management, and landscape design elements.

City of Fresno Metropolitan Water Resources Management Plan

The City of Fresno Metropolitan Water Resources Management Plan (Metro Plan) was prepared to document the existing conditions of the City's water system, and facilitate future water resources decisions and facilities improvements. Phase 1 consists of a baseline system characterization[16], Phase 2 consists of the development and evaluation of future water supplies[17], Phase 3 consists of implementation of the management plan[18], and Phase 4 included the preparation of an Environmental Impact Report (EIR) for the City. [19] Chapters 4, 5, 6 and 8 of Phase 2 discuss objectives, goals and policies related to potable water, including water conservation (Chapter 4), groundwater (Chapter 5), surface water (Chapter 6), and future water supplies (Chapter 8). It should be noted that this plan was prepared in 2011, and a number of the

[16] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 1 Baseline System Characterization," December 2007.
[17] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 2 Alternative Development and Evaluation of Future Water Supply Plan," January 2011.
[18] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 3 Implementation Plan," January 2011.
[19] City of Fresno, "Metropolitan Water Resources Management Plan Update, Final Environmental Impact Report," May 2014.

stated objectives/goals/policies have already been completed. At the time of preparation of this study, an update to the Metro Plan is being developed by the City.

Urban Water Management Plan[20]

The City's Urban Water Management Plan (UWMP) was prepared as a requirement of the Urban Water Management Planning Act (UWMPA).[21] The UWMP outlines a water supplier's long-term water resource planning to ensure sufficient water supplies for existing and future demands; it essentially sets the roadmap for how the City will utilize water over the coming years. UWMPs are updated and submitted to the Department of Water Resources (DWR) every five (5) years. The UWMPA applies to urban water suppliers with 3,000 or more connections being served, or supplying more than 3,000 acre-feet of water annually. The most recent version of the City's UWMP was prepared for 2020.

City of Fresno Standard Specifications and Plans

The City maintains its own set of standard Specifications and Plans to be followed when designing and constructing City projects. Those related to the water distribution system include, but are not limited to:

- Standard Specifications
  - Section 21 – Domestic Water Facilities Design Criteria
  - Section 22 – Water Facilities
  - Section 25 – Landscape Irrigation Systems
- Standard Plans
  - Plans W-1 through W-45

[20] City of Fresno, "2020 Urban Water Management Plan," July 2021.
[21] Division 6, Part 2.6, California Water Code, §10610-10656.

CHAPTER 3
EXISTING CONDITIONS

3.1 Water Infrastructure

3.1.1 General

The City of Fresno Water Division manages and operates the City's water system. The City provides potable water to over 550,000 customers including residential, commercial, and industrial users, in an approximately 115 square mile (73,500 acre) area that includes many County islands (unincorporated areas within the City), and areas within the City's Sphere of Influence (SOI). Fresno's domestic water supplies include groundwater, surface water, and reclaimed water.

The City's water system consists of approximately 1,860 miles of distribution and transmission pipes, 202 active groundwater wells, three (3) surface water treatment facilities (SWTFs), five (5) water storage facilities with pump stations, and three (3) booster pump facilities. The Service Area declines in elevation generally from the northeast to the southwest; to assist with pressure regulation, the area is divided into five (5) pressure zones: Highway 41, Shepherd, Sierra, Southwest, and Booster Pump 4 (BP04). The zones are separated by a series of closed/partially closed valves to prevent and/or impede flow from one zone to another.

3.1.2 Water Sources

The City is located within the Kings River Subbasin of the San Joaquin Valley Groundwater Basin. Historically, the City has relied heavily on groundwater pumped from the underground basin and aquifers. The City has a network of over 270 municipal water wells and operates approximately 202 active municipal supply wells that access groundwater from said basin.[22] The production capacity from the active wells is approximately 403 MGD (million gallons per day), and the total capacity including inactive wells is approximately 487 MGD. The wells are located around the City, and most are directly connected into the water distribution system. The City's water system depended completely upon groundwater as a water source until 2004 when the first surface water treatment facility (SWTF) was commissioned. Today, groundwater is still heavily relied upon as a primary water source for the City.

Groundwater quality generally meets primary and secondary drinking water standards for municipal water use, however the groundwater basin has been impacted by several chemical contaminant plumes and nitrates that require monitoring and wellhead treatment. Treatment efforts and removal of specific wells from service are conducted as required to maintain drinking water supply quality and standards.

In 2004, the City commissioned the Northeast Surface Water Treatment Facility (NESWTF). The facility, located at Chestnut and Behymer Avenues, is designed for a 30-MGD capacity, and is planned to be expanded to a total of 60 MGD as development in Fresno continues. The NESWTF has reduced the City's dependance on groundwater and allowed an increased degree of groundwater recharge to occur. The City also constructed a water storage and modular surface water treatment facility (T-3 SWTF) in 2015 in southeast Fresno, which has a design capacity of 8 MGD.

[22] City of Fresno, "2020 Urban Water Management Plan," July 2021.

Most recently, the City completed construction of the Southeast Surface Water Treatment Facility (SESWTF) in 2018, which is a 54-MGD facility with an ultimate capacity of 80 MGD. This included a 72-inch raw water transmission main to convey surface water from FID's Fresno Canal to the SESWTF. T-3 was shut down after the SESWTF was activated, however the City has indicated that there are future plans to reactivate the site. With the SESWTF and NESWTF combined, the City provided greater than 50% of its potable water supply through the use of surface water in 2019 and 2020.[23] Moving forward, the City expects to provide half or more of its potable water demand with surface water supplies. According to the 2020 Urban Water Management Plan, groundwater pumping has decreased steadily since Fresno began utilizing surface water; groundwater production decreased from 160,000 acre-feet in 2004 to 55,000 acre-feet in 2020.[23]

A portion of the surface water that is treated at the SWTFs is supplied via agreements that the City maintains with the United States Bureau of Reclamation (USBR) and the FID. In the 1960s, the City contracted with the USBR to receive 60,000 acre-feet of surface water per year to utilize for "intentional recharge" of the groundwater basin. This was completed by constructing recharge basins to store the surface water which was allowed to percolate through the soil to the aquifer. The surface water is conveyed to these basins through FID (Fresno Irrigation District) canals. Historically, the amount of water supplied varies year to year, averaging around 60,000 acre-feet; however, there have been extremely dry years in which no water was supplied. Additionally, the City signed an agreement with FID in 1976 for the delivery of surface water supplies from the Kings River based on the City's pro rata share of FID's water entitlements. The most recent agreement with FID made in 2016 placed a maximum percentage of FID's Kings River water at 29%. The average FID delivery between 1964 and 2019 was 452,541 acre-feet, which equates to an average City supply of 131,237 acre-feet, assuming the maximum 29% City supply percentage. The water supplied from both the USBR and FID agreements is used for groundwater recharge and potable use after treatment at one of the SWTFs.

Fresno is located within the North Kings Groundwater Sustainability Agency (GSA), which is working to reach groundwater sustainability in accordance with SGMA. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040; the Kings River Subbasin was identified as a critically overdrafted basin. As a result, the City has placed a higher priority on developing its surface water supply and decreasing its reliability on groundwater to allow the basin to recharge. This is being accomplished via intentional groundwater recharge in dedicated recharge basins around Fresno. The City also contracts with FID and FMFCD to utilize some of their facilities as additional recharge basins.

With the completion of various portions of the City's recycled water distribution system, and the upgrades at the Fresno-Clovis RWRF to allow disinfected tertiary-treatment of collected wastewater, the City has been using recycled water for beneficial uses in an effort to reduce reliance on potable water for non-potable uses. Disinfected tertiary treated wastewater can be used for a number of non-potable uses, including but not limited to landscaping irrigation, industrial processes, golf course irrigation, and agricultural irrigation. Additionally, the City discharges undisinfected secondary-treated wastewater into nearby percolation ponds at the Fresno-Clovis RWRF to allow the effluent to percolate through the soil into the aquifer. The City then extracts this water for delivery through FID facilities for agricultural users. The City also owns and operates the NFWRF, which produces recycled water used for irrigation at the Copper River Ranch Golf Course. Flows received at the Fresno-Clovis RWRF have averaged approximately 63,000 acre-feet over the last 5 years, and the City projects that recycled water deliveries will increase to 5,800 acre-feet per year of non-potable demand. These supplies will continue to help reduce potable water demand, and lend themselves to water conservation efforts.

[23] City of Fresno, "2020 Urban Water Management Plan," July 2021.

3.1.3 Water Distribution

The City's water distribution system consists of approximately 1,800 miles of distribution pipeline ranging in size from ¾-inch to 66 inches, 140,000+ service connections, 12,000+ fire hydrants, 18,000+ main line valves, and several booster pumps and storage tanks.

Generally, the Transmission Grid Mains (TGMs) convey water directly from municipal supply wells to customers, and Regional Transmission Mains (RTMs) convey water from surface water treatment plants to TGMs. TGM pipes range in size from 10 to 16 inches in diameter, and RTM pipes are 18 inches and larger. There is also a network of smaller distribution mains that serve individual customers via TGMs. Fire hydrants are located at regular intervals and served from the same distribution mains as all other customers. Main line valves are located at regular intervals and are used to shut down and isolate sections of the distribution system for emergency repairs, regular maintenance, or replacement projects. These valves are also used to regulate flows between the pressure zones as mentioned in Section 3.1.1. Booster pump stations help maintain the pressure within the system. There are a number of other miscellaneous appurtenances associated with the distribution system designed to assist regular operation, including air release/vacuum breaker assemblies, blow-off valves, backflow preventers, and access manways. Figure 3.1 shows the main infrastructure of the existing City water distribution system.

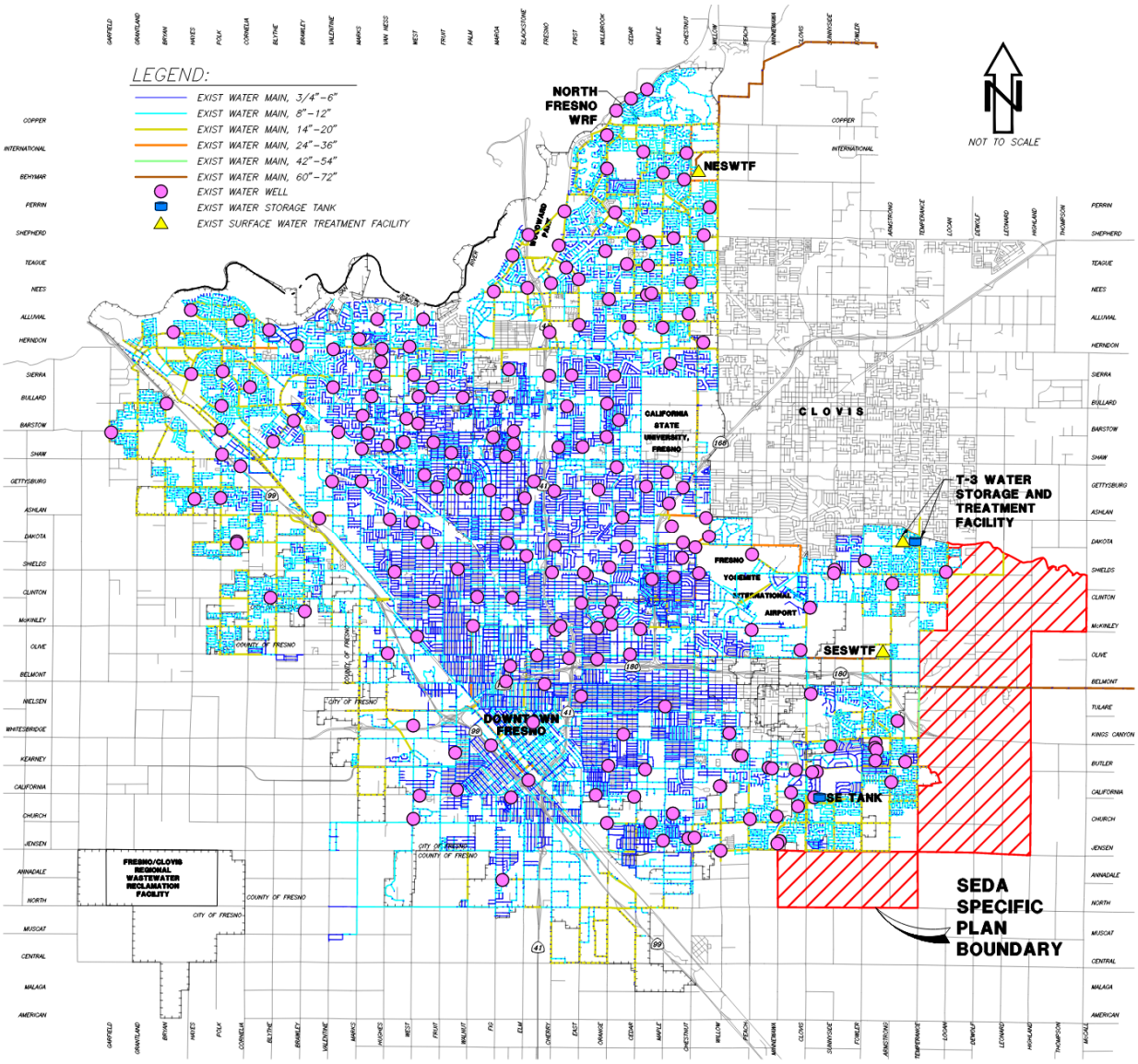


Figure 3.1 Existing City Water Distribution System

CHAPTER 4
FUTURE WATER INFRASTRUCTURE

4.1 General

Future water supply and distribution facilities are included in the City's Metro Plan. The City's General Plan includes developmental policies for water supply and distribution facilities for the City of Fresno, including growth areas such as SEDA.

4.2 General Plan Policies

The General Plan discusses aspects of the water supply and distribution system as they pertain to development in Fresno. As mentioned, the City owns, operates, and maintains the water supply and distribution system that serves Fresno and other participating agencies. See Table 2.1 for a summary of objectives and policies related to water facilities and infrastructure.

4.3 Buildout Improvements

The City Metro Plan analyzed the City's water supplies, treatment, storage, and distribution facilities for the existing conditions at the time the plan was drafted, and future needs based on General Planning policies and goals. The current version of the Metro Plan was completed in four (4) phases – Phase 1, "Baseline System Characterization," covered the existing conditions and analyzed the "Future without Project" alternative, or the impacts of development without additional planning; Phase 2, "Alternative Development and Evaluation of Future Water Supply Plan," analyzed different alternatives for development and infrastructure improvements to meet water resource challenges resulting from future development identified in Phase 1; Phase 3, "Implementation Plan," described the recommended alternative from Phase 2 and the funding and implementation plan for the alternative; and Phase 4, "Project/Programmatic Environmental Impact Report (EIR)," included the preparation of an EIR to evaluate potential impacts from the infrastructure improvements and future development included in the chosen alternative. The Phases were each developed and finalized at different times, with Phase 1 being approved in 2007, Phase 2 and 3 approved in 2011, and Phase 4 approved in 2014.

The Metro Plan and the Urban Water Management Plan (2020) include several objectives, goals, and policies to improve and develop water infrastructure as development progresses in the City. The critical focal points of the water system development are the implementation of further water conservation measures, installation of new municipal groundwater wells, increased groundwater recharge efforts to bring the City's groundwater pumpage into balance with its recharge rate, maximize use of available surface water, increased use of recycled water for landscape irrigation and other non-potable uses, and the acquisition of future water supplies when available.

At the time of preparation of this study, an update to the Metro Plan is being developed by the City. This update is revising the proposed improvements to the City's future water infrastructure, including that for the SEDA Specific Plan Area. There are a number of general improvements for the Plan Area included in the previous Metro Plan that will remain, including new municipal groundwater wells, water storage facilities, expansions to surface water treatment facilities, water booster pumps, and new water distribution mains, including Regional Transmission Mains (RTMs) and Transmission Grid Mains (TGMs). Improvements may include:

- New municipal groundwater wells
    - Municipal wells with wellhead treatment as needed

- Expansion of the NESWTF
- Water storage tanks and booster pump stations
- Extension of 48-inch diameter RTM
- Transmission Grid Mains of various sizes
- Recharge inter-ties to FMFCD basins.

CHAPTER 5
SPECIFIC PLAN WATER DEMAND ANALYSIS

5.1 General

The SEDA Specific Plan revised the General Plan buildout land use classifications in the Plan Area to new SEDA-specific land use classifications – see Figure 5.1 for the General Plan Land Use Map of the Plan Area, and Figure 5.2 for the SEDA Specific Plan Land Use Map for the chosen alternative for the Plan Area. With changes in land use classifications, the Plan Area will need to be evaluated for impacts to the proposed water supply and distribution system due to changes in water demand.

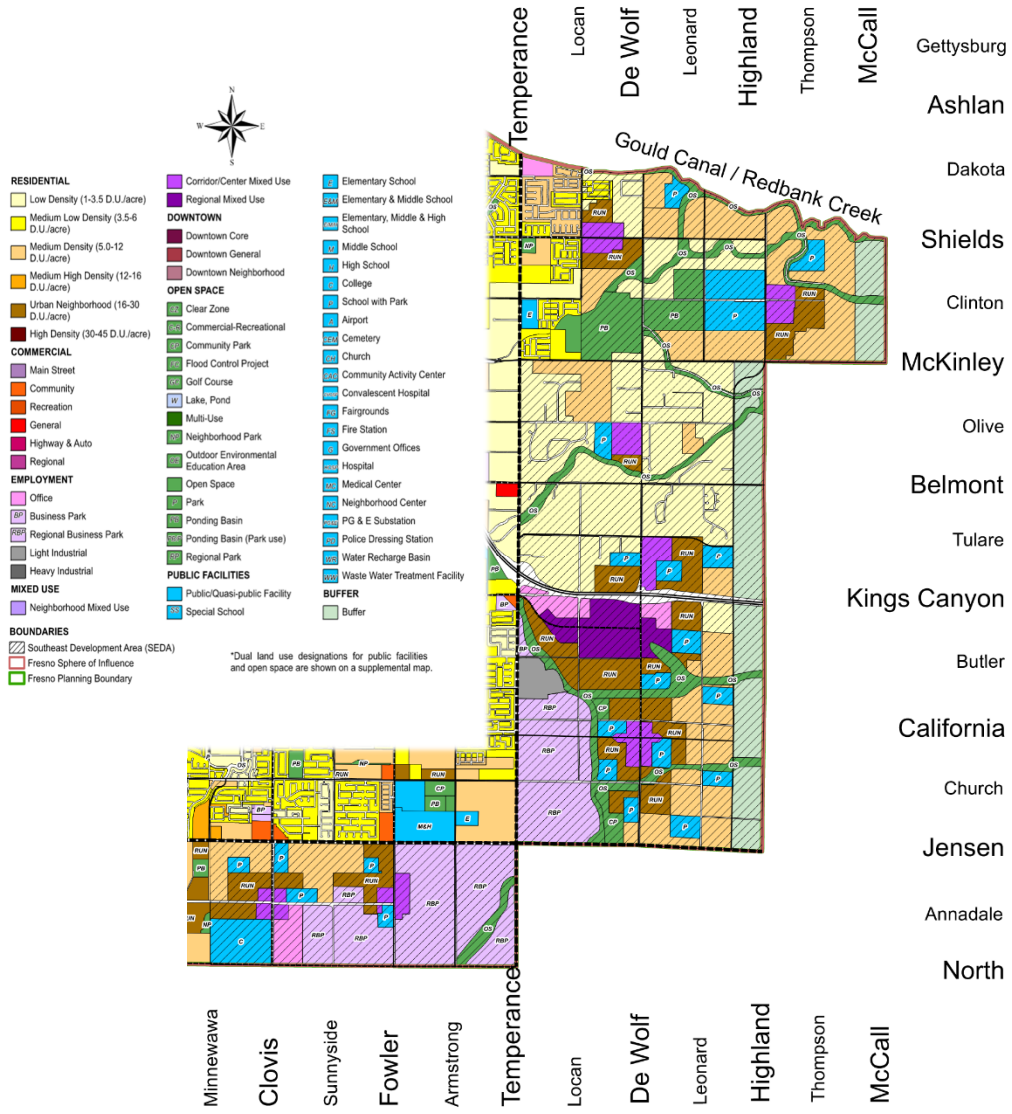
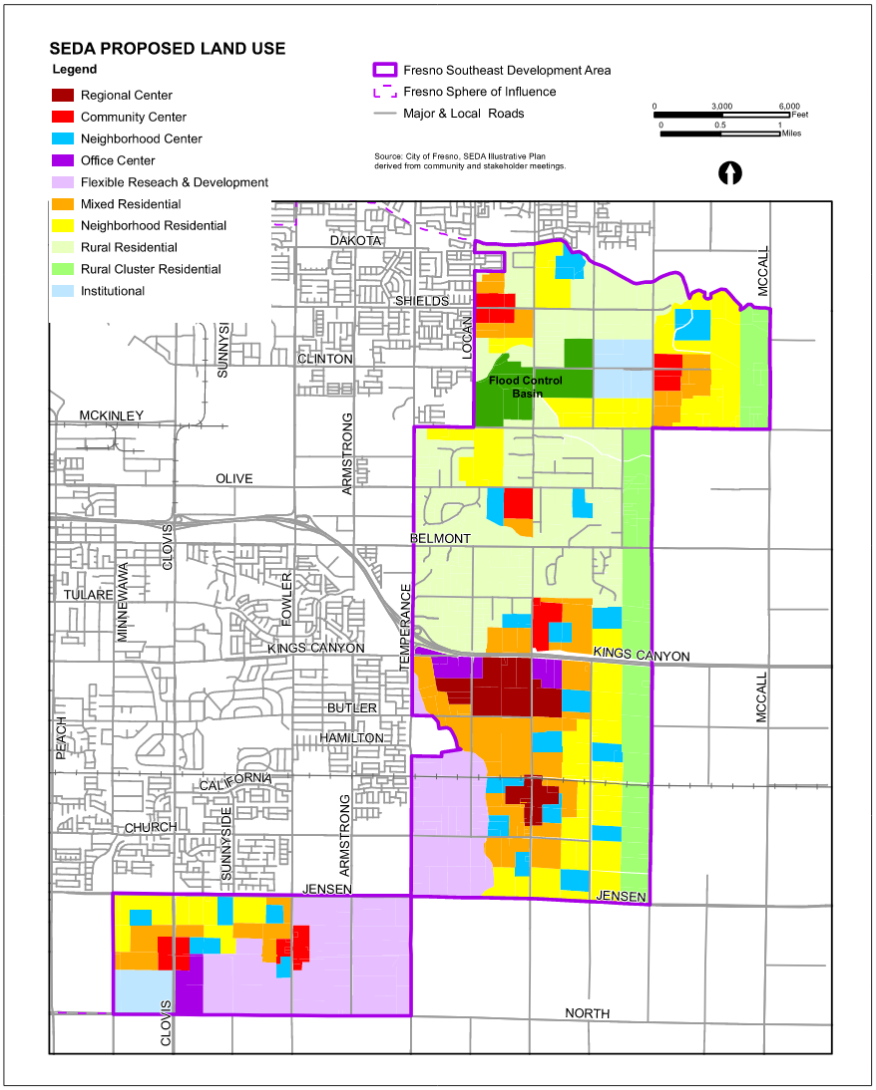


Figure 5.1 General Plan Land Use Map for SEDA Plan Area
Source: City of Fresno General Plan, Figure LU-1, December 2014, Figure Updated 3/2/2021



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

Figure 5.2 SEDA Proposed Land Use
Source: Southeast Development Area Specific Plan Notice of Preparation,
First Carbon Solutions, 02/2022

5.2 Analysis Methodology

The technical analysis of the land use changes in the Plan Area was focused on comparing the change in water demand from the General Plan Land Use case to the Specific Plan Land Use case to determine potential impacts to the water supply and distribution system, and to assist in the development of mitigation measures if necessary. General Plan land use classifications and Specific Plan land use classifications were provided by the City of Fresno Planning and Development Department in the form of GIS (Geographic Information System) and Shape files. GIS and Shape files were also obtained from the City of Fresno Department of Public Utilities for the existing water facilities in Fresno.

The SEDA Specific Plan does not use the same land use classifications as defined in the General Plan, and instead utilizes SEDA-specific land use classifications developed as part of the Specific Plan. At the time of preparation of this technical study, the City was developing water demand

factors for the SEDA-specific land uses as was done for the General Plan land uses; these factors were unavailable during the completion of the analysis for this technical study. However, the SEDA-specific land uses are similar in nature to many of the General Plan land uses, and similarities can be drawn between the two land use categories. Thus, a number of reasonable assumptions were made to determine equivalent General Plan land uses for each SEDA-specific land use in order to utilize the water demand factors for General Plan land uses. Table 5.1 shows the equivalent General Plan land uses established for each Specific Plan land use case as described below.

For the General Plan land use case, the technical memorandum prepared for the City of Fresno General Plan Update MEIR[24] was used to obtain projected water demand data for SEDA. In the memorandum, analyses were completed to project water demands for 2035, which is the buildout year for the City's General Plan. The analyses included one completed for the SEDA based on the land uses included in the General Plan; the demand determined for SEDA was 21,834 ac-ft/year.

For the Specific Plan analysis, the water demand factors used were prepared by Akel Engineering as part of the Metro Plan Update.[25] Table 5.1 shows the equivalent General Plan land uses and the associated category included in the Metro Plan updated table of factors, and

Table 5.2 shows the water demand factors used for each equivalent General Plan land use classification that was determined for each SEDA Specific Plan land use. It should be noted that some General Plan land uses did not exactly match up with those listed in the water demand factors, and some assumptions were made to determine approximate water demand factors; see Appendix B for the full list of water demand factors.

The GIS files for the General and Specific Plan land uses were georeferenced to the California State Plane Coordinate System, Zone 4, Foot, NAD83 Datum for analysis. This allowed mapping of the land uses to pull information necessary to complete the analysis, including the area of each land use. The water demand factors were then used with the area of the corresponding land use classification to determine a total water demand for the Plan Area based on the General Plan and the Specific Plan developments. The total water demand for the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in water demand for the Plan Area.

5.3 Analysis Results

The base water demand for all land uses in the Plan Area was found for both the General Plan and the Specific Plan conditions. The total General Plan base water demand was 21,843 AF/year, or 19.50 MGD,[24] and the Specific Plan base water demand was found to be 19.83 MGD, resulting in an increase in water demand of approximately 0.33 MGD, or 1.7%. See Table 5.3 and Table 5.4 for the results of the analysis and a direct comparison of the General Plan and Specific Plan water demands; see Appendix A for a more detailed version of the analysis.

There may be a number of reasons as to why water demand increased from the General Plan to the Specific Plan. One reason may be that the SEDA boundary increased from that shown in the General Plan, indicated by the increased area of total land uses. The total area of the General

[24] West Yost Associates, "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report," "Table 2. Water Demand Comparison for General Land Use Plan Land Changes," January 21, 2013.
[25] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update," October 2020.

Plan land uses is 8,253.76 acres, while the total area of the Specific Plan land uses is 8,325.57 acres – an increase of approximately 72 acres. This increase will lend itself to an increase in water demand based on which land uses increased in area.

Another contributor to increased water demands is changes in land use classifications. For the most part, the land use classifications remained fairly similar in nature and category when transitioning from the General Plan to the Specific Plan. However, a few areas of land uses changed to different land uses that have larger water demand factors; these include "Public Facilities – School with Park," "Buffer," and some low density residential areas. Per the SEDA Specific Plan land use map, all but one area defined as "School with Park" in the General Plan land use map changed to the SEDA "Neighborhood Center" land use. Similarly, the areas denoted as "Buffer" land use in the General Plan changed to "Rural Cluster Residential" in the SEDA Specific Plan. To a lesser extent, some of the "Low Density" residential areas in the General Plan were changed to residential land uses with higher densities in the Specific Plan. These combined changes lead to cumulative increases in the water demand of the Plan Area.

Finally, many SEDA land uses increased in area from their General Plan counterparts seemingly due to the elimination of the "Open Space" land uses included in the General Plan for the Plan Area, which totaled approximately 617 acres. As shown in Figure 5.1 and Table 5.3, "Open Space," and "Community Park," were removed from the Plan Area, and those areas were absorbed by adjacent land uses, including various residential, mixed use, and employment land uses. Several Open Space land uses have a water demand factor of 0 gpd/ac, and many others have significantly smaller demand factors than other land uses; consequently, this means that some portion of the 617 acres were added to other land uses with larger water demand factors, thereby increasing the total water demand of the SEDA Plan Area when compared to the General Plan buildout condition.

Table 5.1 General Plan–SEDA–General Plan Equivalent Land Use Classifications

SEDA Specific Plan Land Use Classifications [A]	Equivalent General Plan Land Use Classification [B]	Water Demand Factor Category [C]
Residential – Mixed Residential	Residential – Urban Neighborhood	Residential – Medium High & High Density
Residential – Neighborhood Residential	Residential – Medium Density	Residential – Medium Density
Residential – Rural Residential	Residential – Low Density	Residential – Low Density
Residential – Rural Cluster Residential	Residential – Low Density	Residential – Rural Density
Employment – Office Center	Employment – Office	Commercial – Office
Employment – Flexible Research & Development	Employment – Business Park	Commercial – Professional Services Office
	Employment – Regional Business Park	Commercial – Regional
Employment – Institutional	Public Facilities – College	Public Facilities – College
Employment – Institutional	Public Facilities – School with Park	Public Facilities – SEGA School with Park
Mixed Use – Regional Center	Mixed Use – Regional Mixed Use	Residential – High Density, Commercial – Regional, & Public Facilities – Community Activity Center
Mixed Use – Community Center	Mixed Use – Corridor/Center Mixed Use	Public Facilities – Community Activity Center

SEDA Specific Plan Land Use Classifications [A]	Equivalent General Plan Land Use Classification [B]	Water Demand Factor Category [C]
Mixed Use – Neighborhood Center	Public Facilities – Neighborhood Center	Residential – Medium High Density, Commercial – Neighborhood, & Public Facilities – Neighborhood Center
Open Space – Flood Control Basin	Open Space – Ponding Basin	Open Space – Ponding Basin
Other	Streets/Railroad/Canals/Etc.	N/A

[A] City of Fresno, "Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California," February 22, 2022.

[B] City of Fresno, "Fresno General Plan," December 18, 2014.

[C] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update

Table 5.2 Metro Plan Update Water Demand Factors[26]

Water Demand Factor Category	Water Demand Factor (gpd/ac)
Residential	
Medium High & High Density	5,140 [A]
Medium Density	2,810
Low Density	2,050
Rural Density	1,415
Commercial	
Office	2,440
Professional Services Office	2,420
Regional	1,685
Public Facilities	
College	1,665
SEGA School with Park	2,895
High Density Residential, Regional Commercial, & Community Activity Center	2,106 [B]
Community Activity Center	1,930
Medium High Density Residential, Neighborhood Commercial, & Neighborhood Center	1,851 [C]
Open Space	
Ponding Basin	0
Other	
Railroad/Streets/Canals/Etc.	N/A

[A] Average of Medium High and High Density Residential Water Demand Factors

[B] Combination of High Density Residential, Regional Commercial, and Community Activity Center

[C] Combination of Medium High Density Residential, Neighborhood Commercial, and Neighborhood Center

[26] Akel Engineering Group Inc., "Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update," October 2020.

Table 5.3 Specific Plan (SP) Anticipated Water Demand per Land Use Classification

GP Land Use Classification	SP Equivalent Land Use Classification	Water Demand Factor [A,B] (GPD/ac)	SP Area (ac)	SP Base Water (MGD)
Residential - Low Density	Residential - Rural Residential	2,050	2,037.69	4.18
Residential - Medium Density	Residential - Neighborhood Residential	2,810	1,434.91	4.03
Residential - Urban Neighborhood	Residential - Mixed Residential	5,140 [A]	1,026.26	5.27
Employment - Office	Employment - Office Center	2,440	154.47	0.38
Employment - Business Park	Employment - Flexible Research and Development	2,420	16.54	0.04
Employment - Regional Business Park		1,685	1,287.53	2.17
Mixed Use -Corridor/Center Mixed Use	Mixed Used - Community Center	1,930	273.88	0.53
Mixed Use - Regional Mixed Use	Mixed Use - Regional Center	2,106 [B]	291.71	0.61
Open Space - Open Space	N/A	865	0	0.00
Open Space - Community Park	N/A	2,620	0	0.00
Open Space - Ponding Basin	Other - Flood Control Basin	0	265.78	0.00
Public Facilities - College	Employment - Institutional	1,665	116.26	0.19
Public Facilities - School with Park		2,895	149.77	0.43
Public Facilities - School with Park	Mixed Use - Neighborhood Center	1,851 [C]	491.38	0.91
Buffer - Buffer	Residential - Rural Cluster Residential	1,415 [D]	766.47	1.08
Other - Street/Rail/ Canal, etc.	Other	0	12.94	0.00
Totals	-	-	8,325.57	19.83

[A] Average of Medium High and High Density Residential Water Demand Factors
[B] Combination of High Density Residential, Regional Commercial, and Community Activity Center
[C] Combination of Medium High Density Residential, Neighborhood Commercial, and Neighborhood Center
[D] Rural Density Water Demand Factor used for Rural Cluster Residential Land Use.

Table 5.4 Difference Between General Plan and Specific Plan Anticipated Water Demand

SEDA General Plan Total Base Water Demand (MGD)	SEDA Specific Plan Total Base Water Demand (MGD)	Usage Δ (MGD)	Usage Δ (%)
19.5	19.83	0.33	1.7%

CHAPTER 6
IMPACTS AND MITIGATION

6.1 SEDA Planning

Improvements within the Plan Area will require modifications to master planned potable water facilities and infrastructure.

A draft policy document has been completed for the SEDA Specific Plan (March 2022), which includes updated policies for the Plan Area, and proposed improvements to meet the chosen alternative for development of the area. Included among these are policies directly related to potable water in the Plan Area.[27] Refer to the SEDA Specific Plan policy document for details on policies related to potable water.

6.2 Impacts of Significance

The proposed Specific Plan would result in a significant impact if it would:

1. Require or result in the relocation or construction of new or expanded water or wastewater treatment facilities, the construction of which could cause significant environmental effects.

   The potential long-term impacts related to water supply, treatment, and distribution requirements of the General Plan versus the Specific Plan differ by 1.7%; the implementation of the proposed Specific Plan may result in the need for expansion of water supply and treatment facilities, and will require construction of new distribution facilities to serve future land uses in the Plan Area. Thus, development of the Plan Area could result in significant impacts to the existing water supply and distribution system. A summary of master planned proposed water supply, treatment, and distribution infrastructure that may accommodate future development associated with the Specific Plan include:

   - New municipal groundwater wells
     - Municipal wells with wellhead treatment as needed
   - Expansion of the NESWTF
   - Water storage tanks and booster pump stations
   - Extension of 48-inch diameter RTM
   - Transmission Grid Mains of various sizes
   - Recharge inter-ties to FMFCD basins.

   Potential environmental impacts associated with such improvements include but are not limited to: traffic, air emissions, noise, water quality, aesthetics, agricultural resources, biological resources, and cultural resources. The Specific Plan establishes mitigation measures for impacts in these areas associated with construction of expanded or new water infrastructure. These may include traffic control/management plans to address traffic impacts during construction, various capital improvement plans, and the reevaluation of water master plan documents. Without mitigation, the impacts would be significant.

2. Have insufficient water supplies available to serve the project reasonably for the foreseeable future development during normal, dry and multiple dry years.

[27] City of Fresno, "Southeast Development Area Specific Plan Policy Draft," March 2022.

As shown by the 1.7% increase in water demand, existing City of Fresno water supplies could be sufficient to supply the future development in SEDA in addition to the existing demands. Current City water supply sources are as follows:

Groundwater – The City owns and operates 270 municipal water wells with 202 active wells; projected groundwater supply for the City of Fresno in 2035 is 149,100 AFY (acre-ft per year).[28]

Surface Water – The City owns and operates two (2) surface water treatment facilities – the NESWTF and the SESWTF. The NESWTF has a design capacity of 30 MGD expandable to 60 MGD, and the SESWTF has a design capacity of 54 MGD expandable to 80 MGD. The surface water is obtained from the Kings River via an agreement with FID, and from the Friant-Kern Canal through an agreement with the USBR. Treated surface water is used for potable uses and groundwater recharge. The projected surface water supply for the City of Fresno in 2035 is 191,600 AFY (60,000 via USBR, 131,600 via FID).[28]

Recycled Water – The City owns and operates the Fresno-Clovis RWRF and the NFWRF, which collect and treat wastewater from City users to various levels of treatment for non-potable uses. The Fresno-Clovis RWRF produces undisinfected secondary-treated effluent for use as restricted irrigation water for farmland and for groundwater recharge via discharge into adjacent percolation ponds, and disinfected tertiary-treated effluent for distribution through the City's recycled water distribution system for non-potable uses, including landscape irrigation and industrial processes. The NFWRF collects and treats wastewater to a disinfected tertiary-treated level for use as landscape irrigation supply for the Copper River Ranch Golf Course. The projected supply of recycled water for the City of Fresno in 2035 is 5,910 AFY.[28]

The UWMP presents actual data available for water supply and demand for the year 2020, as well as projected water usage. For 2020, the actual total potable water demand for the City was 121,993 AF[28], and the projected potable water demand for the City in 2035 is 154,210 AF.[28] Additionally, the projected non-potable water demand for the City for groundwater recharge is 68,100 AF for 2035.[28]

The estimated groundwater yield for the City in 2035 was projected to be 149,100 AF[28], assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, indicating that groundwater alone will not be sufficient to meet future City demands, including those for SEDA. However, estimated surface water supplies for the City are projected to be 191,600 AF for 2035 (60,000 via USBR, 131,600 via FID) during normal water years, as well as 5,910 AF of recycled water.[28] Total projected water supply for the City in 2035 is 346,610 AF during normal water years and assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, and total projected demand is 222,310 AF. The estimated increase in total water use for SEDA in accordance with the Specific Plan selected alternative is 0.33 MGD, or 1.03 AF. This results in a modified projected potable demand for the City of 154,211 AF, with a total water demand (potable and non-potable) of 222,311 AF.

In the event of a single dry year, the projected water supply for 2035 is 200,862 AF assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA, and the projected demand is 184,174 AF; Table 7-3 of the UWMP shows the projected water supplies and demands for multiple dry years.[28]

[28] City of Fresno, "2020 Urban Water Management Plan," July 2021.

The City Metro Plan Update will include proposed infrastructure improvements necessary to sustain development in SEDA, including the construction of new groundwater wells, surface water treatment plant expansions, and expansion of the Regional Transmission water distribution system. Impacts would be significant without mitigation measures. Since the increase in water demand for the Specific Plan Area is 1.7% from the General Plan condition, the impacts to water supply could be potentially significant; upon compliance with regulatory requirements, proposed policies for full implementation of the proposed Specific Plan, proposed mitigation measures, and construction of proposed water supply and distribution system infrastructure, the impact could be reduced. The normal water year supply projected for the City of Fresno in 2035 is 346,610 AF, and total projected demand is 222,310 AF. All water supply scenarios for dry years for 2035 are sufficient to accommodate the increase in water demand for the Specific Plan Area of 1.03 AF assuming groundwater characteristics are not altered due to climatic events or regulatory influences from SGMA.

The City shall develop and implement water conservation measures to reduce the per capita water use, and continue to refine and implement water saving and conservation standards for new developments approved under the Specific Plan. The City shall complete these measures and standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated the refined measures and standards prior to issuing approval. The City shall also continue to implement the City of Fresno Water Conservation Program, as may be updated, and periodically update restrictions on water uses, and evaluate the feasibility of the conservation target identified as part of the Fresno General Plan MEIR. The City shall complete these measures prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

The City shall refine landscape water conservation standards that will apply to new development installed landscapes, building on the State Model Water Efficient Landscape Ordinance (MWELO) and other state regulations. The City shall complete these standards prior to approving any new project applications for future development in the Plan Area that require a discretionary approval and shall confirm that each project has incorporated any resulting standards prior to issuing approval.

Additionally, the City shall evaluate the water supply system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would demand additional water until additional water sources are secured and provided. The City shall evaluate proposed water supply improvements for potential environmental impacts, and shall construct such improvements prior to exceedance of demand to accommodate full buildout of the Specific Plan.

6.3 Conclusions

City planning documents, including but not limited to the General Plan and the Metro Plan, will need to be updated to account for the development of the SEDA, and account for the policies and revisions present in the Specific Plan.

Mitigations for SEDA from the General Plan to the SEDA Specific Plan include:

a) Develop an update to the City General Plan
b) Develop an update to the City Metro Plan

c) Develop additional water conservation measures in accordance with the City Metro Plan
d) Construct new water supply infrastructure in the Plan Area
e) Construct new water distribution infrastructure in the Plan Area
f) Construct new water storage facilities in the Plan Area
g) Construct groundwater recharge facilities in the Plan Area
h) Construct water treatment facilities in the Plan Area
i) Expand water treatment facilities
j) Secure additional water sources for the City to support development in the Plan Area

Appendix A

Supporting Calculations

GP Land Use Classification	Abbrv.	GP Area (ac)	SP Equivalent Land Use Classification	Abbrv.	Water Demand Factor (GPD/ac)	SP Area (ac)	SP Base Water (MGD)
Residential - Low Density	RL	1,700.92	Residential - Rural Residential	RR	2,050	2,037.69	4.18
Residential - Medium Density	RM	1,473.32	Residential - Neighborhood Residential	NR	2,810	1,434.91	4.03
Residential - Urban Neighborhood	RUN	891.47	Residential - Mixed Residential	MR	5,140	1,026.26	5.27
Employment - Office	O	144.37	Employment - Office Center	OC	2,440	154.47	0.38
Employment - Business Park	BP	12.78	Employment - Flexible Research and Development	F	2,420	16.54	0.04
Employment - Regional Business Park	RBP	1,219.71	Employment - Flexible Research and Development	F	1,685	1,287.53	2.17
Mixed Use -Corridor/Center Mixed Use	CMX	315.41	Mixed Used - Community Center	CC	1,930	273.88	0.53
Mixed Use - Regional Mixed Use	RMX	209.77	Mixed Use - Regional Center	RC	2,106	291.71	0.61
Open Space - Open Space	OS	569.53	N/A	N/A	865	0	0.00
Open Space - Community Park	CP	47.46	N/A	N/A	2,620	0	0.00
Open Space - Ponding Basin	PB	263.32	Other - Flood Control Basin	POF	0	265.78	0.00
Public Facilities - College	C	116.26	Employment - Institutional	I	1,665	116.26	0.19
Public Facilities - School with Park	P	149.77	Employment - Institutional	I	2,895	149.77	0.43
Public Facilities - School with Park	P	413.45	Mixed Use - Neighborhood Center	NC	1,851	491.38	0.91
Buffer - Buffer	BUFFER	715.04	Residential - Rural Cluster Residential	RCR	1,415	766.47	1.08
Other - Street/Rail/ Canal, etc.	N/A	11.21	Other	N/A	0	12.94	0.00
Totals		8,253.76				8,325.57	19.83

SEDA Projected 2035 General Plan Water Demand [A]	21,843 AF/yr 19.50 MGD
SEDA Specific Plan Total Base Water Demand	19.83 MGD
Usage Δ	0.33 MGD
Usage Δ (%)	1.7%

[A] West Yost Associates, "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Updated for the Master Environmental Impact Report," Technical Memorandum, Table 2, "Water Demand Comparison for General Plan Land Use Changes," January 21, 2013.

Appendix B

City of Fresno Water and Wastewater Unit Factor Update for Metropolitan Water Resources Management Plan Update (Prepared by Akel Engineering, Inc.)

CITY OF FRESNO

Water and Wastewater Unit Factor Update

FOR

Metropolitan Water Resources Management Plan Update

PRELIMINARY

October 2020

AKEL
ENGINEERING GROUP, INC.

City of Fresno

Water and Wastewater Unit Factor Update

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Table 1 Water Demand Factors by Land Use Classification

Table 2 Sewer Flow Factors by Land Use Classification

Table 1 Water Demand Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update

City of Fresno

PRELIMINARY

(Revised October 2020)

	Land Use Classifications	Water Service Area[1,2,3] (acres)	2018 Water Demands[4] (mgd)	Recommended Water Demand Factors[5] (gpd/acre)	(ac-ft/yr/acre)
Residential					
1	Rural Density	746	0.85	1,415	1.59
2	Low Density	1,283	2.12	2,050	2.30
3	Medium Low Density	10,139	23.18	2,845	3.19
4	Medium Density	11,033	24.91	2,810	3.15
5	Medium High Density	1,953	6.94	4,425	4.96
6	High Density	1,314	6.19	5,855	6.56
	Subtotal - Residential	**26,467**	**64.18**		
Commercial					
7	Community	558	1.04	2,330	2.61
8	General Heavy	1,124	2.11	2,340	2.62
9	Neighborhood	530	1.08	2,525	2.83
10	Neighborhood Limited	0	0.00	-	-
11	Office	932	1.83	2,440	2.73
12	Professional Services Office	89	0.17	2,420	2.71
13	Regional	294	0.40	1,685	1.89
14	Recreational	109	0.23	2,575	2.88
15	Storage	273	0.07	335	0.38
	Subtotal - Commercial	**3,909**	**6.93**		
Public Facilities					
16	Airport	1,147	0.12	130	0.15
17	College	304	0.41	1,665	1.87
18	High School	505	0.60	1,485	1.66
19	Elementary and High School	141	0.21	1,825	2.04
20	Middle School	305	0.43	1,765	1.98
21	Elementary and Middle School	191	0.30	1,930	2.16
22	Elementary School	792	1.53	2,405	2.69
23	Special School	52	0.05	1,110	1.24
24	SEGA School with Park	6	0.01	2,895	3.24
25	Cemetery	159	0.10	810	0.91
26	Church	662	0.81	1,525	1.71
27	Community Activity Center	11	0.02	1,930	2.16
28	Neighborhood Center	10	0.01	795	0.89
29	Convention Center	17	0.03	1,955	2.19
30	Fairgrounds	90	0.09	1,290	1.45
31	Fire Station	15	0.02	1,855	2.08
32	Government Offices	162	0.26	1,985	2.22
33	Court House Central Area	19	0.15	9,590	10.74
34	Hospital	189	0.76	5,005	5.61
35	Medical Center	20	0.02	1,385	1.55
36	Convalescent Hospital	119	0.39	4,080	4.57
37	Military	55	0.01	170	0.19
38	Mobile Home Park	274	0.49	2,225	2.49
39	Municipal Service Center	37	0.07	2,200	2.46
40	Post Office	30	0.02	750	0.84
41	Public Facility	7	0.01	1,010	1.13
42	Public/Quasi-Public Facility	46	0.10	2,670	2.99
43	Fresno County Jail	3	0.19	80,765	90.47

Table 1 Water Demand Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update

City of Fresno

PRELIMINARY

(Revised October 2020)

Land Use Classifications		Water Service Area[1,2,3] (acres)	2018 Water Demands[4] (mgd)	Recommended Water Demand Factors[5] (gpd/acre)	(ac-ft/yr/acre)
44	Pump Station	9	0.01	805	0.90
	Subtotal - Public Facility	**5,376**	**7.19**		
Industrial					
45	Light Industrial	2,301	3.42	1,850	2.07
46	Heavy Industrial	1,905	5.91	3,860	4.32
	Subtotal - Industrial	**4,206**	**9.34**		
Open Space					
47	Open Space	177	0.12	865	0.97
48	Recreational Use/Clear Zone	15	0.00	-	-
49	Ag	1,531	0.00	-	-
50	Canal	20	0.00	-	-
51	Community Park	24	0.05	2,620	2.93
52	Golf Course	662	0.23	435	0.49
53	Lake or Pond	54	0.00	-	-
54	Multi-Use	0	0.00	-	-
55	Neighborhood Park	218	0.62	3,510	3.93
56	Recreational Park	97	0.15	1,980	2.22
57	Recreational Use	17	0.02	1,235	1.38
58	Regional Park	436	0.18	525	0.59
59	Recreational Commercial	0	0.00	-	-
60	Environmental Education Area	0	0.00	-	-
61	Gravel Mining	0	0.00	-	-
62	Parking	48	0.00	-	-
63	PGE Sub Station	102	0.00	-	-
64	Ponding Basin	236	0.00	-	-
65	Ponding Basin/Park	128	0.16	1,535	1.72
	Subtotal - Open Space	**3,764**	**1.53**		
Total					
	Subtotal - Residential	**26,467**	**64.18**		
	Subtotal - Commercial	**3,909**	**6.93**		
	Subtotal - Public Facility	**5,376**	**7.19**		
	Subtotal - Industrial	**4,206**	**9.34**		
	Subtotal - Open Space	**3,764**	**1.53**		
	Total	**43,722**	**89.17**		

AKEL ENGINEERING GROUP, INC.

10/2/2020

Notes:

1. Source: Land use and acreages based on City of Fresno parcel shapefile downloaded July 16, 2019.
2. Acreages exclude Bakman, Pinedale, and CSU Fresno service areas.
3. Acreages reflect demand generating parcels only.
4. Demand based on 2018 annual metered consumption records.
5. Recommended Water Demand Factors include the following adjustments:
   - Demand Factors normalized to 2018 production to account for system losses
   - Demand Factors increased to account for City-wide vacancy rate of 8.1% based on CA Department of Finance population estimat

Table 2 Sewer Flow Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update
City of Fresno

PRELIMINARY

	Land Use Classifications	Sewer Service Area[1,2,3] (acres)	Return to Sewer Ratio	Unadjusted Wastewater Unit Factor[4] (gpd/acres)	Estimated Sewer Flow (mgd)	Recommended Wastewater Unit Factor[5] (gpd/acres)
Residential						
1	Rural Density	714	0.20	227	0.16	250
2	Low Density	1,063	0.35	577	0.61	625
3	Medium Low Density	9,875	0.40	915	9.03	990
4	Medium Density	11,001	0.50	1,129	12.42	1,225
5	Medium High Density	1,950	0.55	1,956	3.81	2,115
6	High Density	1,314	0.60	2,825	3.71	3,055
				Subtotal - Residential Flow	**29.75**	
Commercial						
7	Community	558	0.80	1,497	0.84	1,620
8	General Heavy	1,124	0.80	1,504	1.69	1,630
9	Neighborhood	530	0.80	1,623	0.86	1,755
10	Neighborhood Limited	0	0.00	0	0.00	0
11	Office	932	0.80	1,567	1.46	1,695
12	Professional Services Office	89	0.80	1,556	0.14	1,685
13	Regional	294	0.80	1,084	0.32	1,175
14	Recreational	109	0.30	621	0.07	675
15	Storage	273	0.80	213	0.06	235
				Subtotal - Commercial Flow	**5.43**	
Public Facility						
16	Airport	1,147	0.80	81	0.09	90
17	College	304	0.70	937	0.29	1,015
18	High School	505	0.70	835	0.42	905
19	Elementary and High School	141	0.70	1,026	0.14	1,110
20	Middle School	305	0.70	993	0.30	1,075
21	Elementary and Middle School	191	0.70	1,087	0.21	1,175
22	Elementary School	792	0.70	1,354	1.07	1,465
23	Special School	52	0.70	625	0.03	680
24	SEGA School with Park	6	0.80	1,860	0.01	2,015
25	Cemetery	159	0.25	163	0.03	180
26	Church	662	0.80	981	0.65	1,065
27	Community Activity Center	11	0.80	1,241	0.01	1,345
28	Neighborhood Center	10	0.80	510	0.00	555
29	Convention Center	17	0.80	1,258	0.02	1,360
30	Fairgrounds	90	0.80	827	0.07	895
31	Fire Station	15	0.80	1,192	0.02	1,290
32	Government Offices	162	0.80	1,277	0.21	1,385
33	Court House Central Area	19	0.80	6,169	0.12	6,670
34	Hospital	189	0.80	3,219	0.61	3,480
35	Medical Center	20	0.80	889	0.02	965
36	Convalescent Hospital	119	0.80	2,624	0.31	2,840
37	Military	55	0.80	109	0.01	120
38	Mobile Home Park	274	0.60	1,072	0.29	1,160
39	Municipal Service Center	37	0.80	1,415	0.05	1,530
40	Post Office	30	0.80	480	0.01	520
41	Public Facility	7	0.80	649	0.00	705
42	Public/Quasi-Public Facility	46	0.80	1,716	0.08	1,855
43	Fresno County Jail	3	0.80	51,972	0.15	56,185
44	Pump Station	9	0.00	0	0.00	0
				Subtotal - Public Facility Flow	**5.24**	

Table 2 Sewer Flow Factors by Land Use Classification

Metropolitan Water Resources Management Plan Update
City of Fresno

PRELIMINARY

	Land Use Classifications	Sewer Service Area[1,2,3] (acres)	Return to Sewer Ratio	Unadjusted Wastewater Unit Factor[4] (gpd/acres)	Estimated Sewer Flow (mgd)	Recommended Wastewater Unit Factor[5] (gpd/acres)
Industrial[6]						
45	Light Industrial	2,301	0.80	1,190	2.74	1,290
46	Heavy Industrial	1,905	0.80	2,484	4.73	2,690
				Subtotal - Industrial Flow	**7.47**	
Open Space						
47	Open Space	177	0.00	0	0.00	0
48	Recreational Use/Clear Zone	15	0.00	0	0.00	0
49	Ag	1,531	0.00	0	0.00	0
50	Canal	20	0.00	0	0.00	0
51	Community Park	24	0.00	0	0.00	0
52	Golf Course	525	0.30	104	0.05	115
53	Lake or Pond	54	0.00	0	0.00	0
54	Multi-Use	0	0.00	0	0.00	0
55	Neighborhood Park	218	0.00	0	0.00	0
56	Recreational Park	97	0.00	0	0.00	0
57	Recreational Use	17	0.00	0	0.00	0
58	Regional Park	436	0.00	0	0.00	0
59	Recreational Commercial	0	0.00	0	0.00	0
60	Environmental Education Area	0	0.00	0	0.00	0
61	Gravel Mining	0	0.00	0	0.00	0
62	Parking	48	0.00	0	0.00	0
63	PGE Sub Station	102	0.00	0	0.00	0
64	Ponding Basin	236	0.00	0	0.00	0
65	Ponding Basin/Park	128	0.00	0	0.00	0
				Subtotal - Open Space Flow	**0.05**	
Non-Metered[7,8,9]						
	Pinedale Public Utilities	-	-	-	0.63	
	Pinedale County Water District	-	-	-	0.46	
	Tarpey Village	-	-	-	0.37	
	Bakman	-	-	-	1.82	
	Clovis	-	-	-	0.20	
	City of Clovis	-	-	-	5.12	
	CSU Fresno	-	-	-	0.13	
				Subtotal - Non-Metered Flow	**8.73**	
Total						
				Subtotal - Residential Flow	**29.75**	
				Subtotal - Commercial Flow	**5.43**	
				Subtotal - Public Facility Flow	**5.24**	
				Subtotal - Industrial Flow	**7.47**	
				Subtotal - Open Space Flow	**0.05**	
				Subtotal - Non-Metered Flow	**8.73**	
				Total Balanced WWTP Flow	**56.68**	
				2018 WWTP Average Annual Flow[10]	**56.81**	

AKEL ENGINEERING GROUP, INC.

10/2/2020

Notes:

1. Source: Land use and acreages based on City of Fresno parcel shapefile downloaded July 16, 2019.
2. Acreages exclude Bakman, Pinedale, and CSU Fresno service areas.
3. Acreages reflect flow generating parcels only and do not account for Septic Users.
4. Demand based on 2018 annual metered consumption records.
5. Wastewater Unit Factors increased to account for City-wide vacancy rate of 8.1% based on CA Department of Finance population estimates.
6. Industrial flow does not exclude the City's top industrial users (Foster Farms, Cal Dairies, Gallo, and Cargil Beef).
7. Development information for non-metered areas provided by City Staff.
8. City of Clovis BWF extracted from City of Fresno Wastewater Collection System Master Plan Update (September 2015).
9. CSU Fresno flows extracted from flow meter data provided by City Staff on April 30, 2019.
10. Historical WWTP flows provided by City Staff on February 13, 2019.

Appendix C

Water Technical Report for the City of Fresno General Plan Update MEIR (Prepared by Blair, Church & Flynn), City of Fresno Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Updated for the Master Environmental Impact Report Technical Memorandum (Prepared by West Yost Associates)

Water Technical Report

for the

City of Fresno General Plan Update MEIR

June 18, 2013

Introduction

The City of Fresno (City) is in the process of developing their General Plan Update. The last update to the City's General Plan was in 2002. The General Plan Update, in part, encourages infill projects and facilitates revitalization. The Master Environmental Impact Report evaluates the impacts associated with the General Plan Update and proposes mitigation measures. West Yost Associates (West Yost) has analyzed the impacts associated with the General Plan Update and prepared recommendations to meet increased demand and additional storage requirements. West Yost's analysis is summarized in their Technical Memorandum entitled "Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report" (Technical Evaluation), attached as Appendix A. The recommendations included in the Technical Evaluation are based on general land use data available as part of the General Plan Update. See Figure 5 in the Technical Report for proposed water infrastructure improvements. As actual development projects are proposed with more specific information, additional evaluation will be required to confirm that the local distribution system and infrastructure are sufficient to meet the City minimum service requirements for service to the end users.

Summary of Analysis

The Technical Evaluation used the land use data obtained from the City's General Plan Update as contained in Geographic Information System geodatabase files provided by the City's Planning and Development Department. These General Plan Update land uses were used, together with appropriate water duty factors to calculate the water demand. Tables 1 and 2 in the Technical Evaluation include the water duty factors per customer class and the calculated water demand, respectively. The calculated water demand as a result of the General Plan Update is 243,570 acre-feet per year (af/yr) and exceeds the water demand projected in the 2012 City of Fresno Metropolitan Water Resources Management Plan by 10,170 af/yr. In order to meet this higher water demand, additional groundwater pumpage or combination of groundwater pumpage and increased surface water treatment capacity will be required. An additional 10,170 af/yr of intentional groundwater recharge, via an additional 210 acres of new recharge basins, would be required to balance the additional groundwater pumpage.

Potable water storage requirements were considered in the Technical Evaluation. The total storage required to meet the daily water demand that is projected to be generated by the 2035 General Plan Update land uses is 250.7 million gallons, see Table 4 in the Technical Evaluation. The storage requirement exceeds the 2025 general plan update storage requirement by 10.1 million gallons. The Technical Evaluation, in Figure 5, indicates proposed locations for the additional storage. The next water master plan update should include recommendations for overall water system improvements, including recommendations for storage improvements.

The West Yost Technical Evaluation indicates that the water infrastructure recommended in the 2012 City of Fresno Metropolitan Water Resources Management Plan is adequate to convey the peak hourly plus fire flow for the General Plan Update land uses and meets the City's service criteria. Therefore, no previously unplanned conveyance or pump systems are needed for that reason.

Additionally, West Yost has analyzed the impacts to the downtown area. West Yost's analysis is summarized in their Technical Memorandum entitled "Hydraulic Evaluation of the Proposed Fulton Corridor Specific Plan Project", attached as Appendix B.

Mitigations (Existing Condition to 2025 General Plan)

a. Construct an 80 million gallon per day (MGD) surface water treatment plant near the intersection of Fowler and Olive Avenues, in accordance with Chapter 9 and Figure 9-1 of the City of Fresno Metropolitan Water Resources Management Plan Update Phase 2 Report, January 2012 (2012 Metro Plan Update).

b. Construct a 30 MGD expansion of the existing northeast surface water treatment plant for a total capacity of 60 MGD, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

c. Construct a 20 MGD surface water treatment plant in the southwest portion of the City, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

d. Construct 65 new groundwater wells, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

e. Construct a 2.0 million gallon potable water reservoir (Reservoir T2) near the intersection of Clovis and California Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

f. Construct a 3.0 million gallon potable water reservoir (Reservoir T3) near the intersection of Temperance and Dakota Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

g. Construct a 3.0 million gallon potable water reservoir (Reservoir T4) in the downtown area, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

h. Construct a 4.0 million gallon potable water reservoir (Reservoir T5) near the intersection of Ashlan and Chestnut Avenues, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

i. Construct a 4.0 million gallon potable water reservoir (Reservoir T6) near the intersection of Ashlan Avenue and Highway 99, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

j. Construct 50.3 miles of regional water transmission mains ranging in size from 24-inch to 48-inch, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

k. Construct 95.9 miles of 16-inch transmission grid mains, in accordance with Chapter 9 and Figure 9-1 of the 2012 Metro Plan Update.

l. Develop additional water conservation measures in accordance with Chapter 4 of the 2012 Metro Plan Update.

m. Implement groundwater objectives, goals and policies as described in Chapter 5 of the 2012 Metro Plan Update.

n. Implement surface water objectives, goals and policies as described in Chapter 6 of the 2012 Metro Plan Update.

o. Implement recycled water objectives, goals and policies as described in Chapter 7 of the 2012 Metro Plan Update.

Mitigations (2025 General Plan to General Plan Update)

a. Construct a 4.0 million gallon potable water reservoir (SEGA Reservoir 1) within the northern part of the Southeast Growth Area.

b. Construct a 4.0 million gallon potable water reservoir (SEGA Reservoir 2) within the southern part of the Southeast Growth Area.

c. Develop an update to the water master plan.

Appendix A

WEST YOST ASSOCIATES
Consulting Engineers



TECHNICAL MEMORANDUM

DATE: January 21, 2013 Project No.: 439-00-12-11

TO: Brock Buche, City of Fresno Water Division Project Manager

CC: Martin Querin, City of Fresno Assistant Public Utilities Director—Water Division
Keith Bergthold, City of Fresno Assistant Director of Development and Resource Management

FROM: Brenda Estrada, Project Engineer, R.C.E. #67062

REVIEWED BY: Charles Duncan, Project Manager, R.C.E. #55498

SUBJECT: Hydraulic Evaluation of the Proposed 2035 General Plan Land Use Update for the Master Environmental Impact Report

INTRODUCTION

The purpose of this technical memorandum (TM) is to present West Yost Associates' (West Yost's) evaluation of the potential hydraulic impacts on the City of Fresno (City) water system of the proposed 2035 General Plan Land Use Update (2035 GP) for the Master Environmental Impact Report (MEIR). As described in this TM, West Yost has used the City's water system hydraulic model to evaluate the ability of the City's existing and proposed water system to provide minimum required pressures and flows under the future, projected demands associated with the update to land use. Our evaluation findings and recommendations to serve the 2035 GP are described below.

PROJECT BACKGROUND AND DESCRIPTION

The City has begun the process of updating their General Plan which was last updated in 2002. The previous General Plan included land use development projections to the year 2025. The 2035 GP will create a blueprint for development over the next 20 years to 2035. The changes in the 2035 GP look to facilitate revitalization, infill, transit-oriented development and more sustainable development practices. The MEIR evaluates the impacts to City infrastructure associated with the proposed changes to development.

The City has performed extensive planning for the future water system as documented in the Metropolitan Plan Update (Metro Plan Update). The Metro Plan Update used the City's 2025 General Plan Land Use Update (2025 GP) land use to project future water demands. These demands are the basis for the City's proposed supply portfolio and transmission pipeline grid developed in the Metro Plan Update to meet the City's future needs. Updates to the proposed land use impacts the City's overall system demands. This TM evaluates how the changes to demands impact the planned infrastructure for the City's water system.

PROJECTED WATER DEMANDS

The City has been using water demands developed in the Metro Plan Update to plan for the future water system infrastructure and supply needs. As described in detail in the Metro Plan Update, West Yost obtained future land use data from the City's GIS, which used land use designation adopted as part of the City's 2025 GP. West Yost consolidated the various land use designations from the City's 2025 GP into the City's Water Division's five existing customer classes (single family residential, multi-family residential, commercial/institutional, industrial, and landscape irrigation) to facilitate development of unit factors. In addition to these five existing customer classes, West Yost had added a sixth customer class category for the Southeast Growth Area (SEGA) which had recently been added to the City's Sphere of Influence (SOI) at the time the Metro Plan Update was developed.

The 2035 GP updates the land use designation for several locations within the City's SOI including detailed land use information for the SEGA. The 2035 GP also includes new land use designations which include mixed use for areas outside of the Downtown Central Area. The main change to the land use designations occur along Blackstone Avenue corridor, Shaw Avenue corridor, SEGA, and the southwest section of the City SOI. Figure 1 shows the parcels within the City's SOI where the planned land use designations were updated in the 2035 GP.

The new mixed use designations required the development of new water customer classes to account for the change in anticipated water use. The mixed use designations combine commercial, office and residential land uses on a single parcel. For the downtown mixed use designated parcels, the water duty factor is higher than for the areas outside of downtown. The mixed use planned in the Downtown Central Area is expected to be high densification of residential, commercial, and office in multiple story buildings. It is anticipated the mixed use downtown will include greater square footage of office and commercial as well as higher density residential than the areas outside of downtown and therefore, different water duty factors were developed for the two areas.

The Metro Plan Update used the assumption that open space land designations did not require irrigation. Since the Metro Plan Update, additional evaluation on how open space area is irrigated within the City has resulted in the development of water duty factors to account for irrigation of turf areas within an open space designated parcel. Depending on the primary purpose of the open space, new park, nature preserve, flood control, or greenbelt, a percentage of the parcel is now assumed to be irrigated.

Table 1 provides a summary of the water duty factors used for the different water customer classes and the land use code for the evaluation.

Table 1. Summary of Unit Water Use Factors

Water Customer Class	Land Use Code	Water Duty Factor[(a)], afa/ac
Single Family Residential	rl, rm, rml, run	3.2
Multi-Family Residential	rh, rmh	6.2
Commercial/Institutional	cbp, cc, cgh, cms, co, cr, crbp, hwy, il, pf, pfs, pqch, pse, psm, psp, pss	1.9
Industrial	Ih	1.9
Landscape Irrigation	ccr, orbp, orp, orpr	2.9
Open Space[(b)] • New parks • Nature preserve park • Ponding basin/Regional flood control • SEGA open space	obp, os	 3.4 (80% of area) 3.4 (15% of area) 0 3.4 (47% of area)
Mixed Use Downtown	Cce	7.5
Mixed use Outside of Downtown	cmx, nmx, rmx	6.6
No Water Use[(c)]	ag, rail, road	0

(a) Assumes water conservation achieved through water conservations implemented by the City and single family meter implementation program.
(b) Open space designations assumed to have a percentage of area irrigated based on type of open space use.
(c) No water use includes roadways, railroads, and agricultural land use designations. The eastside agricultural buffer for SEGA is assumed to have no water use.

Demands were calculated for the parcels with a change in land use. Table 2 provides a comparison of the calculated water demand for the 2025 GP land use and the 2035 GP land use for parcels with a change to its land use designation. Parcels without a land use designation change are assumed to have no change in demands. Demand changes to the downtown area are based on work West Yost has conducted based on densification of the proposed mixed use parcels in the downtown area, as well as specific demand for the Fulton Corridor Specific Plan developed by Sherwood Design Engineers.

For purposes of West Yost's hydraulic evaluation of the demand changes due to the 2035 GP, the water demands associated with the parcels having a change in land use were updated in the hydraulic model. The projected demands for the SEGA are decreased from what was projected as part of the Metro Plan Update. However, the downtown area and the remainder of the City demands increase. The calculated demands show an overall increase for the City due to the changes in the 2035 GP land use of 10,170 acre-feet/year (afa). Figure 2 shows how the changes to demands are spatially located throughout the City.

Table 2. Water Demand Comparison for General Plan Land Use Changes[a]

Water Customer Category	Water Duty Factor	2025 General Plan		2035 General Plan		Difference (2035-2025)	
		Area, acres	Annual Water Demand, afa	Area, acres	Annual Water Demand, afa	Area, acres	Annual Water Demand, afa
Downtown Area[b]							
Commercial/Institutional	1.9	2,179	4,140	1,699	3,229	-480	-911
Commercial/Mixed Use[c]	7.5	0	0	480	3,600	480	3,600
Industrial	1.9	237	450	237	450	0	0
Landscape Irrigation	2.9	185	537	185	537	0	0
Multi-Family Residential	6.2	367	2,278	367	2,278	0	0
No Water Use	0.0	83	0	83	0	0	0
Open Space[d]	2.9	65	0	65	188	0	188
Single Family Residential	3.2	1,851	5,923	1,851	5,923	0	0
Increase for Fulton Corridor[e]	-	-	0	-	1,020	-	1,020
Subtotal Downtown Area		*4,967*	*13,329*	*4,967*	*17,225*	*0*	*3,896*
SEGA							
South East Growth Area	3.2	8,227	26,328	0	0	-8,227	-26,328
Commercial/Institutional	1.9	0	0	1,715	3,258	1,715	3,258
Irrigated School Parks	3.4	0	0	354	1,204	354	1,204
Industrial	1.9	0	0	0	0	0	0
Landscape Irrigation	2.9	0	0	34	97	34	97
Multi-Family Residential	6.2	0	0	0	0	0	0
No Water Use	0.0	0	0	733	0	733	0
Open Space[d]	0.0	0	0	0	0	0	0
Regional Flood Control[f]	0.0	0	0	269	0	269	0
SEGA Open Space[g]	3.4	0	0	564	901	564	901
Single Family Residential	3.2	0	0	4,039	12,924	4,039	12,924
Mixed Use[h]	6.6	0	0	524	3,460	524	3,460
Subtotal SEGA		*8,227*	*26,328*	*8,230*	*21,843*	*3*	*-4,485*
Remainder of City							
Commercial/Institutional	1.9	6,131	11,650	3,309	6,287	-2,822	-5,362
Industrial	1.9	3	7	121	230	118	223
Landscape Irrigation	2.9	157	455	257	745	100	290
Multi-Family Residential	6.2	884	5,482	372	2,307	-512	-3,175
No Water Use	0.0	8	0	31	0	23	0
Open Space[d]	0.0	280	0	0	0	-280	0
New Parks[i]	3.4	0	0	359	977	359	977
Nature Preserve[j]	3.4	0	0	135	69	135	69
Ponding Basin[k]	0.0	0	0	56	0	56	0
Regional Flood Control(f)	0.0	0	0	32		32	
Single Family Residential	3.2	3,699	11,838	3,874	12,397	175	558
Mixed Use[h]	6.6	0	0	2,603	17,180	2,603	17,180
Subtotal Remainder of City		*11,163*	*29,431*	*11,150*	*40,192*	*-13*	*10,761*
Total		***24,358***	***69,088***	***24,348***	***79,260***	***-10***	***10,172***

[a] Demands shown for parcels with a change in Land Use from the 2025 General Plan to the 2035 General Plan Update.

[b] Demands for the Downtown Area based on increase in densification to mixed use land use designation and Fulton Corridor Specific Plan detailed demand use.

[c] Downtown Commercial/Mixed Use water duty factor based on densification of mixed use within the downtown area and proposed population increases. Downtown Area commercial/mixed use assumed to contain a greater building square footage than mixed use in other parts of the City and therefore, a larger water duty factor is applied to the Downtown Commercial/Mixed Use land categories.

[d] Open Space water duty factor developed for original Metro Plan demand projections assumed 0 water usage. Additional research on the type of irrigation needs for various open space uses has resulted in new water duty factors for the 2035 General Plan land use.

[e] Demands for Fulton Corridor Specific Plan are based on building type and proposed square footage as provided by Sherwood Engineering. Demands for Fulton Corridor are not tied to a specific land use type.

[f] The water duty for the Open Space land use areas planned to be used as Regional Flood Control facilities is assumed to be 0 afa. A total of 300.7 acres is planned with a majority of the land use within SEGA.

[g] SEGA open space/mixed vegetation area is assumed to be approximately 47 percent irrigated. This assumes 263.6 acres of the total 563.6 acres of open space will require irrigation.

[h] Mixed Use land designations outside of the downtown area are assumed to contain less square footage than mixed use within the Downtown Area. Mixed use water duty factor is based on assumptions for building and population projections for SEGA.

[i] Open Space land uses assumed to be used as new parks are assumed to be 80 percent irrigated. A total of 359.3 acres of new park is planned for the remainder area of the City.

[j] The water duty for the Open Space land use area planned to be used as a nature preserve type park located in the northwest part of the City is assumed to be 15 percent irrigated. A total of 135.1 acres is currently planned.

[k] The water duty for the Open Space land use areas planned to be used as Ponding Basis facilities is assumed to be 0 afa. A total of 56.4 acres is currently planned.

WATER SUPPLY

As described in the City's Metro Plan Update, the City's Water Master Plan, the City's 2010 Urban Water Management Plan (2010 UWMP) and West Yost's March 2009 TM "Hydraulic Evaluation of the Downtown Central Area," the City's available water supplies are confined to a finite quantity and are extremely limited. Therefore, water supplies to meet the projected increase in water demand must come from within the City's existing, limited water supply portfolio. The availability and reliability of the City's water supplies to meet the City's projected water demands under various hydrologic conditions were evaluated in the City's 2010 UWMP which was adopted by City Council in November 2012.

The projected water demands in the 2010 UWMP were based on the City's anticipated compliance with adopted per capita water use targets in accordance with the Water Conservation Act of 2009 (SBx7-7) and the projected City population in 2035[1]. As documented in the 2010 UWMP, the City population in 2035 is projected to be 786,000 (this is based on the Fresno Council of Governments estimate of 1,290,000 people countywide in 2035, with 61 percent of the population residing in the City of Fresno). Assuming that the land use changes proposed for the 2035 General Plan do not result in an increase in the total projected City population, but instead result in an increased densification of population in some parts of the City and reduced densification in other parts of the City, the projected water demand per SBx7-7, based on per capita consumption, in 2035 (220,100 af) would be unchanged as a result of the proposed land use changes.

The projected water supplies in the 2010 UWMP were calculated using land-use based water demand projection using the 2025 General Plan land uses (shifted out 10 years to 2035 to account for the slowdown in development in the City) and assuming water conservation by all users. This land use-based water demand projection (233,400 af) is higher than the SBx7-7 water demand projection (220,100 af) and is more conservative for water supply planning purposes as it provides for additional water supplies in the event that the City were not able to comply with the SBx7-7 requirements. With the land use changes proposed for the 2035 General Plan, this 2035 water demand estimate would increase to 243,570 af (233,400 af + 10,170 af). This increased land use-based water demand projection is shown on Figure 3.

To meet this higher land use-based water demand projection in 2035, additional water supplies would be required. The City's water supply portfolio in 2035 is projected to include treated surface water supplies, groundwater supplies and recycled water supplies (see Figure 3). Supplies to meet additional water demands would likely be derived from additional groundwater pumpage in conjunction with additional intentional groundwater recharge. The groundwater pumpage projected for 2035 in the 2010 UWMP (85,000 af) would increase to 95,170 af (85,000 af + 10,170 af) with the land use changes proposed for the 2035 General Plan. This increase in groundwater pumpage would require a like amount of additional intentional groundwater recharge to keep the City's groundwater operations in balance. As described in the City's 2010 UWMP, the projected future increase in intentional groundwater recharge is assumed to occur due to the increased use of existing recharge basins, construction of new recharge basins, and/or development of a groundwater bank and maximizing the use of available surface water supplies[2].

[1] See Chapter 6 of the City of Fresno 2010 Urban Water Management Plan dated November 2012.
[2] See Section 4.2.3 of the City's 2010 Urban Water Management Plan dated November 2012.

An additional 210 acres[3] of new recharge basins (beyond those previously identified) would be required to balance the additional required groundwater pumpage of 10,170 af associated with the 2035 General Plan.

EVALUATION CRITERIA

The planning and modeling criteria used for this evaluation are based on West Yost's recent work with the City. The August 2008 verified hydraulic model of the City's water distribution system was used as the basis for the evaluation. The hydraulic model has been updated since 2008 to account for the updates to demand within the Downtown Central Area.

Planning and Modeling Criteria

The criteria used to evaluate the potential impacts to the City's existing water system are as follows:

- Minimum peak hour demand pressure 40 pounds per square inch (psi);
- Maximum allowable velocity is 7 feet per second (fps) during a peak hour condition for distribution pipelines and 5 fps during a peak hour condition for transmission pipelines;
- Maximum allowable head loss rate is 10 feet per 1,000 feet during any condition[4];
- Any new, required pipelines will be modeled with a roughness coefficient (C-factor) of 130; and
- Assumed peaking factors for maximum day and peak hour demand conditions are consistent with the City's adopted peaking factors and are as follows:
  - Maximum Day Demand = 2.0 times Average Day Demand
  - Peak Hour Demand = 2.9 times Average Day Demand

Fire Flow Requirements

As a purveyor of water, the City is responsible for providing a realistic water supply to meet fire flow requirements. The City's Fire Department establishes minimum water flows and pressures required for firefighting purposes. The Fire Department uses the 2007 California Fire Code (CFC) (*Table B105.1 – Minimum Required Fire-Flow and Flow Duration for Buildings*) to assist them in establishing minimum fire flows and durations for individual structures.

The fire flow requirements based on land use type are presented in Table 3. Fire flow requirements do not change significantly due to the 2035 GP land use change. Figure 4 shows how the land use changes impact the required fire flow. The most significant change is to the SEGA area. Prior to having a land use plan for SEGA, the area was assigned a conservative fire flow requirement of 4,000 gpm. Therefore, the fire flow in SEGA have been adjusted to reflect

[3] Based on a recharge rate of 0.2 acre-feet per acre per day over a 10-month per year operational cycle (per the Metropolitan Water Resources Management Plan Phase 2 Report (Chapter 5), January 2011) plus 25 percent to account for inactive portions of the recharge area (setbacks and roadways within the recharge areas).

[4] This criteria was developed primarily for new development; ability to meet this criteria within existing distribution systems (such as that in the City's downtown area) can be difficult due to existing small diameter pipelines and aging pipelines.

the proposed land use designations and results in a reduction to projected fire flow requirements for most of the area.

Although these criteria have been established, and used to size new pipelines, the existing system should be evaluated using pressure as the primary criterion. Secondary criteria, such as velocity, head loss, age, and material type, are used as indicators for areas of the water system that also may need improvements, but may not be required as part of this evaluation.

Table 3. Recommended Fire Flow Requirements[a,b]

Designation	Non-Sprinklered		Sprinklered[c,d,e]	
	Fire Flow, gpm	Duration, hours	Fire Flow, gpm	Duration, hours
Single Family Residential	2,000	2	—	—
Multi-Family Residential	3,000	3	—	—
Commercial/Institutional	6,000	4	3,500	4
Industrial	8,000	4	4,500	4

(a) Construction type and fire area are not generally known during the development of a master plan; consequently, fire flow requirements set forth in this table are based on previous estimates for these land use types and similar communities.
(b) Unique projects or projects with alternate materials may require higher fire flows and will be reviewed by the City's Fire Marshal on a case-by-case basis (e.g., proposed commercial/industrial areas and schools).
(c) The City's Fire Marshal normally allows up to a 50 percent reduction in fire flows if a building is sprinklered. However, the CFC also requires that no fire flow be less than 1,000 gpm for single family residential or 1,500 gpm for all other building types. For a more conservative fire flow estimate, single family and multiple family buildings were considered non-sprinklered for this evaluation.
(d) Specific fire flows were determined from Table B105.1 of the 2007 CFC, and depend on construction type and fire area. These fire flow requirements are based on buildings being fully sprinklered.
(e) Fire flow includes a 500 gpm demand for on-site sprinkler flow.

WATER SYSTEM FACILITY ASSUMPTIONS

The City's hydraulic model was verified for August 2008 operating conditions. Since the initial verification and allocation of existing and proposed demands, West Yost has prepared several evaluation of the proposed infrastructure required to meet future demands.

Recommendations from Previous Evaluations

In March 2009, West Yost completed a hydraulic evaluation of the Downtown Central Area to evaluate available supplies in the City's downtown area and address the loss of supply in the downtown area due to aging wells and water quality issues[5]. This evaluation also considered changes to demands in the downtown area based on densification of the mixed use land designations. Based on population projections, projected per capita water demand factors, and proposed land use designations for the downtown Central Area, a unit water demand factor was calculated for mixed use designations. The calculated mixed use water duty factor is used in the evaluation for 2035 GP land use changes.

[5] "Hydraulic Evaluation of the Downtown Central Area", TM, prepared by West Yost, March 12, 2009.

In May 2011, West Yost conducted a re-evaluation of the Downtown Central Area to determine what potential alternatives existed other than the March 2009 recommendation for increasing the pumping capacity of Well 172[6]. The recommendations of the May 2011 evaluation were to make distribution pipeline improvements to improve flow from Well 172 (as recommended in the March 2009 evaluation), but instead of upgrading the pumping capacity of Well 172, distribution system improvements should be made to convey supplies from Well 313 to the Downtown Central Area.

In July 2011, West Yost conducted additional evaluation of the downtown area to determine the impacts of proposed demands for the Fulton Corridor Specific Plan Project.

For purposes of this evaluation, it has been assumed that the pipeline and storage infrastructure recommendations from these prior hydraulic evaluations will be implemented by the City and will be available to serve the 2035 GP requirements.

Specific System Assumptions

The following specific assumptions have been made related to available water system facilities within the City's service area:

- The Northeast Surface Water Treatment Facility (SWTF) has a future production capacity of 60 million gallons per day (mgd) and a firm capacity of 54 mgd to serve maximum day and peak hour demands;
- The proposed Southeast SWTF has a production capacity of 80 mgd and a firm capacity of 72 mgd to serve maximum day and peak hour demands;
- The City's proposed future groundwater production capacity is assumed to be approximately 549 mgd with a firm capacity of 439 mgd to supplement the surface water supplies during maximum day and peak hour demand conditions, as calculated in the Metro Plan Update Phase 2;
- For peak hour demands, the City will supplement surface and groundwater supplies with existing and proposed storage tank capacity;
    - Northeast SWTF Clearwell (1.5 MG existing + 4.5 MG proposed)
    - T-1 and T-2 Southeast Tanks (2.0 MG existing + 2.0 MG proposed)
    - T-3 Tank (3.0 MG existing)
    - Southeast SWTF Clearwell (8.0 MG proposed)
    - T-4 Downtown Tank (3.0 MG proposed)
    - SEGA Tanks (2- 4.0 MG proposed)
    - T-5 Tank (3.0 MG proposed)
    - T-6 Tank (3.0 MG proposed)

[6] "Hydraulic Re-Evaluation of the Downtown Central Area Water Distribution System", TM, prepared by West Yost, May 10, 2011.

- Major regional transmission mains and transmission grid mains (TGMs) as recommended in the Metro Plan Update Phase 3 report are assumed to be active for the 2035 GP evaluation.

The City's planned water system facilities based on the 2025 GP are shown on Figure 5.

EVALUATION SCENARIOS

To evaluate the adequacy of the City's water system to serve the Proposed 2035 GP land use changes, West Yost has evaluated the City's system at buildout (2035) under the following two demand conditions:

- A future maximum day demand condition concurrent with fire flow demand while maintaining a minimum residual system pressure of 20 psi along the corridors with significant changes to future demands; and
- A peak hour demand condition while maintaining a minimum system pressure of 40 psi.

Figure 6 shows how the demands are changed based on the proposed 2035 GP land use for maximum day demands for the City. Figure 7 shows how the demands are changed based on the proposed 2035 GP land use for peak hour demands for the City.

EVALUATION FINDINGS

Storage Capacity Evaluation

Treated water storage capacity requirements for the City were evaluated based on the following three components: operational storage, emergency storage and fire storage. The principal advantage that storage provides is to equalize demands on supply sources and production facilities.

Table 4 shows the storage requirement calculated for the 2025 GP land use demands, the incremental increase to storage requirements based on the demand changes for the 2035 GP land use designations, and the available system storage and storage credits.

Table 4. City of Fresno Storage Requirements

Storage Component	Required Storage, MG
Required Storage - 2025 GP Land Use Demands	
Operational[(a)]	62.5
Emergency[(b)]	177.1
Fire Flow[(c)]	1.0
Subtotal 2025 GP Land Use	**240.6**
Required Storage - 2035 GP Incremental Increase	
Operational[(d)]	2.7
Emergency[(e)]	7.4
Fire Flow[(f)]	—
Subtotal 2035 GP Incremental Increase	10.1
Total System Storage 2035 GP Land Use	**250.7**
Available Storage and Storage Credits	
Planned Reservoir Capacity[(g)]	38.0
Emergency Storage Credit[(h)]	92.6
Operational Storage Credit[(i)]	60.9
Surface Storage Credit[(j)]	60.0
Total Available Storage and Storage Credits	**251.6**
Future System Storage Needs	
Total System Storage 2035 GP Land Use	250.7
Total Available Storage and Storage Credit	251.6
Future Storage Surplus (Deficit)[(k)]	**0.9**

(a) Based on 15 percent maximum day demand (MDD = 416.7 million gallons per day (mgd).
(b) Based on 85 percent of an average day demand (ADD = 208.4 mgd).
(c) Based on a fire flow of 4,000 gallons per minute (gpm) multiplied by a 4 hour duration.
(d) Based on 15 percent of maximum day demand resulting from change in demand due to 2035 General Plan Land Use update (MDD = 12,605 gpm).
(e) Based on 85 percent of an average day demand resulting from change in demand due to 2035 General Plan Land Use update (ADD = 6,033 gpm).
(f) Fire flow already accounted for in City-wide storage calculations and not needed for the incremental land use change.
(g) Assumes the following for reservoir capacity: 6.0 Million Gallons (MG) Northeast SWTF (1.5 MG existing + 4.5 MG future); 4.0 MG T-1 and T-2 Southeast Tank (2.0 MG existing + 2.0 MG future); 3.0 MG T-4 Downtown Tank; 8.0 MG SEGA Proposed; 8.0 MG Southeast SWTF; 3 MG Existing T-3; 3.0 MG Proposed T-5; and, 3.0 MG Proposed T-6.
(h) Equal to the sum of the groundwater pumping capacity of active wells with backup power. Minimum credit is zero, and the maximum credit is the recommended emergency storage capacity.
(i) 56 percent of the difference between the firm groundwater capacity and a maximum day demand. Minimum credit is zero and the maximum credit is the recommended operational storage capacity. Firm groundwater pumping capacity assumes 20 percent of groundwater production capacity is out of service (FPC = 522 mgd) Draft Chapter 4 in the Water Master Plan further defines operational storage credit assumptions.
(j) Equal to the capacity of the smallest surface water treatment facility.
(k) Equal to the difference between total available storage and storage credits, and the total required storage.

MG = Million Gallons

The City's Water Master Plan is evaluating the overall system and will make recommendations for overall system improvements, including recommendations for storage improvements. As shown in Table 4, the preliminary storage calculations indicate the City has planned for adequate storage to include the proposed 2035 GP land use changes.

Distribution System Evaluation

The impacts from the 2035 GP land use changes on the water system infrastructure proposed for the 2025 GP land use was evaluated using the City's hydraulic model. Scenarios were run for 2025 GP demands and 2035 GP demands under maximum day plus fire flow and peak hour conditions. The ability to maintain system pressure, velocity, and available fire flow criteria for the increase in demands due to the land use changes was evaluated. The evaluation results are described below.

Maximum Day Plus Fire Flow for 2025 GP Land Use

As discussed under the fire flow requirements section, the SEGA area was initially evaluated using a conservative fire flow of 4,000 gpm prior to a detailed land use plan being available. The required fire flow for the land use plan for the 2035 GP shows a reduction in the required fire flow for this area. Due to this conservative approach taken initially, it is assumed, for this evaluation, that the SEGA area has been adequately planned to meet fire flow requirements. In addition, the downtown area has been evaluated for fire flow requirements as part of the densification in the Central Area and the Fulton Corridor Specific Plan hydraulic analysis performed. Therefore, the maximum day plus fire flow evaluation for this TM examines the corridors along Blackstone Avenue, Shaw Avenue, and the southwest section of the City where demands are shown to increase due to the proposed change in land use.

The results of the maximum day demand plus fire flow condition for the system with the 2025 GP land use are shown on Figure 8. The available flow at nodes along Blackstone Avenue, Shaw Avenue, and the southwest corridors in the hydraulic model are shown assuming that a minimum system pressure residual of 20 psi is maintained. Nodes that are shown in "green" have available flows of 3,500 gpm or more, indicating that they meet the fire flow requirement. Nodes shown in "red" have available flows that are less than 3,500 gpm, indicating that they do not meet the fire flow requirement for the 2025 GP land use. As shown, a node along Blackstone Avenue near Shields Avenue does not meet the minimum of 3,500 gpm (see "red" node on Figure 8). The inability of this node to meet the required 3,500 gpm fire flow is due to the age and small diameter of the pipeline at this location. Therefore, specific infrastructure improvements to meet required fire flow in older areas of the City with small diameter pipelines are addressed as part of the system's rehab and replacement program for aging infrastructure.

It should be noted that the City's pipeline velocity criteria of a maximum of 10 fps during a simulated fire flow condition was not used as a constraint for this evaluation. Typically, the pipeline velocity criteria for fire flow conditions is used for planning and design of new pipelines, and not for evaluation of existing pipeline systems due to the fact that new criteria standards might have been put in place since the construction of these existing pipelines.

Maximum Day Plus Fire Flow for 2035 GP Land Use

The hydraulic model was used to run the maximum day plus fire flow for the updated demands based on the 2035 GP land use changes. The initial run for this scenario assumed no changes to infrastructure or operations of the City's system to assess whether required fire flow was impacted by the increased system demands. Results indicated additional locations were not able to meet the 3,500 gpm fire flow. However, the reduction in available fire flow was mitigated in the hydraulic model by adjusting the operational settings for wells. An additional six wells in the vicinity of Blackstone Avenue and Shaw Avenue were assumed to be active for the maximum day plus fire flow scenario with the increased demands. As shown on Figure 9, the changes to operational settings were able to mitigate the reduction in available fire flow.

The results for the maximum day plus fire flow scenarios for the change in demands indicate the infrastructure recommendations for the 2025 GP land use is adequate to convey the additional demand. Mitigation through operation of system wells addresses any reduction in available fire flow.

Peak Hour Demands for 2025 GP Land Use

The results of the peak hour demand condition for the buildout with the 2025 GP demands are shown on Figure 10. Figure 10 shows the system pressure at each node in the hydraulic model based on peak hour demand conditions. As shown, system pressures throughout most of the City are above the minimum pressure criteria of 40 psi (indicated by the "green" nodes). One location, in the northwest part of the City indicates pressures drop below the minimum pressure of 40 psi (indicated by the "red" nodes). This location is a subzone within the City's system and there are constraints to how water is conveyed to this area. Improvement options are being evaluated to determine how to best improve pressures to this area. The City's minimum peak hour pressure criterion is being met throughout the rest of the City with the infrastructure being proposed for the 2025 GP land use demands.

Peak Hour Demands for 2035 GP Land Use

The results of the peak hour demand condition for the buildout with the 2035 GP demands are shown on Figure 11. Figure 11 shows the system pressure at each node in the hydraulic model based on peak hour demand conditions. As shown, system pressures throughout most of the City are able to meet the minimum pressure criterion. The results indicate the area in the northwest is still below criteria but the remainder of the City is above the minimum criterion of 40 psi. Like the maximum day demand plus fire flow scenario, operational adjustments were made for the peak hour demand scenario to mitigate areas where pressure in the system had dropped due to the increase demands. An additional five wells were activated in the southwest area of the City to ensure the minimum pressure criterion was being met for this area. The operation of these additional wells was confirmed to be within the firm pumping capacity for groundwater for the City's supply availability. Therefore, no specific improvements are required for the peak hour demand condition based on the increase in demands due to the 2035 GP changes.

EVALUATION RECOMMENDATIONS

As indicated through the results from the system evaluations, the infrastructure recommended in the Metro Plan Update reports is adequate to convey the increased demands throughout the system. However, operational changes are needed to maintain system pressure and velocity criteria. In order to maintain pressure in the southwest area during peak hour conditions, the City will need to operate additional wells without exceeding the firm production capacity of their groundwater supply. For maximum day demand plus fire flow conditions the City will also need to rely on additional wells to provide required fire flow to the corridors where demands have been increased.

This evaluation looked at the impact of the increased demands due to the 2035 GP land use changes on the City's infrastructure's ability to maintain minimum system service standards. The evaluation did not look at specific recommendations for distribution system infrastructure improvements to address localized pressure or available fire flow conditions. The City's Water Master Plan is evaluating the overall system and will make recommendations for overall system improvements, including recommendations to address localized areas of concern such as pipeline rehab and replacement for older areas of the City. Generally, however, the existing and planned infrastructure improvements are capable of meeting 2035 GP demands.

The recommendations in this TM are based on the general land use data available for the 2035 GP. As projects develop with more specific information, additional evaluation will need to be conducted to confirm the local distribution system and infrastructure is adequate to maintain the City system criteria.

2035 GENERAL PLAN LAND USE

Residential
- Low Density (1-3 D.U./acre)
- Medium Low Density (3.5-6 D.U./acre)
- Medium Density (5.0 - 12 D.U./acre)
- Medium High Density (12-16 D.U./acre)
- Urban Neighborhood (16-30 D.U./acre)
- High Density (30-45 D.U./acre)

Industrial
- Light Industrial
- Heavy Industrial

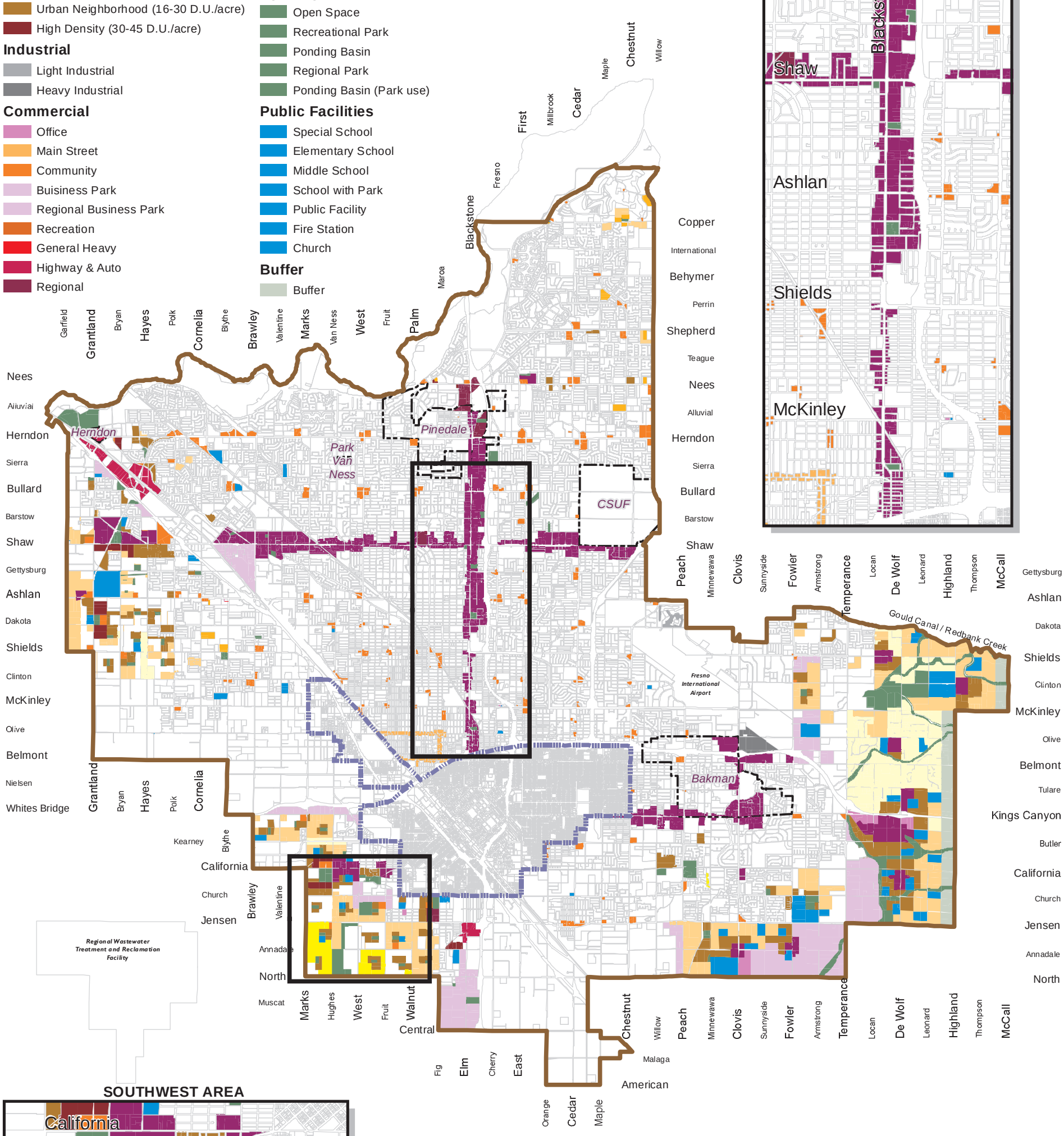
Commercial
- Office
- Main Street
- Community
- Buisiness Park
- Regional Business Park
- Recreation
- General Heavy
- Highway & Auto
- Regional

Mixed Use
- Corridor/Center Mixed Use
- Regional Mixed Use
- Neighborhood Mixed Use

Open Space
- Open Space
- Recreational Park
- Ponding Basin
- Regional Park
- Ponding Basin (Park use)

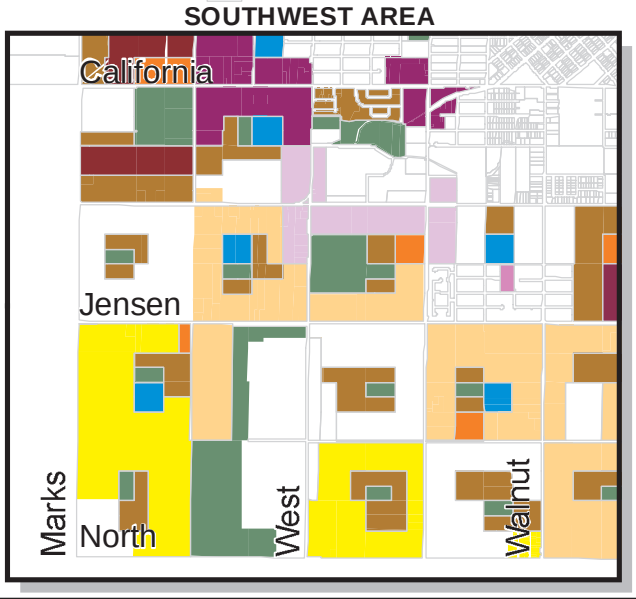
Public Facilities
- Special School
- Elementary School
- Middle School
- School with Park
- Public Facility
- Fire Station
- Church

Buffer
- Buffer



BLACKSTONE AREA

SOUTHWEST AREA



Note:
- Land use only shown for areas where 2035 General Plan Update is proposing a change to the 2025 General Plan Land use.
- Downtown Area land use expected to be refined through specific and community plans.
- Areas with land use change based on GIS data provided by the City.

LEGEND
- Independent Water System
- Downtown Boundary
- Sphere of Influence

N

0 1 2
Miles

FIGURE 1

City of Fresno
General Plan Land Use Change Evaluation

2035 GENERAL PLAN LAND USE CHANGE AREAS

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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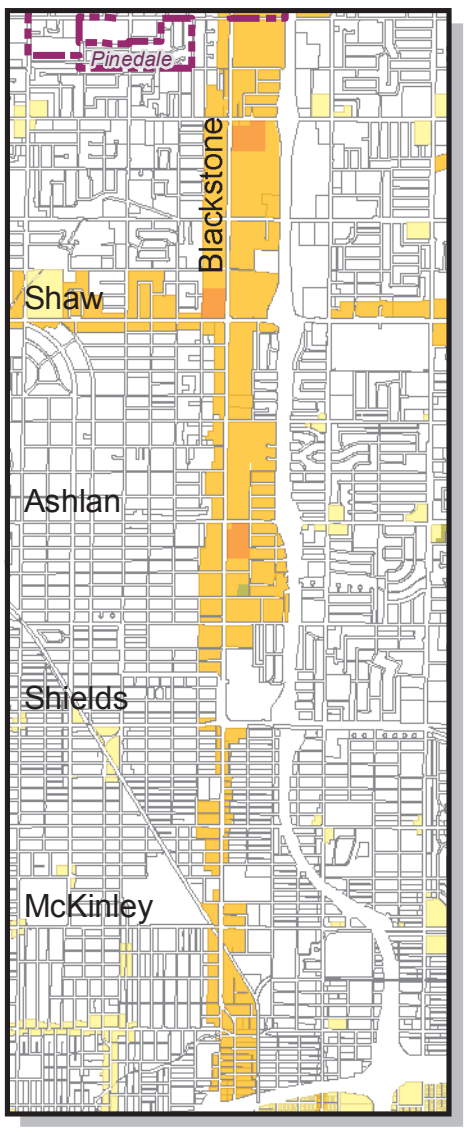
Last Saved: 12/11/2012 10:23:18 AM bestrada: N:\Clients\439 Fresno\00-12-11 MEIR Support\GIS\Figures\Fig2 Annual Demand.mxd

Annual Demand Comparison

- -232 to -100 afa (decrease)
- -100 to -50 afa (decrease)
- -50 to 0 afa (decrease)
- 0 afa (no change)
- 0 to 50 afa (increase)
- 50 to 100 afa (increase)
- 100 to 375 afa (increase)

Blackstone Area

- 2025 General Plan Demands = 1,567 afa
- 2035 General Plan Demands = 4,410 afa
- Difference in Demands = 2,844 afa



Southwest Area

- California on North, North on South, Marks on West, and Walnut on East
- 2025 General Plan Demands = 2,746 afa
- 2035 General Plan Demands = 3,403 afa
- Difference in Demands = 657 afa

Note:

- Demand change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to demands shown on a per parcel basis calculated based on parcel acreage.
- Planned land use changes for 2035 General Plan result in an overall system increase of 10,172 afa (Downtown Area, not shown, increase of 3,896 afa, SEGA decrease of 4,485, and remainder area of the City increase of 10,761 afa.)

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

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FIGURE 2

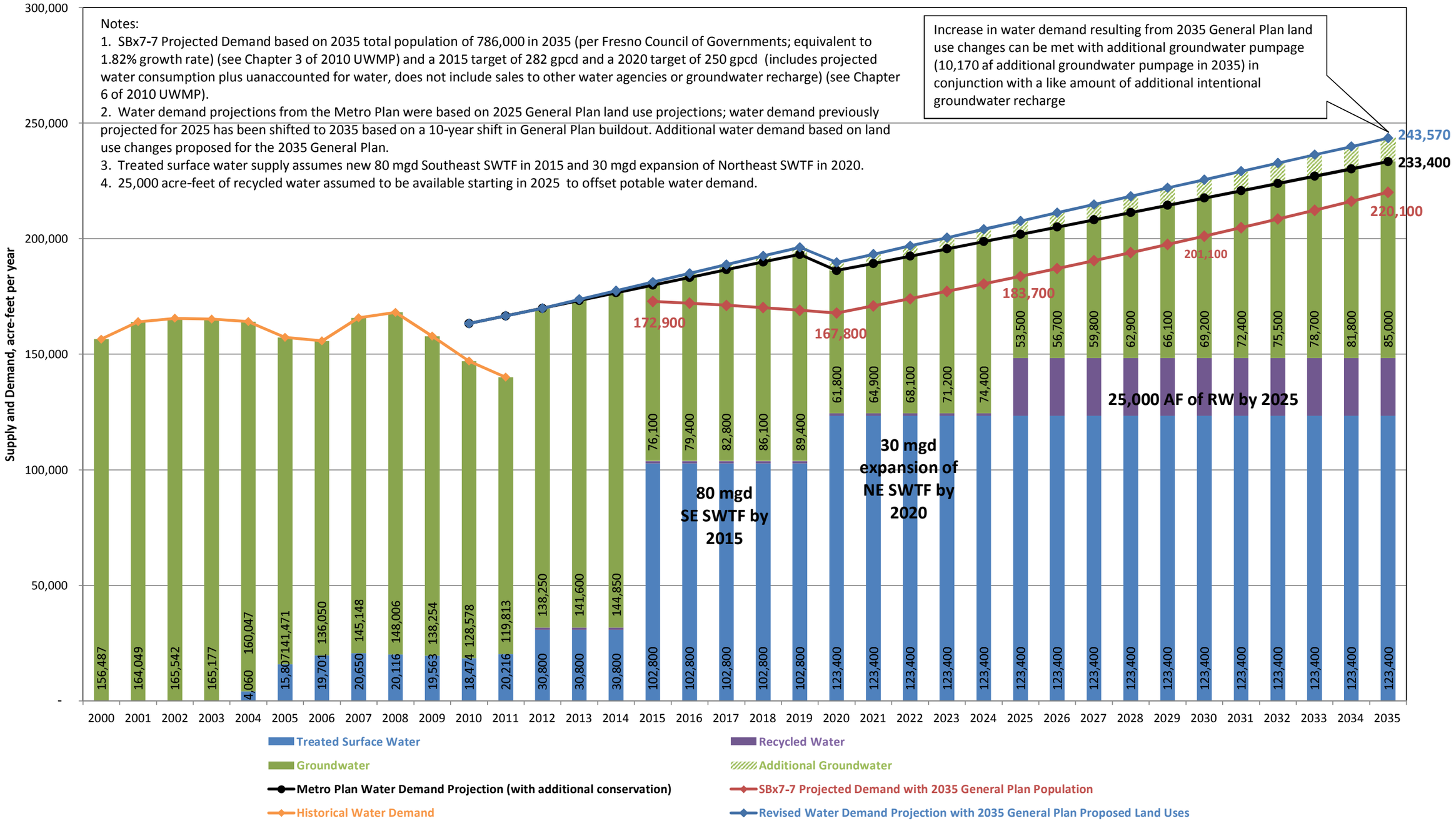
City of Fresno General Plan Land Use Change Evaluation

CHANGES TO ANNUAL DEMANDS

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

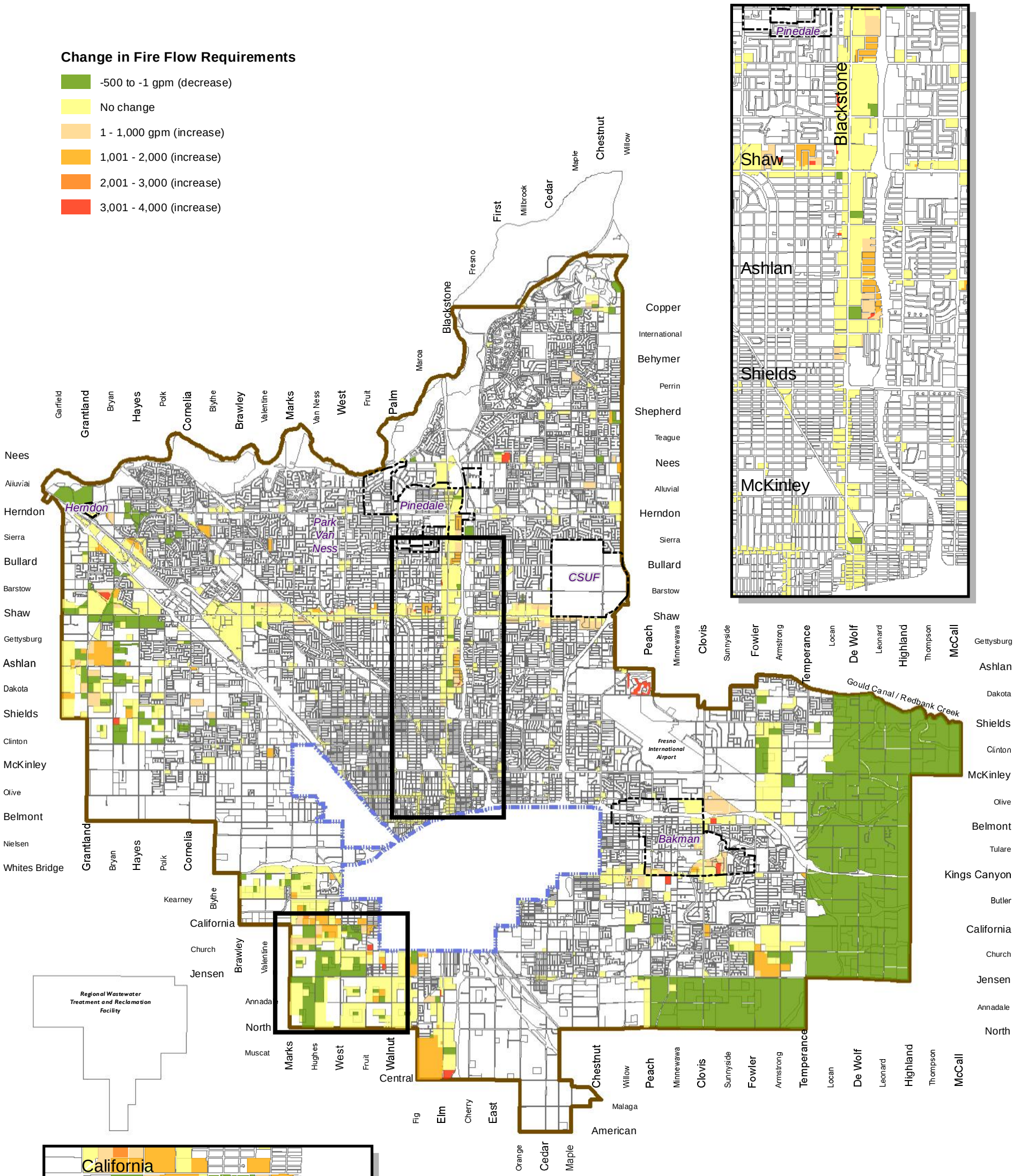
Figure 3. Changes to Future Supply and Demand



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Change in Fire Flow Requirements

- -500 to -1 gpm (decrease)
- No change
- 1 - 1,000 gpm (increase)
- 1,001 - 2,000 (increase)
- 2,001 - 3,000 (increase)
- 3,001 - 4,000 (increase)



Note:
- Fire Flow requirement change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to fire flow requirements shown on a per parcel basis
- Fire flow demand requirements based on 20 psi residual:
  Single family residential = 2,000 gpm (2 hours)
  Multi-family residential = 3,000 gpm (3 hours)
  Commercial/Institutiional = 3,500 gpm (4 hours)
  Industrial = 4,000 gpm (4 hours)

FIGURE 4

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

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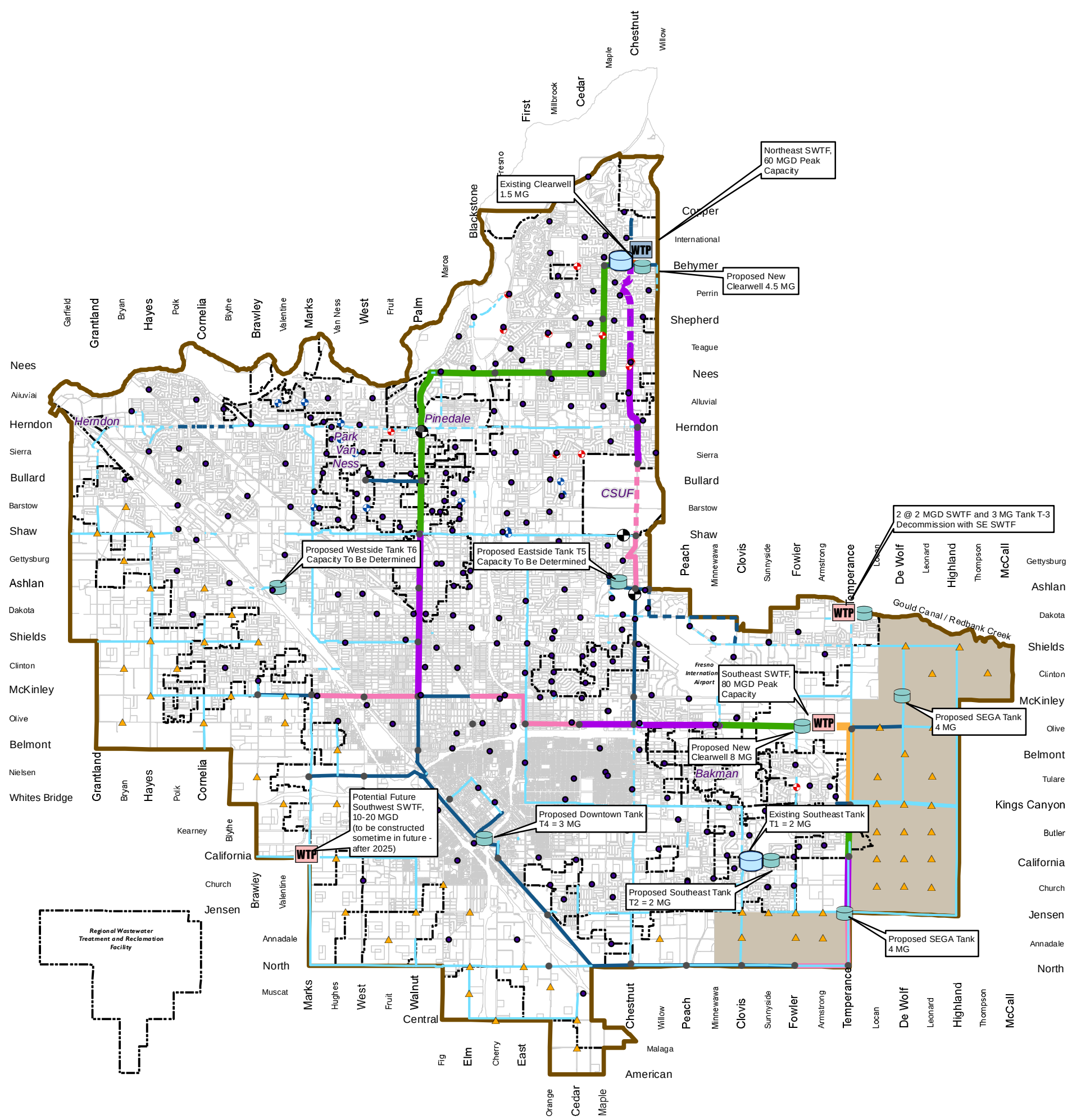
City of Fresno
General Plan Land Use Change Evaluation

CHANGES TO FIRE FLOW REQUIREMENTS

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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LEGEND

- WTP — Existing Water Treatment Plant
- Proposed Tank Site
- WTP — Future Water Treatment Plant
- Future Pressure Reducing Valve
- TGM Tie-in Location
- Existing Well
- Future Well 2010-2025
- Existing City Limit
- Sphere of Influence
- Independent Water System
- Southeast Growth Area
- 16-inch Diameter
- 24-inch Diameter
- 30-inch Diameter
- 36-inch Diameter
- 42-inch Diameter
- 48-inch Diameter

Note:
- Dashed line indicates an existing pipeline
- Infrastructure shown proposed in the Metro Plan Update Phase 3.
- New well locations shown are for display purposes. The City will conduct well siting studies to determine actual well locations.

N

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Miles

FIGURE 5

City of Fresno General Plan Land Use Change Evaluation

2025 PROPOSED REGIONAL AND TGM INFRASTRUCTURE

City of FRESNO

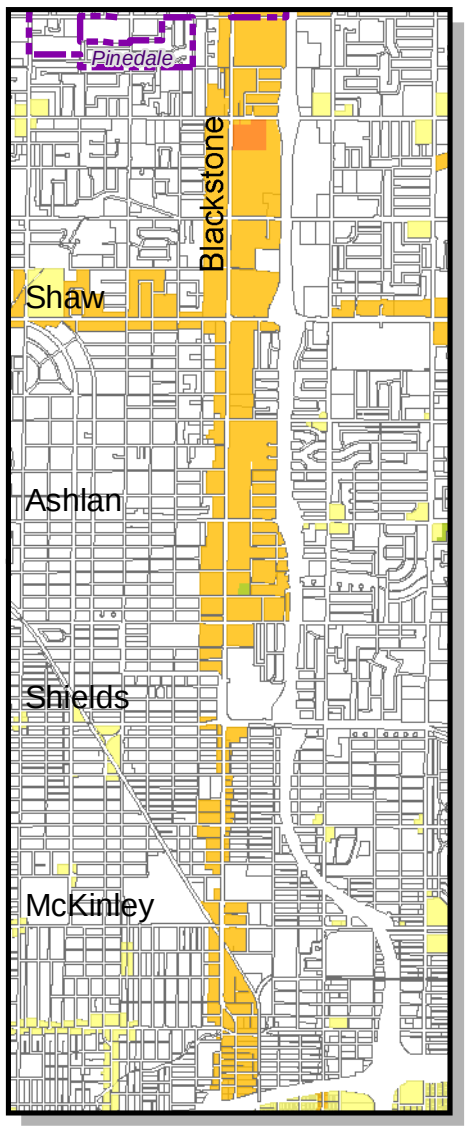
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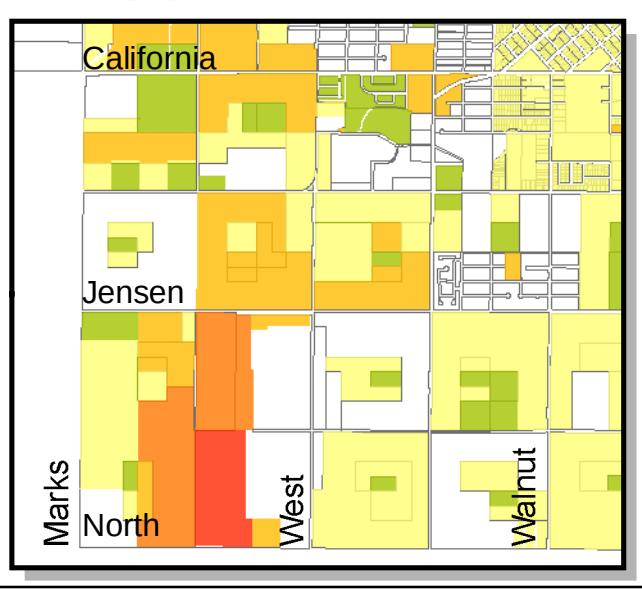
Maximum Day Demand Comparison

- -288 to -150 gpm (decrease)
- -150 to -75 gpm (decrease)
- -75 to 0 gpm (decrease)
- 0 gpm (no change)
- 0 to 75 gpm (increase)
- 75 to 150 gpm (increase)
- 150 to 465 gpm (increase)

Blackstone Area

- 2025 General Plan Demands = 1,942 gpm
- 2035 General Plan Demands = 5,466 gpm
- Difference in Demands = 3,524 gpm





Southwest Area

- 2025 General Plan Demands = 3,403 gpm
- 2035 General Plan Demands = 4,216 gpm
- Difference in Demands = 813 gpm

Note:

- Demand change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to demands shown on a per parcel basis calculated based on parcel acreage.
- Planned land use changes for 2035 General Plan result in an overall system increase of 12,605 gpm for maximum day demands.

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

0 1 2 Miles

FIGURE 6

City of Fresno General Plan Land Use Change Evaluation

CHANGES TO MAX DAY DEMANDS

City of FRESNO

WEST YOST ASSOCIATES Consulting Engineers

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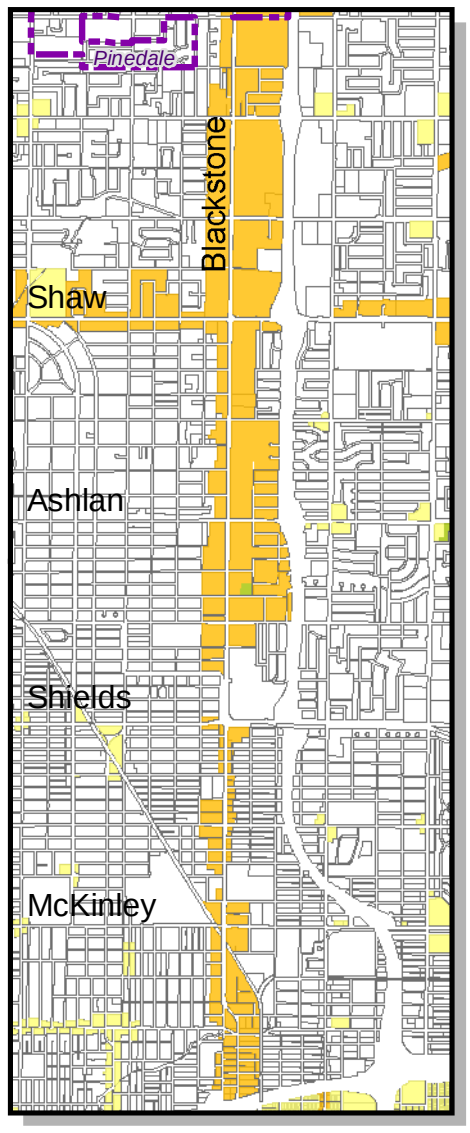
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Peak Hour Demand Comparison

- -418 TO -300 gpm (decrease)
- -300 to -150 gpm (decrease)
- -150 to 0 gpm (decrease)
- 0 gpm (no change)
- 0 to 150 gpm (increase)
- 150 to 300 gpm (increase)
- 300 to 674 gpm (increase)

Blackstone Area

- 2025 General Plan Demands = 2,816 gpm
- 2035 General Plan Demands = 7,926 gpm
- Difference in Demands = 5,110 gpm



Southwest Area

- 2025 General Plan Demands = 4,934 gpm
- 2035 General Plan Demands = 6,114 gpm
- Difference in Demands = 1,180 gpm

Note:

- Demand change based on planned 2035 land use from General Plan Update
- Only parcels with a change to planned land use shown in figure.
- Changes to demands shown on a per parcel basis calculated based on parcel acreage.
- Planned land use changes for 2035 General Plan result in an overall system increase of 18,278 gpm for peak hour demands.

LEGEND

- Independent Water System
- Downtown Boundary
- Sphere of Influence

Proposed Transmission Pipelines

- 16-inch Diameter
- 24-inch Diameter
- 30 to 36-inch Diameter
- 42 to 48-inch Diameter

N

0 1 2

Miles

FIGURE 7

City of Fresno General Plan Land Use Change Evaluation

CHANGES TO PEAK HOUR DEMANDS

City of FRESNO

WEST YOST ASSOCIATES Consulting Engineers

Note:
- Demand based on proposed 2025 General Plan land use
- Availalbe fire flow shown for 20 psi residual

LEGEND

Required Fire Flow (2025 GP)
- No Fire Flow
- 2,000 gpm
- 3,000 gpm
- 3,500 gpm
- 4,000 gpm

Available Fire Flow
- Less than 3,500 gpm
- 3,500 gpm and Greater
- Distribution Pipeline
- Transmission Pipeline

0 1 2
Miles

FIGURE 8

City of Fresno General Plan Land Use Change Evaluation

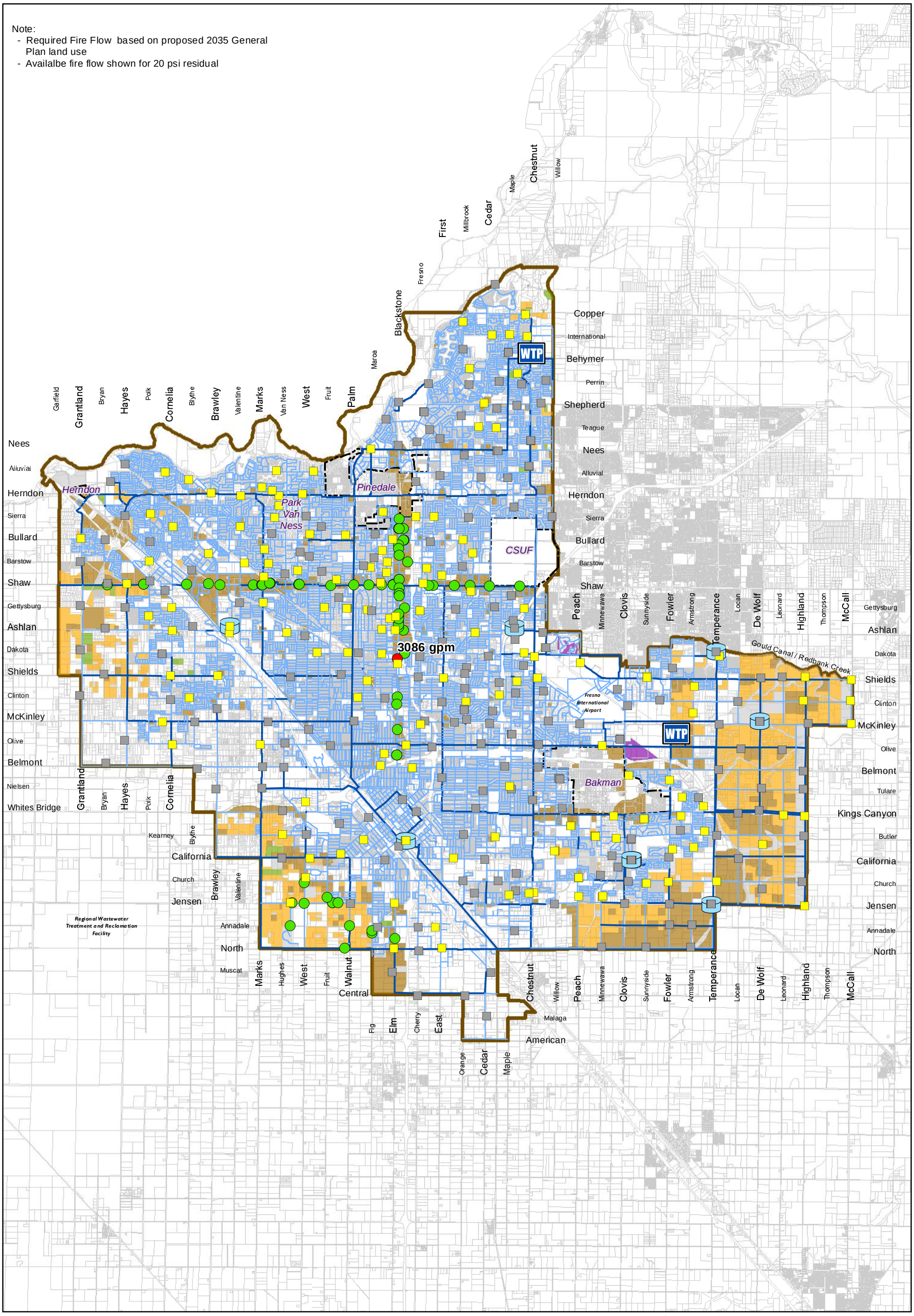
2025 GENERAL PLAN AVAILABLE FIRE FLOW

City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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Note:
- Required Fire Flow based on proposed 2035 General Plan land use
- Availalbe fire flow shown for 20 psi residual



LEGEND

Required Fire Flow (2035 GP)
- No Fire Flow
- 2,000 gpm
- 3,000 gpm
- 3,500 gpm
- 4,000 gpm

Available Fire Flow
- Less than 3,500 gpm
- 3,500 gpm and Greater
- Distribution Pipeline
- Transmission Pipeline

N

0 1 2
Miles

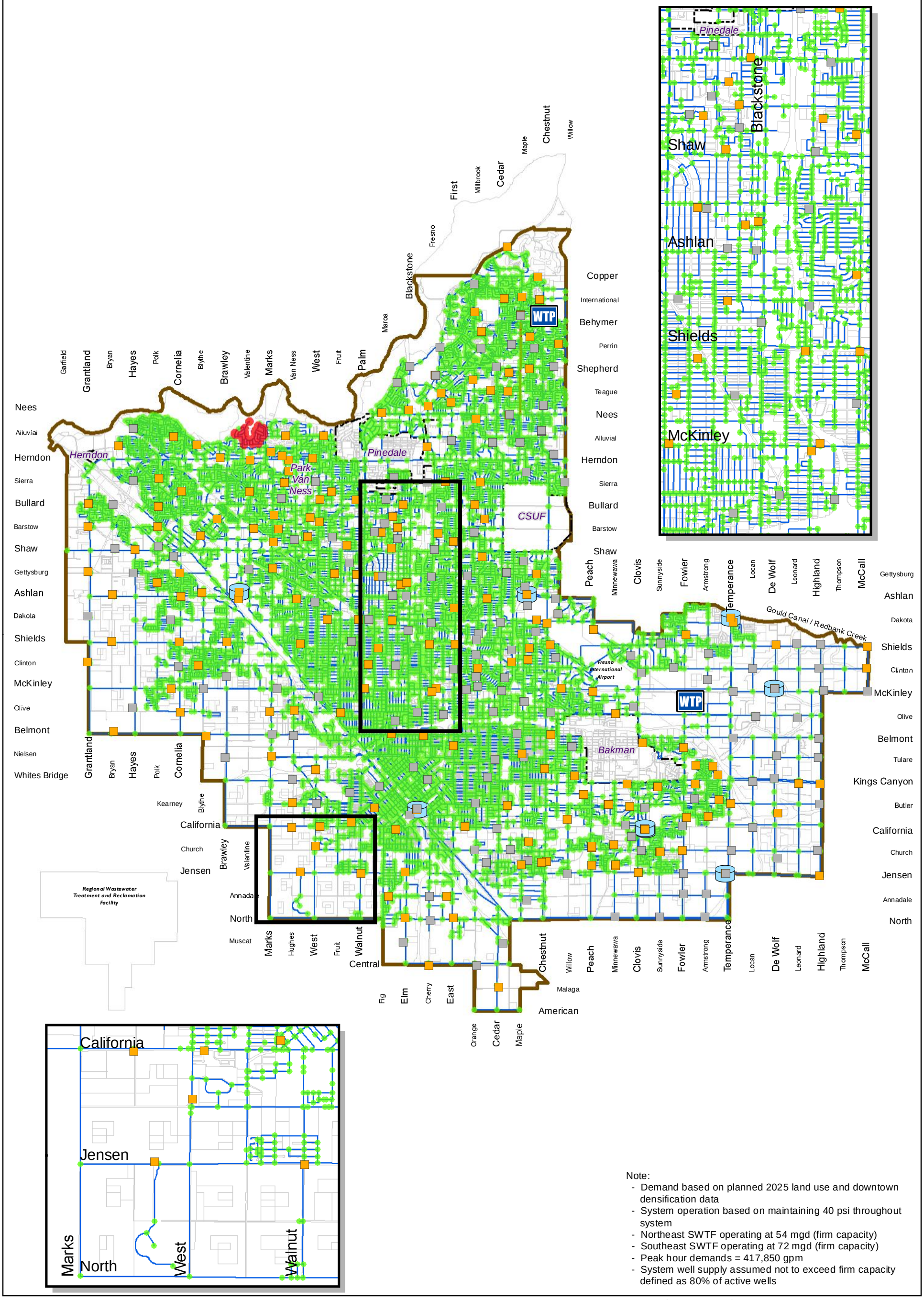
FIGURE 9

City of Fresno
General Plan Land Use Change Evaluation
2035 GENERAL PLAN AVAILABLE FIRE FLOW

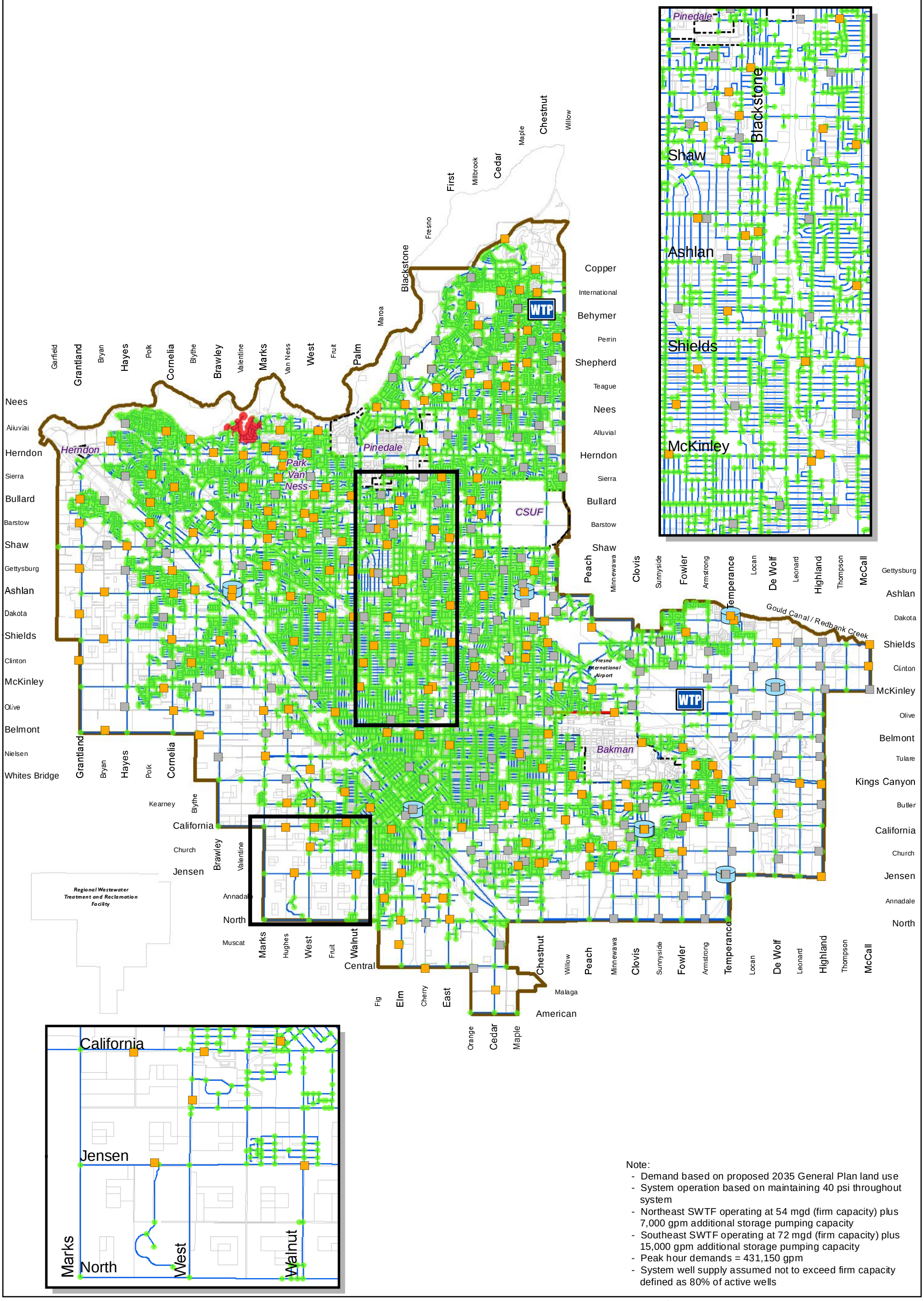
City of FRESNO

WEST YOST ASSOCIATES
Consulting Engineers

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Note:
- Demand based on proposed 2035 General Plan land use
- System operation based on maintaining 40 psi throughout system
- Northeast SWTF operating at 54 mgd (firm capacity) plus 7,000 gpm additional storage pumping capacity
- Southeast SWTF operating at 72 mgd (firm capacity) plus 15,000 gpm additional storage pumping capacity
- Peak hour demands = 431,150 gpm
- System well supply assumed not to exceed firm capacity defined as 80% of active wells

LEGEND

System Pressure
- Less than 40 psi (Below Criteria)
- 40 psi and Greater

Pump Status
- Inactive
- Active

Distribution Pipeline (Less than 18")
- 7 fps or Less
- Greater than 7 fps

Transmission Pipeline (18" and greater)
- 5 fps or Less
- Greater than 5 fps

N

0 1 2
Miles

FIGURE 11

City of Fresno General Plan Land Use Change Evaluation

2035 GENERAL PLAN PEAK HOUR RESULTS

City of FRESNO

WEST YOST ASSOCIATES Consulting Engineers

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Appendix B

WEST YOST ASSOCIATES



TECHNICAL MEMORANDUM

DATE: July 22, 2011 Project No.: 439-02-10-07

TO: Brock Buche, City of Fresno Water Division Project Manager
Martin Querin, City of Fresno Assistant Public Utilities Director—Water Division

FROM: Brenda Estrada, Project Engineer, R.C.E. #67062
Elizabeth Drayer, Project Engineer, R.C.E. #46872

REVIEWED BY: Charles Duncan, Project Manager, R.C.E. #55498

SUBJECT: Hydraulic Evaluation of the Proposed Fulton Corridor Specific Plan Project

INTRODUCTION

The purpose of this memorandum is to present West Yost Associates' (West Yost's) evaluation of the potential hydraulic impacts on the City of Fresno (City) water system of the proposed Fulton Corridor Specific Plan Project (Proposed Project) located in the City's downtown area. As described in this memorandum, West Yost has used the City's water system hydraulic model to evaluate the ability of the City's existing water system to provide minimum required pressures and flows under the future, projected demands associated with the buildout of the Proposed Project. Our findings and recommendations for water system infrastructure improvements to serve the Proposed Project are described below.

PROJECT DESCRIPTION

The Proposed Project is located in the City's Downtown area and encompasses several distinct center city areas (districts) including the Central Business District, the Cultural Arts District, the South Stadium zone, and Chinatown. As shown on Figure 1, the approximate boundaries of the Proposed Project are East Divisadero Street to the north, N and O Streets to the east, Highway 41 to the south, and Highway 99 to the west. In all, the combined Proposed Project area comprises approximately 440 acres and includes a mix of multi-family residential, industrial mixed use, office and retail land uses.

As described below, three different land use development scenarios for the Proposed Project have been evaluated by Sherwood Design Engineers (Sherwood) based on a range of Floor Area Ratio (FAR) assumptions. The total building area for the three development scenarios ranges from 5.2 million square feet for the minimum proposed FAR scenario to 14.1 million square feet for the maximum proposed FAR scenario.

PROJECTED WATER DEMANDS

The analysis of the potable water demand within the Proposed Project was performed by Sherwood[1]. The demand analysis utilized the proposed building areas and FARs as developed by Moule & Polyzoides (M&P) and the Project planning team. The water demands were calculated for each development scenario using water demand rates based on built area per land use types. Unit water use factors were based on the increased densification and proposed land uses for underutilized parcels included in each district within the Proposed Project area and were taken from Sherwood's existing internal data/research and cross-referenced with the City of Oakland's land use demand values[2]. Proposed average daily flow rates per district were calculated as weighted averages based on M&P's distribution of land uses within each district.

Table 1 provides a summary of the unit water use factors used by Sherwood for each district for the evaluation.

Table 1. Summary of Unit Water Use Factors Used for Proposed Project

District	Unit Water Use Factor, gallons per day per 1,000 square feet
Central Business District 1 (CBD1)	204
Central Business District 2 (CBD2)	202
Civic Center	210
Chinatown District	196
Cultural Arts/South Stadium District	192
Chinatown Industrial District	150
Town Center	210
Neighborhood General	200
Neighborhood General Preservation	200
Special District	130

Source: Sherwood Design Engineers Water Demand Calculations received May 23, 2011 (FCSP_Water_Analysis_110513.pdf) (Water_Flow_SP.xlsx).

Three development scenarios were evaluated by Sherwood:

- A minimum buildout scenario (minimum FAR),
- A median buildout scenario (median FAR), and
- A maximum buildout scenario (maximum FAR).

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1 Sherwood Design Engineers Water Demand Calculations received May 23, 2011 (FCSP_Water_Analysis_110513.pdf) (Water_Flow_SP.xlsx).

2 The data available for the City of Oakland was based on estimated wastewater flows for various types of development. To back-calculate water use based on this data, the estimated wastewater flows were multiplied by a factor of 1.20 to account for consumptive water uses which do not result in wastewater flows.

Table 2 provides a summary of the calculated water demands for the three development scenarios evaluated by Sherwood for the Proposed Project. Demands were calculated for underutilized parcels within the Proposed Project area, such that the calculated additional demand represents the projected demand associated with the Proposed Project for various FAR scenarios. Based on the current land use of the underutilized parcels, the existing demand was estimated at 170,822 gallons per day (gpd), or 191 acre-feet per year (af/yr). The estimated water demands on other parcels within the Proposed Project were assumed not to change. A copy of Sherwood's water demand calculation spreadsheet showing the calculated water demand for each underutilized parcel for each development scenario is provided in Attachment 1.

Table 2. Summary of Projected Water Demand for Various Development Scenarios

Development Scenario	Total Projected Building Area on Underutilized Parcels, square feet	Existing Demand on Underutilized Parcels, gpd	Additional Demand on Underutilized Parcels as a result of Proposed Project, gpd	Total Demand on Underutilized Parcels within Proposed Project Area, gpd	Total Existing Demand on All Parcels within Proposed Project Area, gpd	Total Demand within Proposed Project Area, gpd
		[1]	[2]	[3] = [1] + [2]	[4]	[5] = [2] + [4]
Minimum Buildout Scenario (Minimum FAR)	5,240,428	170,822	870,835	1,041,656	683,983	1,554,818
Median Buildout Scenario (Median FAR)	9,572,280	170,822	1,733,744	1,904,565	683,983	2,417,727
Maximum Buildout Scenario (Maximum FAR)[(a)]	14,123,642	170,822	2,637,503	2,808,324	683,983	3,321,486

Source: Sherwood Design Engineers Water Demand Calculations received May 23, 2011 (FCSP_Water_Analysis_110513.pdf) (Water_Flow_SP.xlsx).

[(a)] The Maximum Buildout Scenario (Maximum FAR) is the basis for West Yost's analysis.

For purposes of West Yost's hydraulic evaluation of the Proposed Project, West Yost has evaluated the water demands associated with only the maximum buildout (maximum FAR) development scenario which equate to an additional average day demand of approximately 2.6 million gallons per day, which equals an additional annual demand of 2,955 af/yr.

Figure 2 shows the projected demands by parcel within the Proposed Project area for the maximum buildout development scenario.

WATER SUPPLY

As described in the City's Metro Plan Update, the City's Water Master Plan, and West Yost's March 2009 Technical Memorandum "Hydraulic Evaluation of the Downtown Central Area," the City's available water supplies are limited to a finite quantity and are extremely limited. As shown in Table 2, the estimated annual demand for the maximum buildout scenario for the Proposed Project will further increase required water supplies by an additional 2,955 af/yr. Water supplies to meet this estimated additional demand must come from within the City's existing, limited water supply portfolio and may need to be "imported" from other parts of the City and/or require reduced water use (additional water conservation) in other parts of the City.

Water supplies for the Proposed Project will probably need to be evaluated as part of an SB 610 Water Supply Assessment to evaluate the availability and reliability of the City's water supplies to meet the projected increased water demands of the Proposed Project under various hydrologic conditions and whether these demands were anticipated as part of the City's most recent Urban Water Management Plan.

EVALUATION CRITERIA

Planning and Modeling Criteria

The planning and modeling criteria used for this evaluation are based on West Yost's recent work with the City. The August 2008 verified hydraulic model of the City's water distribution system was used as the basis for the evaluation. The criteria used to evaluate the potential impacts to the City's existing water system are as follows:

- Minimum peak hour demand pressure 40 pounds per square inch (psi);
- Maximum allowable velocity is 7 feet per second (fps) during a peak hour condition;
- Maximum day plus fire flow residual pressure at the flowing hydrant must be equal to or greater than 20 psi;
- Maximum allowable velocity is 10 fps during the simulated fire flow condition[3];
- Maximum allowable head loss rate is 10 feet per 1,000 feet during any condition[4];
- Any new, required pipelines will be modeled with a roughness coefficient (C-factor) of 130;

[3] This criteria was developed primarily for new development; ability to meet this criteria within existing distribution systems (such as that in the City's downtown area) can be difficult due to existing small diameter pipelines and aging pipelines.

[4] This criteria was developed primarily for new development; ability to meet this criteria within existing distribution systems (such as that in the City's downtown area) can be difficult due to existing small diameter pipelines and aging pipelines.

- Assumed peaking factors for maximum day and peak hour demand conditions are consistent with the City's adopted peaking factors and are as follows:
  - Maximum Day Demand = 2.0 times Average Day Demand
  - Peak Hour Demand = 2.9 times Average Day Demand

Fire Flow Requirements

Fire flow requirements based on proposed land use for each parcel were determined by Sherwood and were based on the California Building Code (CBC) and the 2007 California Fire Code (CFC) (Table B105.1). Sherwood assumed maximum potential building footprints for each parcel and assumed CBC construction type (IA, IIIB, etc.) for each land use zone based on the building type with the maximum FAR. Based on this methodology, fire flow requirements of up to 6,250 gallons per minute (gpm) for a four-hour duration were identified for some of the parcels. The projected fire flow requirements by parcel are shown on Figure 3. A copy of Sherwood's fire flow calculation spreadsheet showing the calculated fire flow requirement by parcel is provided in Attachment 2.

Some of the larger buildings included in the Proposed Project will be fully sprinklered which results in a reduction of the required fire flow. Therefore, based on direction received from Byron Beagles (City of Fresno Fire Prevention Engineer), a fire flow requirement of 3,500 gpm for a four-hour duration with a minimum 20 psi residual pressure will be assumed for the Proposed Project[5].

It should be noted that evaluated fire flows and residual pressures are based on ground surface elevations, and do not account for required minimum water service pressures on higher floors in multi-story buildings. As such, utility system designs for some buildings within the Proposed Project may require the provision of booster pumps to provide adequate water service pressures on higher floors and for fire suppression systems.

Although these criteria have been established, and used to size new pipelines, the existing system in the City's downtown area should be evaluated using pressure as the primary criterion. Secondary criteria, such as velocity, head loss, age, and material type, are used as indicators for areas of the water system that also may need improvements, but may not be required as part of this evaluation.

[5] February 6, 2011 e-mail from Byron Beagles to Brock Buche, re: Fire Flow Requirements.

WATER SYSTEM FACILITY ASSUMPTIONS

Recommendations from Previous Evaluations

In March 2009, West Yost completed a hydraulic evaluation of the Downtown Central Area to evaluate available supplies in the City's downtown area and address the loss of supply in the downtown area due to aging wells and water quality issues[6]. The following recommendations for water system improvements were made:

- Additional storage to increase system reliability during peak hour and fire flow conditions;
- Replacement or rehabilitation of Wells 1A and 21A;
- Upgrade of Well 172 pumping capacity along with associated distribution system improvements from Well 172 to the City's downtown area; and
- Addition of 24-inch and 16-inch diameter pipelines through the Central Area to support integrating surface water supply from the east and continuing the City's goal of developing opportunities to transition their predominate groundwater supply to a more balanced conjunctive use system.

In May 2011, West Yost conducted a re-evaluation of the Downtown Central Area to determine what potential alternatives existed other than the March 2009 recommendation for increasing the pumping capacity of Well 172[7]. The recommendations of the May 2011 evaluation were to make distribution pipeline improvements to improve flow from Well 172 (as recommended in the March 2009 evaluation), but instead of upgrading the pumping capacity of Well 172, distribution system improvements should be made to convey supplies from Well 313 to the Downtown Central Area.

For purposes of this evaluation, it has been assumed that the pipeline and storage infrastructure recommendations from these prior hydraulic evaluations of the Downtown Central Area without the pumping capacity increase of Well 172 will be implemented by the City and will be available to serve the Proposed Project.

Specific Facility Assumptions

The following specific assumptions have been made related to available water system facilities and other water demands within the City's service area:

- Wells 1A and 21A in the City's downtown area (located just northeast of the Proposed Project) area are assumed to be inactive;

[6] "Hydraulic Evaluation of the Downtown Central Area", Technical Memorandum, prepared by West Yost Associates, March 12, 2009.

[7] "Hydraulic Re-Evaluation of the Downtown Central Area Water Distribution System", Technical Memorandum, prepared by West Yost Associates, May 10, 2011.

- New Well 1B (located just outside the City's downtown area) is assumed to be operational and active (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area as a replacement for Wells 1A and 21A);
- The new 3.0 million gallon (MG) Downtown tank and associated pipelines (along Nielsen Avenue and G Street) (currently under design) are assumed to be operational (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area);
- The distribution system improvements from Well 172 to the Central Area are assumed to be operational. The associated distribution system improvements include a new 16-inch diameter pipeline south along Hughes Avenue and a new 24-inch diameter pipeline along Nielsen Avenue to convey supplies from Well 172 to the Central Area (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area);
- A 12-inch diameter connection at West Avenue to the 24-inch diameter pipeline in Nielsen Avenue to convey supplies from Well 313 to the Central Area is assumed to be operational (recommended as part of West Yost's May 2011 Hydraulic Re-Evaluation of the Downtown Central Area Water Distribution System);
- New 24-inch and 16-inch diameter pipelines through the Central Area along G Street, Ventura Street, O Street and Stanislaus Street are assumed to be operational to support integrating surface water supply from the east and continuing the City's goal of developing opportunities to transition their predominate groundwater supply to a more balanced conjunctive use system (recommended as part of West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area);
- The new Chestnut Avenue transmission pipeline from the City's Northeast Surface Water Treatment Facility (SWTF) is assumed to be operational;
- The regional Transmission Grid Mains (TGMs) are included and assumed to be operational;
- Future water demands in the southwest part of the City service area are included (per June 8, 2011 e-mail from Brock Buche, the City's Development Department has indicated that development in the southwest part of the City will occur concurrently with the Proposed Project);
- The proposed new Southeast SWTF is <u>not</u> included; and
- Future water demands associated with the Southeast Growth Area (SEGA) are <u>not</u> included.

The City's assumed water system facilities available to serve the Proposed Project in the downtown area are shown on Figure 4.

EVALUATION SCENARIOS

As described above, only the maximum buildout (maximum FAR) development scenario of the Proposed Project has been analyzed by West Yost for this evaluation; no other development scenarios or phasing plans were evaluated.

To evaluate the adequacy of the City's water system to serve the Proposed Project, West Yost has evaluated buildout of the Proposed Project under the following two demand conditions:

- A future maximum day demand condition concurrent with a 3,500 gpm fire flow demand while maintaining a minimum residual system pressure of 20 psi; and
- A peak hour demand condition while maintaining a minimum system pressure of 40 psi.

EVALUATION FINDINGS

Storage Capacity Evaluation

Treated water storage capacity requirements for the City were evaluated based on the following three components: operational storage, emergency storage and fire storage. The principal advantage that storage provides is to equalize demands on supply sources and production facilities. The City's Metro Plan Update and Water Master Plan both indicate a need for water storage in the City's downtown area.

West Yost's March 2009 evaluation of the City's Central Area recommended that approximately 3 million gallons (MG) of storage be constructed in the City's Central Area to increase system reliability during peak hour and fire flow conditions. As described above, a new 3 MG Downtown Tank is currently under design and is assumed to be operational for the purposes of this evaluation. However, the required storage capacity previously calculated for the City's Central Area did not take into account the increased densification associated with the Proposed Project. This increased densification will increase the need for storage in the City's Downtown area. Table 3 shows the increased storage requirement attributed to the increased demands associated with the Proposed Project.

Table 3. Additional Storage Required Due to Densification Associated with Proposed Project

Storage Component	Required Storage based on Current Buildout of Fulton Corridor Area without Proposed Project, MG	Required Storage based on Current Buildout of Fulton Corridor Area with Proposed Project, MG	Increased Storage Requirement Attributed to Proposed Project, MG
Operational: Equal to 25% of the Maximum Day Demand	1.17	1.65	0.48
Emergency: Equal to Average Day Demand	2.33	3.30	0.96
Fire Flow: Equal to the highest fire flow demand for an area multiplied by the required duration.	0.84	0.84	0.00
Total	4.34[(a)]	5.78	1.45

[(a)] The storage requirement shown for buildout of the Fulton Corridor Area without the Proposed Project (4.34 MG) is part of required storage previously calculated for the Downtown Central Area. As described in West Yost's March 2009 Hydraulic Evaluation of the Downtown Central Area, required storage within the Downtown Central Area was previously calculated to 8.3 MG, which will be met by a combination of groundwater credits (5.2 MG) and a new Downtown storage tank (3.0 MG). These previous storage calculations for the Downtown Central Area did not include the Proposed Project described in this technical memorandum.

As shown in Table 3, the additional storage requirement resulting from the increased densification associated with the Proposed Project is 1.45 MG.

As described in West Yost's March 2009 evaluation of the City's Central Area, water storage within the City is considered on a regional basis with the water storage requirements for the downtown area being a portion of the overall system requirements. The City's Water Master Plan is evaluating the overall system and will make recommendations for overall system improvements, including recommendations for storage improvements. The 3.0 MG Downtown tank (currently being designed) does not provide adequate capacity for the additional storage required for the Proposed Project, therefore additional operational and emergency storage will need to be provided within the City's overall system to meet the storage needs for the Proposed Project.

Pumping Capacity Evaluation

Along with the increased storage due to the demand densification, the City will require additional pumping capacity for the Proposed Project to meet operational demands. The operational pumping requirements are used to help meet the City's performance criteria during peak demand conditions. The pumping capacity for fire flow has been accounted for on a regional basis and will not increase as a result of the densification. Emergency pumping capacity is based on an average day demand and is generally met by wells and pump stations equipped with auxiliary power. The recommended pumping required to serve the operational needs of the Proposed Project is approximately 1.44 mgd (1,000 gpm). This increased pumping capacity will need to be added within the City's overall system to meet peak demand operations.

Distribution System Evaluation

The City's existing water system hydraulic model was modified by West Yost to be representative of the projected water demands associated with the maximum buildout (maximum FAR) development scenario of the Proposed Project. The estimated future demands were distributed throughout the Proposed Project area, as appropriate, according to the proposed development plans.

The future buildout system with the Proposed Project, and the previously recommended Downtown Central Area water system infrastructure improvements described above, was evaluated under maximum day demand plus fire flow conditions and peak hour demand conditions. The evaluation results are described below.

The results of the maximum day demand plus fire flow condition for the future buildout system with the Proposed Project are shown on Figure 5. Figure 5 shows the available flow at each node in the hydraulic model assuming that a minimum system pressure of 20 psi is maintained. Nodes that are shown in "green" have available flows of 3,500 gpm or more, indicating that they meet the fire flow requirement for the Proposed Project. Nodes shown in "red" have available flows that are less than 3,500 gpm, indicating that they do not meet the fire flow requirement for the Proposed Project. As shown, in the northern part of the Proposed Project area, there are several locations where available flows are below the required minimum of 3,500 gpm (see "red" nodes on Figure 5); the lowest available flow in this area is 1,617 gpm. Similarly, there are several locations in the southern part of the Proposed Project area where available flows are below the required minimum of 3,500 gpm (see "red" nodes on Figure 5); the lowest available flow in this area is 1,497 gpm. It should also be noted that the City's pipeline velocity criteria of a maximum of 10 fps during a simulated fire flow condition is not being met in many locations within the Proposed Project area; however, this is expected due to the age and small diameter size of the existing pipelines in the downtown area. Therefore, infrastructure improvements will be required to meet the City's fire flow pressure and flow criteria (these recommendations are described below).

The results of the peak hour demand condition for the future buildout with the Proposed Project are shown on Figure 6. Figure 6 shows the system pressure at each node in the hydraulic model based on peak hour demand conditions. As shown, system pressures throughout most of the Proposed Project area are between 40 and 50 psi under buildout peak hour demand conditions (indicated by the "green" nodes), and some are between 50 to 60 psi (indicated by the "blue" nodes). Therefore, the City's minimum peak hour pressure criteria of 40 psi is being met throughout the Proposed Project area and no specific improvements are required for the peak hour demand condition.

EVALUATION RECOMMENDATIONS

Figure 7 shows the following recommended infrastructure improvements to resolve the fire flow deficiencies described above as a result of the increased water demands associated with the Proposed Project. The recommended improvements include the replacement of existing smaller diameter pipelines with 8-inch diameter pipelines (approximately 1,400 linear feet in total) and the installation of new 8-inch diameter pipelines where pipelines did not previously exist

(approximately 7,660 linear feet in total). A table listing the proposed pipeline improvements by street is provided as Attachment 3.

Also, as described below, West Yost recommends that an additional 1.5 MG of storage be located within the City's overall water system to meet the operational and emergency storage needs of the Proposed Project.

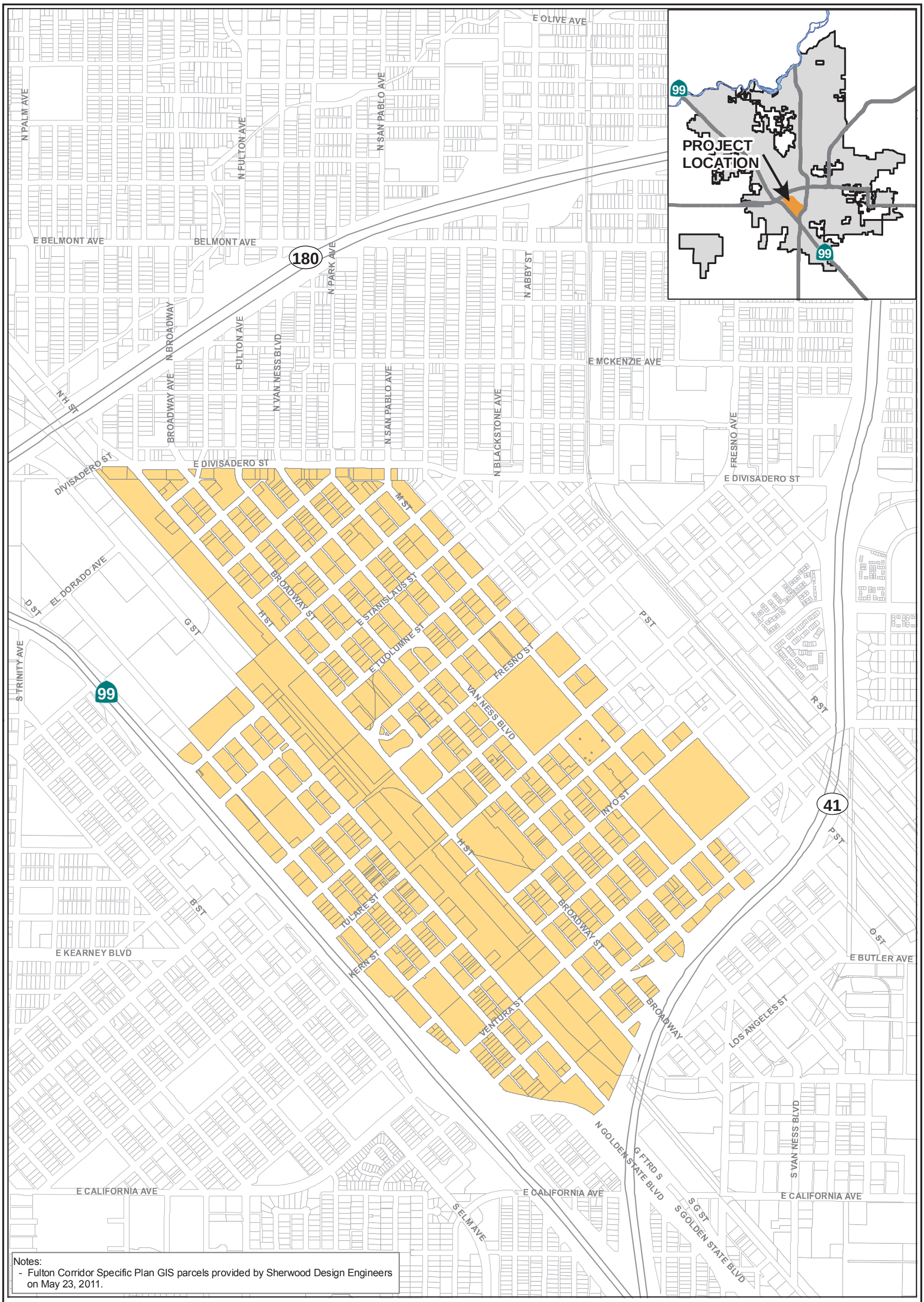
Figure 8 shows the maximum day demand plus fire flow scenario with the Proposed Project with the recommended pipeline improvements as listed above. As shown, with the recommended improvements, the fire flow requirement of 3,500 gpm is met throughout the entire Proposed Project area, with the exception of the following two locations:

- G Street (just north of Stanislaus Street): The available fire flow at this location is 1,972 gpm. This node is located at the end of an approximately 440 foot long, 8-inch diameter pipeline (which appears to be a hydrant lateral). Flows from this location could be combined with flows from other nearby hydrants to provide the fire flow requirement of 3,500 gpm for the Proposed Project.
- Mono Street (just east of E Street): The available fire flow at this location is 2,140 gpm. This location has smaller parcels and no proposed multi-story buildings, therefore, this available fire flow appears to be adequate for this area. Also, flows from this location could be combined with flows from other nearby hydrants to provide the fire flow requirement of 3,500 gpm for the Proposed Project.

It should be noted that the City's pipeline velocity criteria of a maximum of 10 fps during a simulated fire flow condition is still not being met in many locations within the Proposed Project area, even with the recommended improvements described above and shown on Figure 7; however, this is expected due to the age and small diameter size of the existing pipelines in the downtown area. Because fire flow pressure and flow requirements are being met, this velocity criteria, by itself, is not considered as being critical enough to require replacement of additional existing pipelines with larger diameter pipelines in the downtown area.

Figure 9 shows the peak hour demand scenario with the Proposed Project with the recommended improvements. As noted above, no specific improvements were required for the peak hour demand condition for the Proposed Project. Similar to the peak hour results shown in Figure 6, the minimum peak hour system pressure of 40 psi is met throughout the entire Proposed Project area.

An estimation of probable construction costs for these recommended water system infrastructure improvements to serve the Proposed Project was not included in West Yost's Scope of Work for this evaluation. However, these cost estimates can be provided if requested and if a budget augmentation is approved by the City.



Notes:
- Fulton Corridor Specific Plan GIS parcels provided by Sherwood Design Engineers on May 23, 2011.

LEGEND

Fulton Corridor Specific Plan

N

0 500 1,000

Scale in Feet

FIGURE 1

City of Fresno

Fulton Corridor Hydraulic Analysis

PROJECT LOCATION

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 1 Location.mxd 6/28/2011



Notes:
- Demand projections based on Sherwood Design Engineers provided data (5/13/2011).
- Shown demands are based on the maximum proposed FAR.
- Proposed densification demands are only calculated for underutilized parcels. All other parcels are assumed not to change.

LEGEND

Fulton Corridor Projected Demands

- 0 - 5,000 gpd
- 5,001 - 10,000 gpd
- 10,001 - 20,000 gpd
- 20,001 - 30,000 gpd
- 30,001 - 286,209 gpd

N

0 500 1,000

Scale in Feet

FIGURE 2

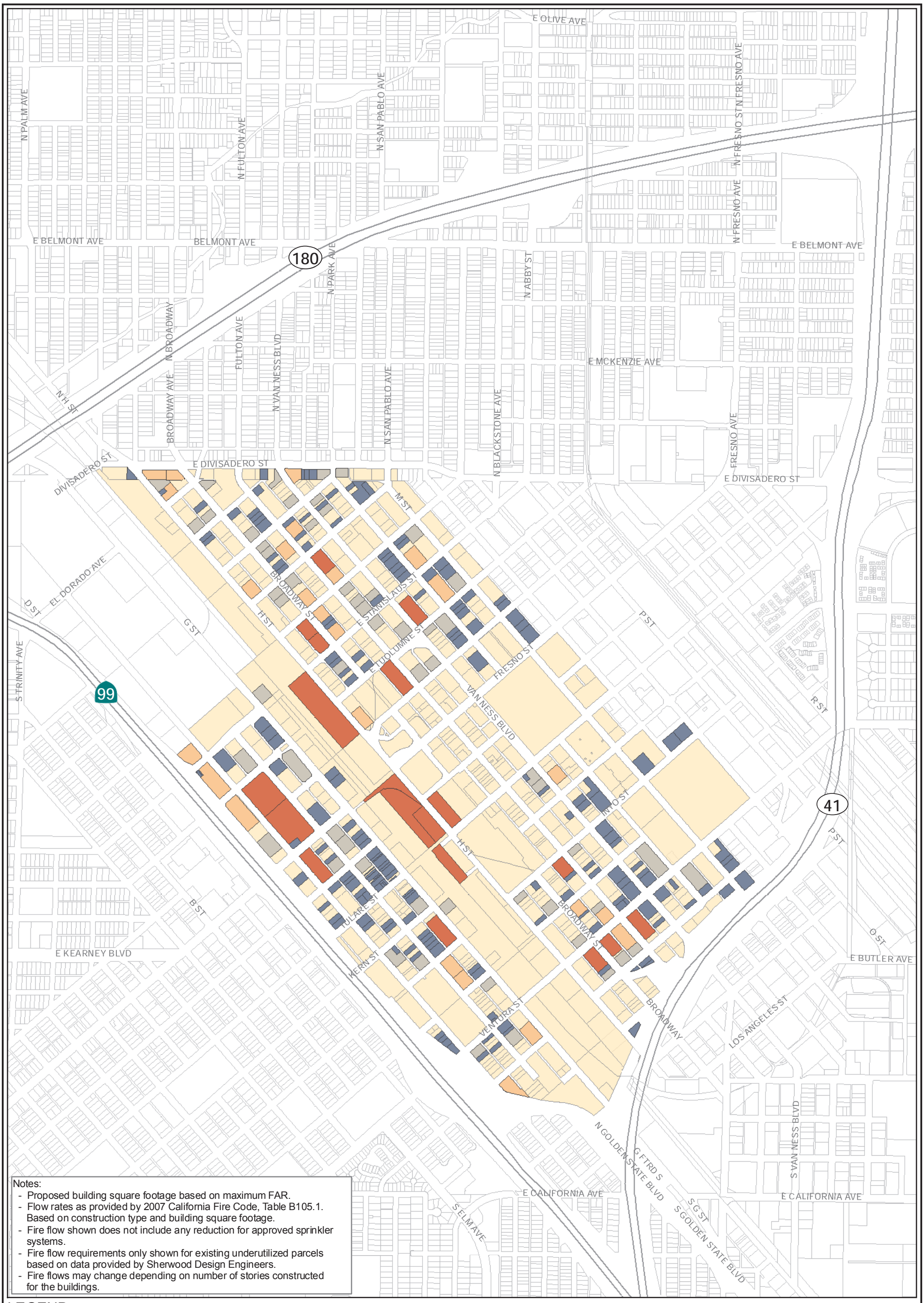
City of Fresno

Fulton Corridor Hydraulic Analysis

PROJECTED DEMAND DENSIFICATION

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 2 Ex System.mxd 6/28/2011



Notes:
- Proposed building square footage based on maximum FAR.
- Flow rates as provided by 2007 California Fire Code, Table B105.1. Based on construction type and building square footage.
- Fire flow shown does not include any reduction for approved sprinkler systems.
- Fire flow requirements only shown for existing underutilized parcels based on data provided by Sherwood Design Engineers.
- Fire flows may change depending on number of stories constructed for the buildings.

LEGEND

Underutilized Parcel Fire Flow

- 1,500 - 3,000 gpm
- 3,001 - 4,000 gpm
- 4,001 - 5,000 gpm
- 5,001 - 6,500 gpm
- Fire Flow not updated

N

0 500 1,000

Scale in Feet

FIGURE 3

City of Fresno

Fulton Corridor Hydraulic Analysis

PROJECTED FIRE FLOW REQUIREMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 3 Projected Fire Flow.mxd 6/28/2011

WELL 010A
WELL 018A
WELL 066
WELL 002B
WELL 050A
WELL 021A
WELL 001A
WELL 022A
WELL 009A
WELL 003A
WELL 16A
3 MG Downtown Storage Tank and Booster Pump Station
E BELMONT AVE
BELMONT AVE
N PALM AVE
N FULTON AVE
N SAN PABLO AVE
N FRESNO ST
N PARK AVE
N ABBY ST
E MCKENZIE AVE
N BROADWAY
FULTON AVE
N VAN NESS BLVD
N H ST
E DIVISADERO ST
M ST
BROADWAY ST
EL DORADO AVE
D ST
G ST
E LUDLOW ST
FRESNO ST
P ST
R ST
VAN NESS BLVD
H ST
TULARE ST
KERN ST
VENTURA ST
O ST
E BUTLER AVE
LOS ANGELES ST
E KEARNEY BLVD
E CALIFORNIA AVE
N GOLDEN STATE BLVD
S GOLDEN STATE BLVD
S VAN NESS BLVD
S TRINITY AVE
S ELM AVE
180
99
41

Notes:
- Downtown tank and transmission pipeline along G Street currently under design.
- Planned transmission pipeline recommendations based on the City of Fresno Metropolitan Plan to supply surface water throughout the City.

LEGEND

- Existing Pipelines
- **Planned Transmission Pipelines**
  - 12 inch diameter
  - 16 inch diameter
  - 24 inch diameter
  - 30 inch diameter
- Well/Pump Station
- Inactive Well
- Storage Tank
- Fulton Corridor SP

N

0 500 1,000

Scale in Feet

FIGURE 4

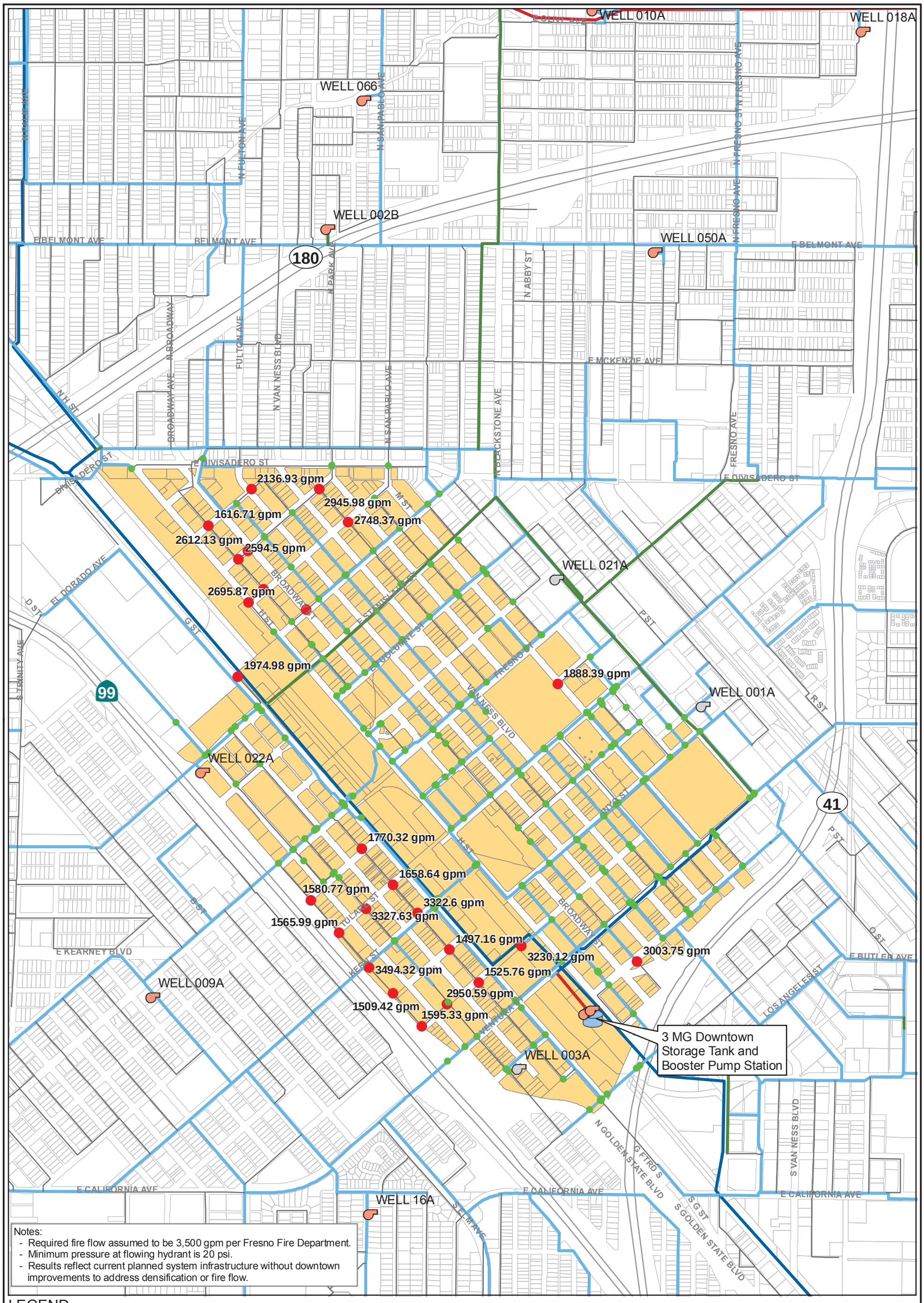
City of Fresno

Fulton Corridor Hydraulic Analysis

PLANNED BUILDOUT FACILITIES

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan Water Infrastructure Evaluation\GIS\Figures\Figure 4 Bo System.mxd 7/1/2011



Notes:
- Required fire flow assumed to be 3,500 gpm per Fresno Fire Department.
- Minimum pressure at flowing hydrant is 20 psi.
- Results reflect current planned system infrastructure without downtown improvements to address densification or fire flow.

LEGEND

Available Flow @ 20 psi
- Less than 3,500 gpm
- Greater than 3,500 gpm
- Well/Pump Station
- Inactive Well
- Storage Tank

Pipe Diameters
- 6 to 8 inch
- 10 to 12 inch
- 14 to 16 inch
- 24 inch
- 30 inch

N

0 500 1,000

Scale in Feet

FIGURE 5

City of Fresno

Fulton Corridor Hydraulic Analysis

PROPOSED Ddensification FIRE FLOW

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 5 Sw System FF.mxd 7/1/2011

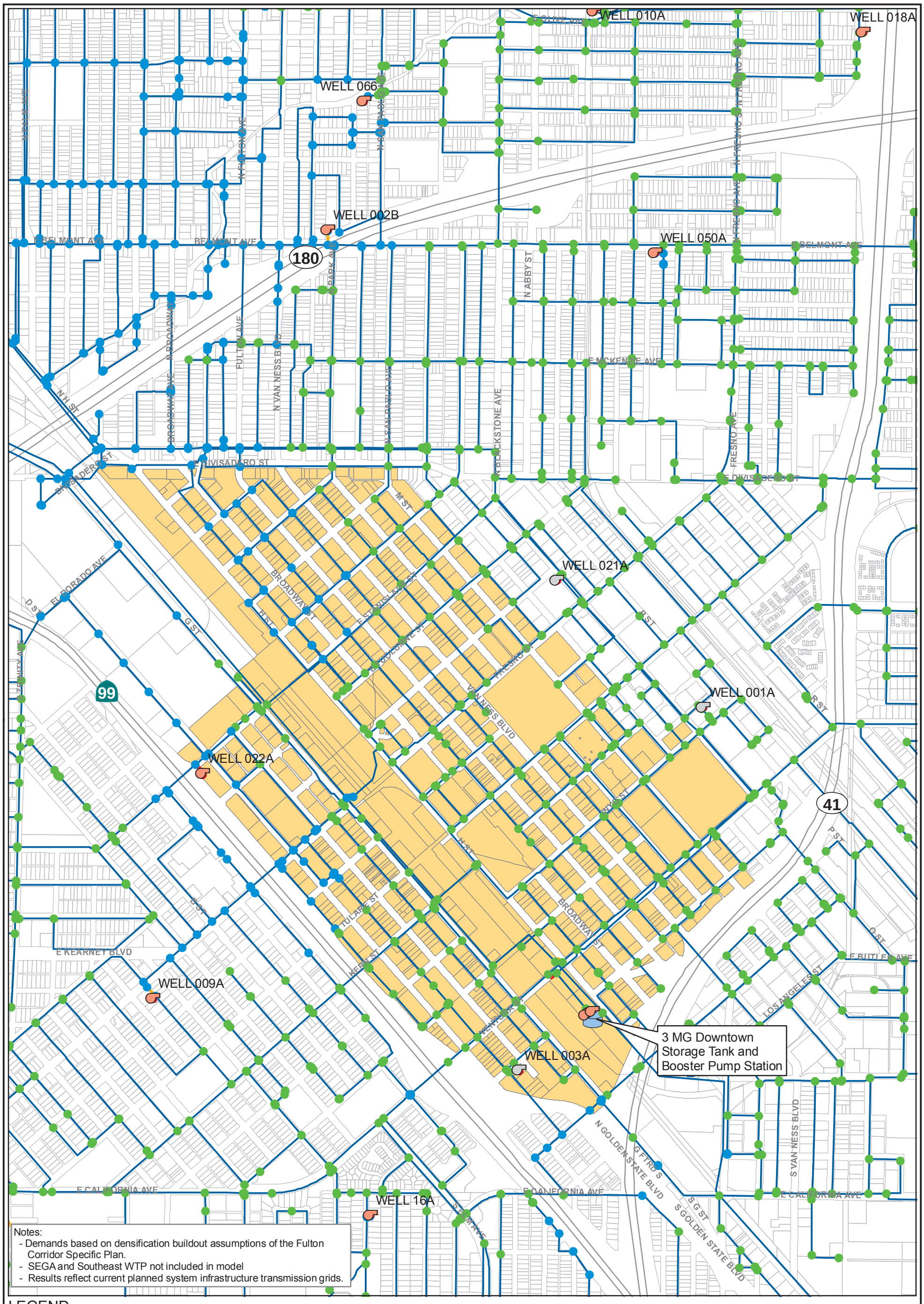


FIGURE 6

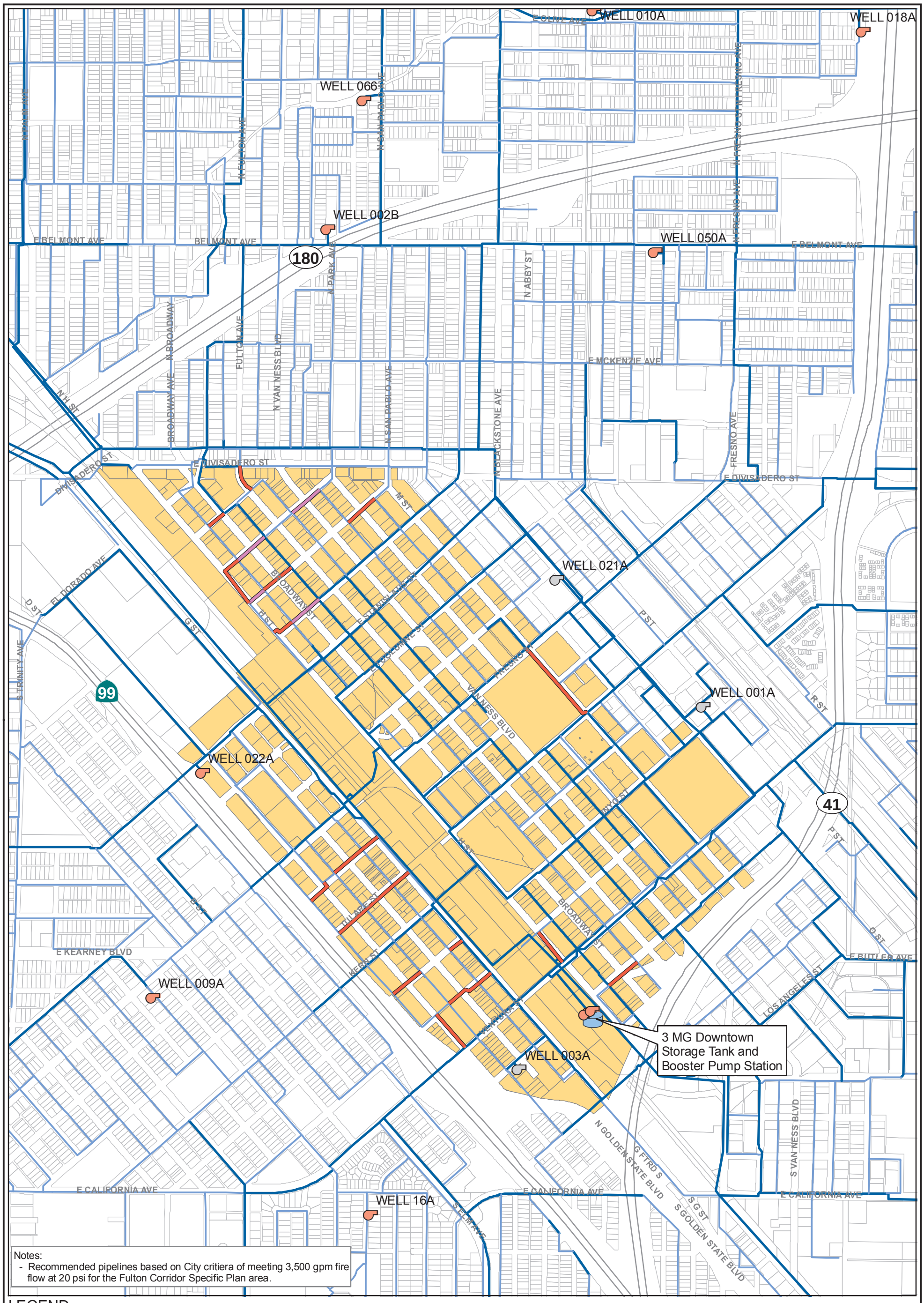
City of Fresno

Fulton Corridor Hydraulic Analysis

PROPOSED Ddensification PEAK HOUR

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 6 Sw System Peak hour.mxd 7/1/2011



Notes:
- Recommended pipelines based on City critiera of meeting 3,500 gpm fire flow at 20 psi for the Fulton Corridor Specific Plan area.

LEGEND

Recommended Improvements
- New Pipeline (8 inch)
- Replacement Pipeline (8 inch)
- Well/Pump Station
- Inactive Well
- Storage Tank

Existing/Planned Pipeline
- Distribution (less than 12 inch)
- Transmission (12 inch and greater)

N

0 500 1,000

Scale in Feet

FIGURE 7

City of Fresno

Fulton Corridor Hydraulic Analysis

RECOMMENDED PIPELINE IMPROVEMENTS

WEST YOST ASSOCIATES Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan \Water Infrastructure Evaluation\GIS\Figures\Figure 7 Sw System Improvements.mxd 6/30/2011

WELL 010A
WELL 018A
WELL 066
WELL 002B
WELL 050A
WELL 021A
WELL 001A
WELL 022A
WELL 009A
WELL 003A
WELL 16A
1,972 gpm
2,140 gpm
3 MG Downtown Storage Tank and Booster Pump Station
E BELMONT AVE
N FULTON AVE
N SAN PABLO AVE
N FRESNO ST
N ABBY ST
N PARK AVE
N BROADWAY
FULTON AVE
N VAN NESS BLVD
E MCKENZIE AVE
N BLACKSTONE AVE
FRESNO AVE
E DIVISADERO ST
M ST
BROADWAY ST
EL DORADO AVE
D ST
G ST
H ST
I ST
P ST
R ST
O ST
S TRINITY AVE
FRESNO
VAN NESS BLVD
E KEARNEY BLVD
E BUTLER AVE
LOS ANGELES ST
N GOLDEN STATE BLVD
S GOLDEN STATE BLVD
S VAN NESS BLVD
E CALIFORNIA AVE
SELMA AVE
180
99
41

Notes:
- Required fire flow assumed to be 3,500 gpm per Fresno Fire Department.
- Minimum pressure at flowing hydarnt is 20 psi.
- Results reflect current planned system infrastructure plus the recommended improvements to address densification fire flow.

LEGEND

Available Flow @ 20 psi
- Less than 3,500 gpm
- Greater than 3,500 gpm
- Well/Pump Station
- Inactive Well
- Storage Tank

Pipe Diameters
- 6 to 8 inch
- 10 to 12 inch
- 14 to 16 inch
- 24 inch
- 30 inch

N

0 500 1,000
Scale in Feet

FIGURE 8

City of Fresno
Fulton Corridor Hydraulic Analysis
DENSIFICATION FIRE FLOW IMPROVEMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan Water Infrastructure Evaluation\GIS\Figures\Figure 8 Sw System FF Improvements.mxd 6/30/2011

WELL 010A
WELL 018A
WELL 066
WELL 002B
WELL 050A
WELL 021A
WELL 001A
WELL 022A
WELL 009A
WELL 003A
WELL 16A
3 MG Downtown Storage Tank and Booster Pump Station
E OLIVE AVE
N FULTON AVE
N SAN PABLO AVE
N FRESNO ST
E BELMONT AVE
BELMONT AVE
N PARK AVE
N ABBY ST
N BROADWAY
FULTON AVE
N VAN NESS BLVD
E MCKENZIE AVE
N H ST
FRESNO ST
E DIVISADERO ST
M ST
N BLACKSTONE AVE
BROADWAY ST
E STANISLAUS ST
H ST
TUOLUMNE ST
FRESNO
VAN NESS BLVD
P ST
R ST
D ST
EL DORADO AVE
G ST
TRINITY AVE
99
180
41
E KEARNEY BLVD
TULARE ST
WEST ST
MERCED ST
E BUTLER AVE
LOS ANGELES ST
N GOLDEN STATE BLVD
G FTRD S
S VAN NESS BLVD
E CALIFORNIA AVE
S G ST
S GOLDEN STATE BLVD
S E M AVE

Notes:
- Demands based on densification buildout assumptions of the Fulton Corridor Specific Plan.
- SEGA and Southeast WTP not included in model.
- Results reflect current planned system infrastructure transmission grids plus recommended improvements in the Fulton Corridor Specific Plan.

LEGEND

System Pressure
- Less than 35 psi
- 35 to 40 psi
- 40 to 50 psi
- 50 to 60 psi
- 60 psi and Greater

Pipeline Velocity
- Less than 6 fps
- 6 to 7 fps
- 7 fps and Greater
- Well/Pump Station
- Inactive Well

Storage Tank

N

0 500 1,000

Scale in Feet

FIGURE 9

City of Fresno

Fulton Corridor Hydraulic Analysis

DENSIFICATION PEAK HOUR IMPROVEMENTS

WEST YOST ASSOCIATES
Consulting Engineers

O:\Clients\439_Fresno\02-10-07 Fulton Corridor Specific Plan Water Infrastructure Evaluation\GIS\Figures\Figure 9 Sw System Peak hour Improvements.mxd 6/30/2011

Appendix D

City of Fresno 2020 Urban Water Management Plan

City of FRESNO
Department of Public Utilities

2020 Urban Water Management Plan

Final

JULY 2021

CITY OF FRESNO



Photo Credit: Downtown Fresno Partnership

City of FRESNO
Department of Public Utilities

CITY OF FRESNO

Final 2020 Urban Water Management Plan

JULY 2021



Prepared by Water Systems Consulting, Inc.

WSC

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ACRONYMS & ABBREVIATIONS

°F	degrees Fahrenheit
1,2,3-TCP	1,2,3-trichloropropane
AF	acre-feet
AFY	acre-feet per year
AMI	advanced metering infrastructure
AWE	Alliance for Water Efficiency
AWWA	American Water Works Association
BP04	Booster Pump 4
CII	Commercial, Institutional, and Industrial
CIMIS	California Irrigation Management Information System
City	City of Fresno
COG	Council of Governments
CPC	California Plumbing Code
CSUF	California State University Fresno
CVP	Central Valley Project
CVPIA	Central Valley Project Improvement Act
CVWAC	Central Valley Water Awareness Committee
CWC	California Water Code
CY	Calendar Year
DBCP	1,2-dibromo-3-chloropropane
DMM	Demand Management Measures
DDW	Department of Drinking Water
DPU	Department of Public Utilities
DRA	Drought Risk Assessment
DWR	Department of Water Resources
EDB	ethylene dibromide or 1,2-dibromoethane
ETo	Evapotranspiration
FID	Fresno Irrigation District
FMFCD	Fresno Metropolitan Flood Control District
GIS	Geographic Information System
GPCD	gallons per capita per day
GSA	Groundwater Sustainability Agency

GSP	Groundwater Sustainability Plan
HCF	hundred cubic feet
IGSM	Integrated Groundwater and Surface Water Model
Metro Plan	Fresno Metropolitan Water Resource Management Plan
mgd	million gallons per day
NESWTF	Northeast Surface Water Treatment Facility
NFWRF	North Fresno Wastewater Reclamation Facility
NKGSP	North Kings Groundwater Sustainability Plan
NRDC	Natural Resources Defense Council
PCE	perchloroethylene or tetrachloroethylene
PEIR	Programmatic Environmental Impact Report
PFAS	per- and polyfluoroalkyl substances
PFOA	perfluorooctanoic acid
PFOS	perfluorooctanesulfonic acid
RHNA	Regional Housing Needs Allocation
RWMP	Recycled Water Master Plan
RWRF	Regional Wastewater Reclamation Facility
SB	Senate Bill
SBx7-7	Senate Bill x 7-7
SESWTF	Southeast Surface Water Treatment Facility
SGMA	Sustainable Groundwater Management Act
SOI	Sphere of Influence
sq mi	square miles
SWTF	Surface Water Treatment Facility
T-3 SWTF	T-3 Water Storage and Modular Surface Water Treatment Facility
TCE	trichloroethylene
TDS	total dissolved solids
TTDF	Tertiary Treatment and Disinfection Facility
USBR	United States Bureau of Reclamation
UV	ultraviolet
UWMP	Urban Water Management Plan
UWMP Act	Urban Water Management Planning Act
WSCP	Water Shortage Contingency Plan
WSIP	Water Storage Investment Program
WY	Water Year

CITY OF FRESNO

Executive Summary

This section summarizes the 2020 Urban Water Management Plan (UWMP) for the City of Fresno (City). It provides a lay description of the 2020 UWMP in a manner that is accessible to non-technical readers. This summary describes the fundamental purposes of the UWMP, including water service reliability, future challenges, and strategies for managing water reliability risks.

UWMPs are updated every five years and outline each suppliers' long-term water resource planning to ensure there is enough water to meet both existing and future demands. They set the roadmap for how the City will use water over the coming years.

The original Fresno water system began operations in 1876 as a non-profit organization established by a group of public-minded citizens. Today, the City covers approximately 115 square miles (sq mi) (73,500 acres) consisting largely of single-family residential, commercial, public, and industrial development. The City's General Plan projects buildout of the 106,000 acres planning area in 2056. This UWMP addresses the City's water service reliability, future challenges, and strategies for managing risks to water reliability through 2045. The City's Fresno Metropolitan Water Resource Management Plan (Metro Plan), which is currently being prepared, addresses a 50-year horizon – through 2070.

IN THIS SECTION

- Service Area Description
- Water Use
- Water Sources
- Water Supply Reliability

Purpose and Organization of the Plan

This plan comprises the 2020 UWMP for the City, as required by the California Urban Water Management Planning Act, which requires all urban water suppliers with more than 3,000 connections or distributing more than 3,000 acre-feet per year (AFY) to complete an UWMP every five years. As of the close of the 2020 calendar year, the City has over 139,500 residential, commercial, industrial, and institutional water service connections and produced nearly 122,000 acre-feet (AF) of water. As a result, the City is required to prepare and adopt an UWMP and submit it to the Department of Water Resources (DWR) by the July 1, 2021, due date.

Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

The UWMP is a valuable planning document used for multiple purposes:

- Serves as a valuable resource to the community and other interested parties regarding water supply and demand, conservation, and water related information
- Meets a statutory requirement of the California Water Code (CWC)
- Provides a key source of information for water supply assessments and written verifications of water supply
- Supports regional long-range planning, including City and County General Plans
- Provides a standardized methodology for water utilities to assess their water resource needs and availability
- Provides a resource for regional involvement in the California Water Plan
- Provides for a plan during water drought situations

Outreach and Engagement

The City has coordinated the preparation of its 2020 UWMP with its water suppliers, Fresno County, the City of Clovis, nearby water agencies, and community members to develop a UWMP that adheres to the requirements of the CWC and plans for a resilient water future. In total, the City has coordinated preparation of the 2020 UWMP and solicited participation and comments with the following agencies**:**

- Bakman Water Company
- City of Clovis
- County of Fresno
- Fresno Irrigation District
- Fresno Metropolitan Flood Control District
- Friant Water Authority
- Garfield Water District
- Malaga County Water District
- Pinedale County Water District
- North Kings Groundwater Sustainability Agency
- US Bureau of Reclamation

Service Area Description

The City's General Plan planning area covers approximately 106,000 acres comprised of approximately 73,500 acres of incorporated land and 32,500 acres of unincorporated land. The City's water service area covers 70,400 acres consisting largely of single-family residential, commercial, public, and industrial development, shown in **Figure ES-6** (located at the end of the Executive Summary). The service area excludes areas served by the Bakman Water Company, Pinedale County Water District, Park Van Ness Mutual Water Company, California State University Fresno, and private groundwater users located within Fresno County islands. The City will eventually serve out to the Sphere of Influence (SOI) boundary adopted in the 2014 General Plan and includes all lands planned to be annexed by the City at the projected 2056 buildout of the General Plan, summarized in **Table ES-1**.

Table ES-1. Existing and Future Water Service Area

LAND USE CATEGORY	2020 WATER SERVICE AREA		2056 WATER SERVICE AREA	
	ACRES	PERCENT	ACRES	PERCENT
Single-Family Residential	27,700	39.3%	40,000	47.4%
Multifamily Residential	3,700	5.3%	3,800	4.5%
Commercial	4,500	6.4%	8,600	10.2%
Public Facility	5,600	8.0%	7,200	8.5%
Industrial	4,500	6.4%	9,300	11.0%
Open Space/ Landscape Irrigation	13,100	18.6%	11,000	13.0%
Mixed Use	0	0%	3,900	4.6%
Downtown	0	0%	600	0.7%
Vacant / Partially Vacant	11,300	15.9%	0	0%
TOTAL	**70,400**	**100%**	**84,400**	**100%**

Note: Acreage from City GIS Shapefile of Land Uses and aligns with the General Plan for buildout in year 2056.

Population Projections

The City experienced rapid growth since it was founded by the Central Pacific Railroad in 1872 up through the mid-1990s, when the City's annual growth rate was typically greater than 2%. From 1995 to 2015, the annual growth rate has decreased to an average of 1.3%, and since 2015, the rate has not surpassed 1.0%. Achieving General Plan buildout population estimates requires an average annual growth rate of 1.44% from 2020 to 2056. The City's water service area population is anticipated to continue to grow along with the City, with some slightly higher growth years anticipated in the next 10 years due to multiple large developments planned for completion in the near term. As a result, population growth, shown in **Figure ES-1** on the following page, occurs at an annual rate of ranging from 1.1–2.1% between 2020 and 2056.

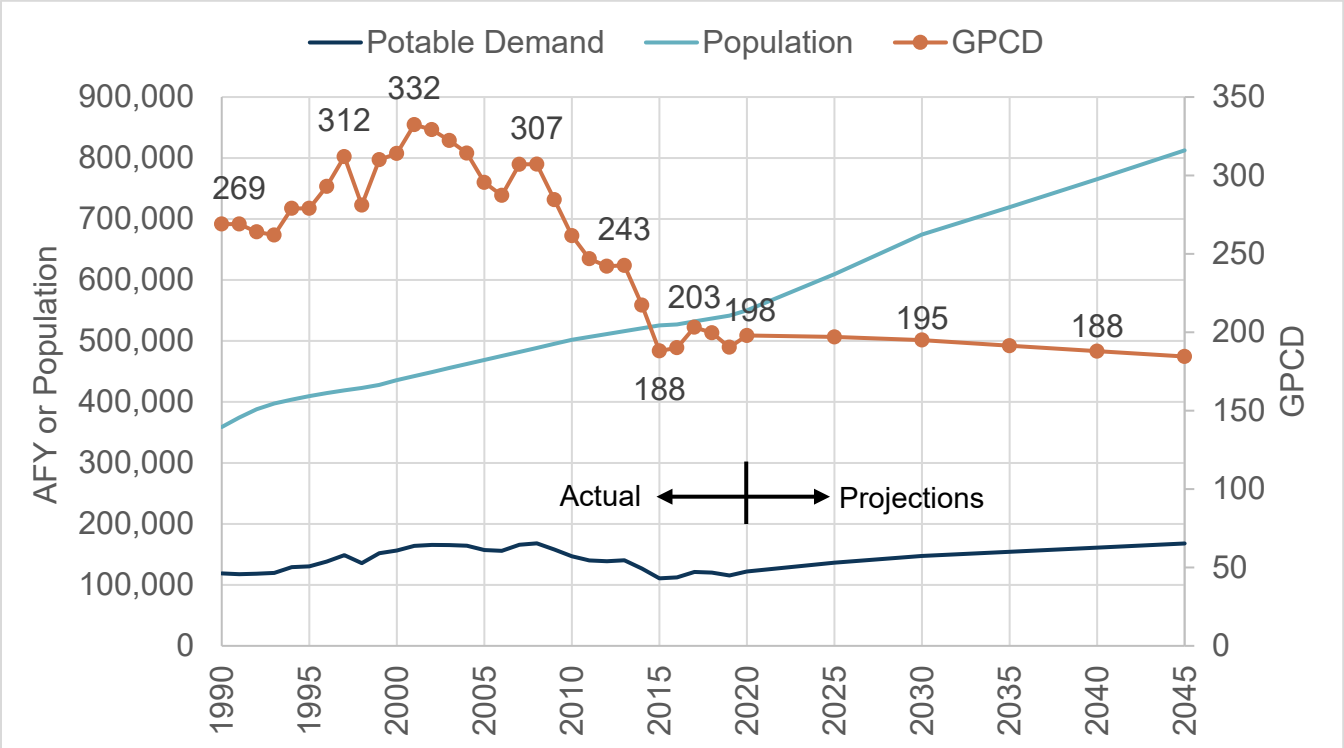
Water Use

Water consumption in the City is characterized by the typical demand sectors of residential, commercial, institutional, industrial, and irrigational. The difference between production and consumption is losses, which may be attributed to system leaks, meter inaccuracies, fire flows, theft, unmetered use, or other factors.

As shown in **Figure ES-1**, the City's water demand has decreased even as the City has grown over the past several decades, and demands are projected to grow slower than population growth. This trend is captured by the City's daily per capita water use, measured as gallons per capita per day (GPCD). For 2020, the City's water use averaged 198 GPCD based on 121,993 AF of water production and a service area population of 550,217. The City is far below its 2020 daily per capita water use target of 247 GPCD due to the extensive conservation efforts implemented by the City in the past decade.

The City also diverts raw surface water obtained from the United States Bureau of Reclamation (USBR) and the Fresno Irrigation District (FID) to recharge basins throughout the service area. The City coordinates with FID for the delivery of the recharge water, utilizing FID's existing system of channels and pipelines to covey the raw water, and with Fresno Metropolitan Flood Control District (FMFCD) to deliver water to FMFCD's stormwater retention and recharge basins or the City's own recharge basins. The raw surface water recharges the groundwater basin to sustain the groundwater supply for the City. The groundwater recharge volume can vary based on surface water supply availability and is represented as an addition to annual groundwater supplies. In addition, the City serves a limited number of customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively.

Figure ES-1. City of Fresno Demand Projections



The City's per capita water usage is projected to continue to decline through 2045 due to more water efficiency in future construction and passive conservation; however, due to the increase in population the demand is expected to slowly increase in the next 25 years. The potable demand projections for normal water use are based on land use where future land use areas are expected to be more water efficient than existing land uses and buildings due to the California Plumbing Code (CPC) and use of higher efficiency appliances and landscapes. Demand for existing land uses is also expected to slowly reduce over time due to passive conservation, which includes the replacement of older water fixtures and appliances with more efficient types now required as part of the CPC.

Water Sources

The City relies on groundwater from the North Kings Subbasin; surface water from Central Valley Project (CVP), through a contract with the USBR; Kings River water, through a contract with FID; and recycled water. Water production in the City has consisted of 100% groundwater prior to the commissioning of the City's first surface water treatment facility (SWTF) in 2004. Since 2004, the City has invested in expanding its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demands in the service area.

Groundwater

The City overlies the Kings Subbasin, which is part of the greater San Joaquin Valley Groundwater Basin. The City is one of many water purveyors that use groundwater from the Kings Subbasin. The City has a network of over 270 municipal wells and currently operates approximately 202 municipal supply wells within the Kings Subbasin.

The City was a founding member of the North Kings Groundwater Sustainability Agency (North Kings GSA), which was formed following passage of the Sustainable Groundwater Management Act (SGMA) of 2014. This legislation created a statutory framework for groundwater management in California that can be sustained during the planning and implementation horizon without causing undesirable results. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040. The Kings Subbasin was designated a critically overdrafted basin by DWR and the North Kings GSA is working within the SGMA framework to reach groundwater sustainability.

Due to the City's investments in other supplies – surface water, recycled water, and conservation – groundwater levels beneath the City have already begun to recover from low levels experienced during the recent drought. The City plans to continue to use groundwater within a larger conjunctive use program that maximizes its existing water rights and surface water supply sources.

Surface Water

With the completion and operation of the Southeast Surface Water Treatment Facility (SESWTF), surface water is now a primary water supply used to meet potable demands within the City. The City contracts with FID for Kings River water and with USBR for CVP water from the Friant-Kern Canal. The surface water supply is used either for potable uses through treatment and distribution or delivery to recharge basins for groundwater recharge. The City has historically not used all its available FID allocation in any given year, although it pays a flat rate for its total allocation regardless of use. Water unused by the City is reallocated by FID to its other customers.

The City, through an agreement originally executed in 1961, secured a surface water supply from USBR CVP Friant Division for an annual water supply of 60,000 AF of Class 1 water. The agreement was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement, which ended an 18-year legal dispute over the operation of Friant Dam brought by a coalition of conservation and fishing groups. The projected surface water available for the City from USBR is based on USBR simulations for the 2006 Settlement Agreement. Average simulated delivery is 53,680 AFY and the median simulated delivery is 60,000 AFY. However, very dry years have previously resulted in substantial reductions as demonstrated by the zero allocations that occurred in 2014 and 2015.

FID is one of 28 agencies that receives an entitlement of water from the Kings River through the Kings River Water Association. The City executed its most recent agreement with FID in 2016. The 2016 agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly every year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID, and is roughly 200,000 acres. As the City incorporates new users and the water service area expands, the percentage of FID supply increases. However, the 2016 FID Agreement sets the City's maximum percentage of FID's Kings River water as 29.0%, which is expected to be reached between 2025 and 2030.

The City's potential supply from FID was projected using actual Kings River deliveries for 1964–2019. The average FID Kings River delivery over that time was 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29.0% City supply percentage. The projected City percentage of FID supplies was estimated based on City's water service area growth projections through buildout in 2056.

Recycled Water

The Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) has developed from what was once a sewer farm to what is now a state-of-the-art wastewater treatment facility. The RWRF treats flows from not only the City, but also sewered County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District. Flows received at this facility peaked at 81,100 AF in 2006 and have been steadily decreasing since, with the average influent flow about 63,000 AF over the last five years.

The City has three primary means of effluent disposal from the RWRF:

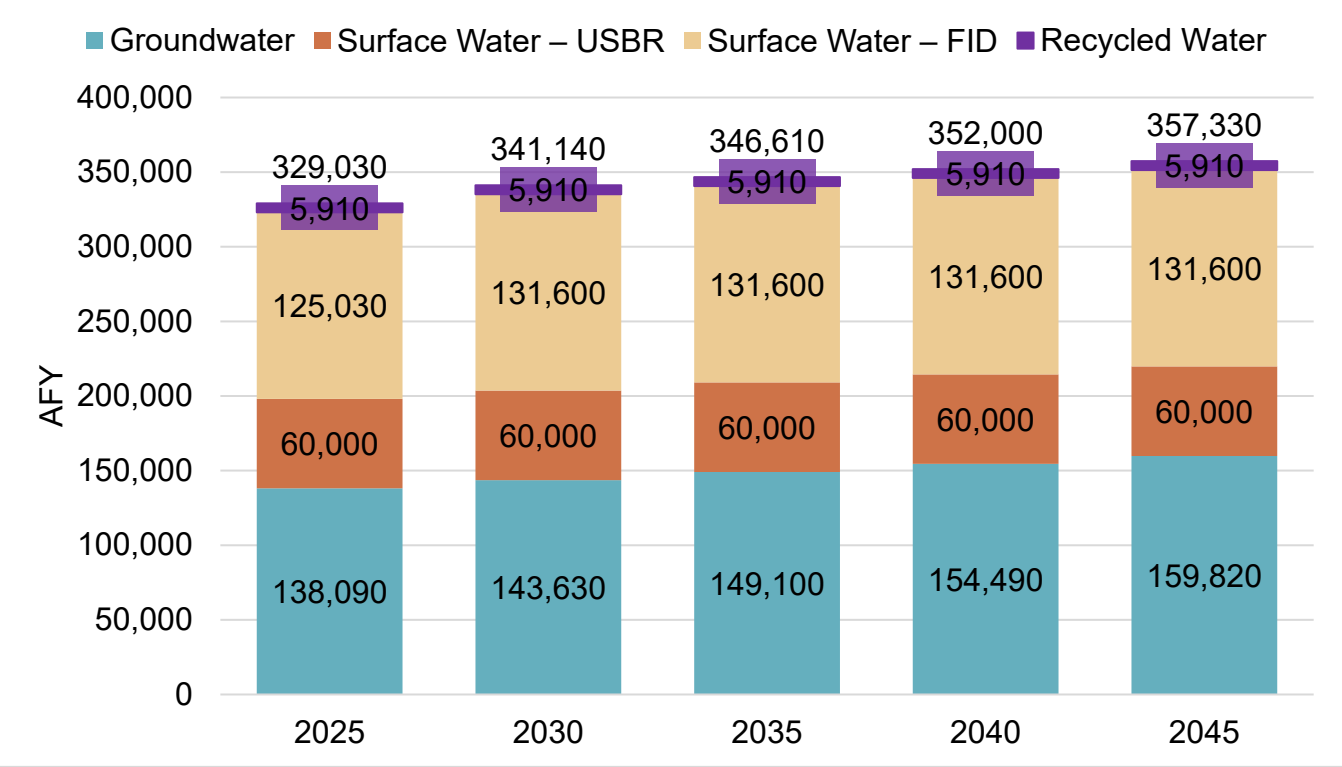
1. Undisinfected secondary effluent to on-site and off-site farmland for restricted irrigation
2. Undisinfected secondary effluent to percolation ponds
3. Disinfected tertiary effluent to the recycled water distribution system

The percolated effluent has been deemed equivalent to tertiary treated water by the State and the City has been extracting this water for reuse in areas within and surrounding the RWRF, as well as to FID's canals, through an exchange agreement for delivery to FID agricultural customers. The City recently constructed the Tertiary Treatment and Disinfection Facility (TTDF) at the RWRF and has constructed most of the southwest recycled water system, which is projected to increase deliveries from roughly 1,000 AFY today to eventually meet 5,800 AFY of non-potable demands. In addition, the City uses recycled water from the North Fresno Wastewater Reclamation Facility (NFWRF) to irrigate Copper River Ranch Golf Course.

Summary of Supplies

The City currently balances its surface water supplies and groundwater based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes and prevent their spread. The minimum operation conditions typically occur in the low-demand winter months, and the City can increase surface water production during peak demand months when surface water is available. In normal and wet years, the City intends to rely on more surface water supply and recharge raw surface water to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will ramp up well production to meet demands. The City is expected to continue this supply management strategy in the future. **Figure ES-2** shows the City's annual average projected water supplies through 2045.

Figure ES-2. Projected Water Supplies



Water Supply Reliability

The City currently manages its surface water and groundwater supply by maximizing surface water for potable use and intentional recharge during wet and normal years, while relying on groundwater during dry years. The City is currently updating its Metro Plan, which will recommend projects and programs to optimize the use of its supply portfolio and further improve supply resilience. Supply management tools are an expected outcome of the Metro Plan update; however, the City's ongoing supply management is intended to maximize local supplies and improve the groundwater basin storage. Current actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

Normal water year, single dry water year, and five-year consecutive drought period supply projections were made based on historic water allocations for surface water supplies, sustainable yield for groundwater, and projected utilization for recycled water. For surface water, the single dry year is based on 2015 allocations and the five-year drought is based on 2012 to 2016. Groundwater supplies, due to intentional recharge augmentation, remain reliable in all hydrologic conditions.

Despite severe reductions of surface water supplies during recent dry years, sufficient good-quality water was available to operate the SWTFs. The projected supplies and demands for a normal year, single dry year, and five-year consecutive drought, shown in **Figure ES-3** through **Figure ES-5** on the next page and in **Table 7-1** through **Table 7-3** in **Section 7.1.4**, demonstrate that the City is projected to have greater than 100,000 AF of available supply after meeting demands in normal years; the City's surface water supplies are reduced in a single dry year, but all potable demands are met and groundwater recharge of raw surface water is reduced; and the City is projected to meet all demands during a five-year drought with its existing supplies with reduced groundwater recharge in years three and four of a five-year drought to accommodate low surface water allocations.

Managed recharge of surface water is an essential component of the City's groundwater supply and the City must average 60,000 AFY to 70,000 AFY of recharge with surface water to meet the projections. This highlights the City's priority of recharging available surface water in the coming years.

Figure ES-3. Normal Year Supply vs. Demand

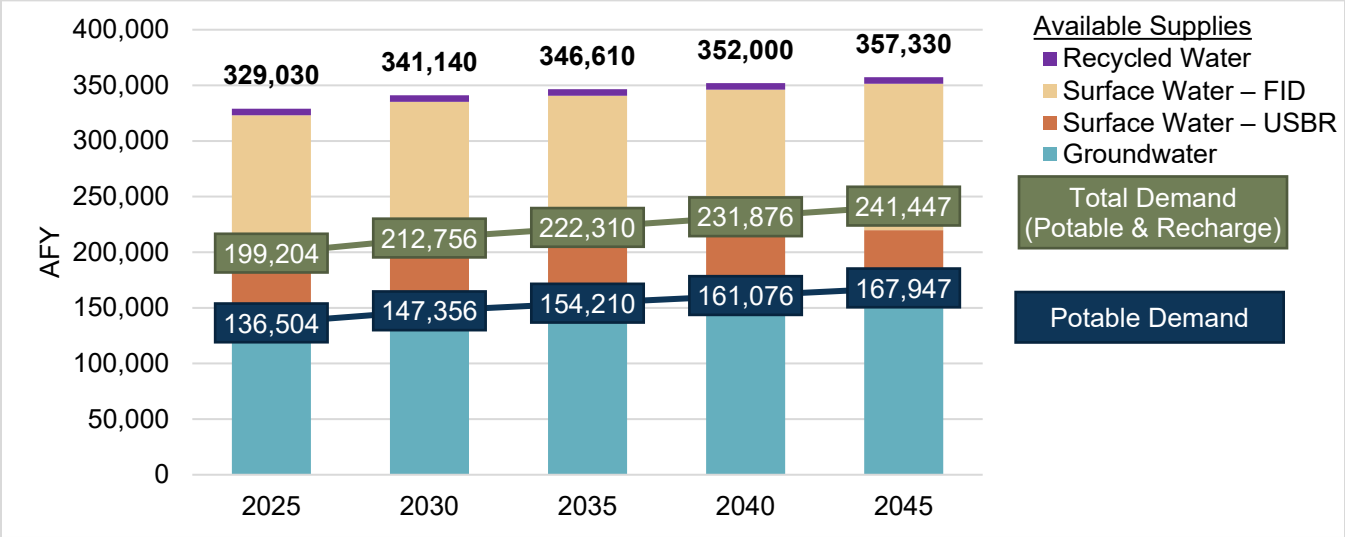


Figure ES-4. Single Dry Year Supply vs. Demand

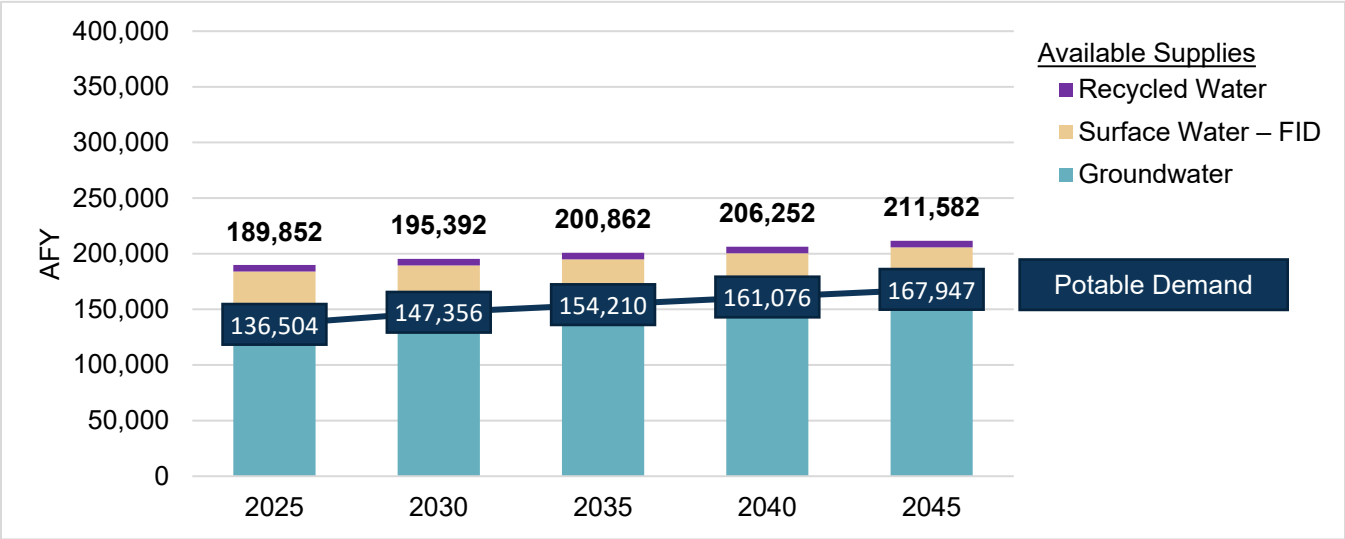
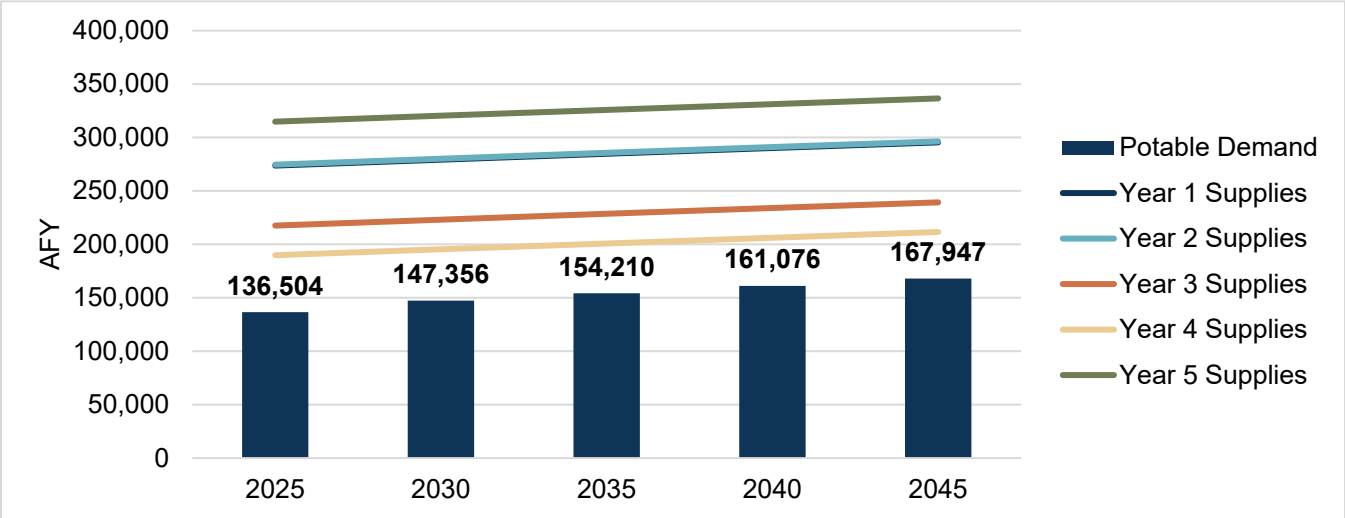


Figure ES-5. Multiple Dry Years Supply vs. Demand



2021-2025 Drought Risk Assessment

A new provision of the Water Code directs Suppliers to prepare a Drought Risk Assessment (DRA), assuming a drought period lasting five consecutive years, starting from the year following the year when the assessment is conducted. The DRA analysis allows the City to examine the management of its supplies during stressed hydrologic conditions and an opportunity to evaluate whether the City may need to enact its Water Shortage Contingency Plan (WSCP) during the next actual drought period lasting at least five years. The projected gross water use for the five-year DRA is based on unrestricted potable demand, a reduction in raw-water demand for intentional recharge in years three and four of the five-year drought, and unrestricted recycled water demand. Surface water supply availability is based on actual allocations during the previous drought – from 2012 to 2016.

Table ES-2 compares the total projected supply and demand for the five-year DRA for 2021 through 2025. As shown, the City does not expect to enact its WSCP for a five-consecutive-year drought based on the unrestricted potable demand projections and the reliability of the current supply portfolio. Available surface water supplies during this period would be utilized for groundwater recharge to sustain the groundwater basin.

Table ES-2. Five-Year Drought Risk Assessment

WATER USE TYPE	2021	2022	2023	2024	2025
Groundwater	133,602	134,724	135,846	136,968	138,090
Surface Water – USBR	30,000	37,200	0	0	45,000
Surface Water – FID	93,354	83,085	65,425	40,776	111,911
Recycled Water	1,912	2,911	3,911	4,910	5,910
TOTAL SUPPLY	**258,868**	**257,920**	**205,181**	**182,655**	**300,911**
Potable Demand	124,910	127,827	130,745	133,662	136,504
Non-Potable Demand	60,000	60,000	48,287	22,260	60,000
TOTAL DEMAND	**184,910**	**187,827**	**179,032**	**155,922**	**196,504**
AVAILABLE SUPPLIES	**73,958**	**70,093**	**26,149**	**26,732**	**104,407**

Water Shortage Contingency Plan

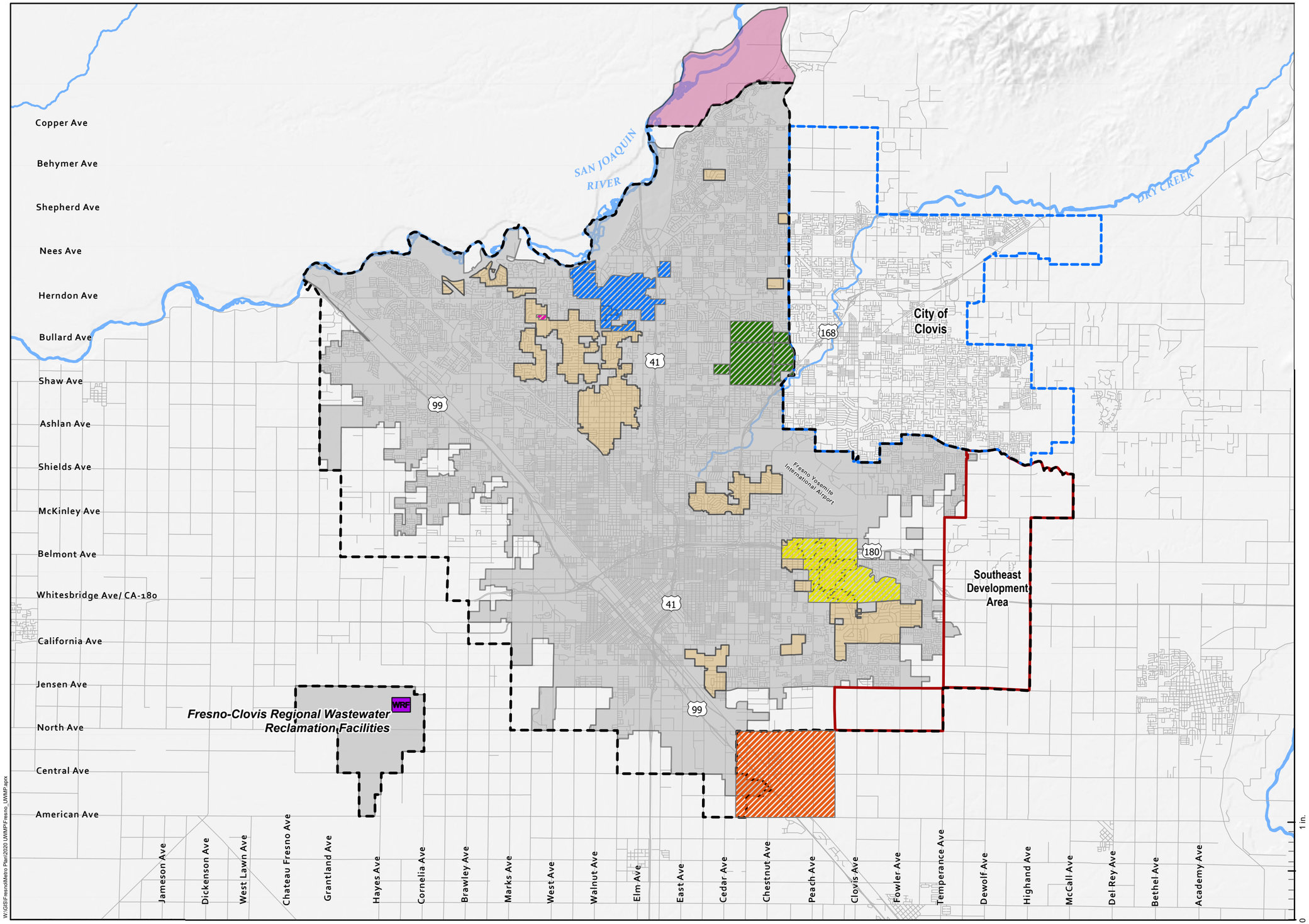
This WSCP is a detailed plan for how the City intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time.

The WSCP is used to provide guidance to the City's governing body, staff, and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

The WSCP describes the following:

- Water Supply Reliability Analysis
- Annual Water Supply and Demand Assessment Procedures
- Six Standard Shortage Stages
- Shortage Response Actions
- Communication Protocols
- Compliance and Enforcement
- Legal Authority
- Financial Consequences of WSCP Implementation
- Monitoring and Reporting
- WSCP Refinement Procedures
- Special Water Features Distinctions
- Plan Adoption, Submittal, and Availability

The 2020 WSCP is a standalone document that can be modified as needed and is included as **Appendix J** in the 2020 UWMP.



Legend

- Fresno Sphere of Influence
- Clovis Sphere of Influence
- Fresno City Limits
- County Islands
- North Area
- Southeast Development Area
- Wastewater Reclamation Facility
- Streets

Areas Served Water by Others

- Bakman Water District
- Malaga Water District
- Park Van Ness Mutual Water District
- Pinedale County Water District
- CA State University, Fresno

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Prepared by: WSC

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References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure ES-6. City Service Area

1 CITY OF FRESNO Introduction

This plan comprises the 2020 Urban Water Management Plan (UWMP) for the City of Fresno (City), as required by the California Urban Water Management Planning Act (UWMP Act).

The UWMP Act requires all urban water suppliers with more than 3,000 connections or distributing more than 3,000 acre-feet per year (AFY) to complete an UWMP every five years.

As of the close of the 2020 calendar year, the City has over 139,500 residential, commercial, industrial, and institutional water service connections and produced nearly 122,000 AF of water. As a result, the City is required to prepare and adopt an UWMP and submit it to DWR by the July 1, 2021, due date.

IN THIS SECTION

- California Water Code
- UWMP Organization

The UWMP is a valuable planning document used for multiple purposes:

- Serves as a valuable resource to the community and other interested parties regarding water supply and demand, conservation, and water related information
- Meets a statutory requirement of the California Water Code (CWC)
- Provides a key source of information for water supply assessments and written verifications of water supply
- Supports regional long-range planning documents, including City and County General Plans
- Provides a standardized methodology for water utilities to assess their water resource needs and availability
- Provides a resource for regional involvement in the California Water Plan
- Provides for a plan during water drought situations

1.1 The California Water Code

The UWMP Act is administered by the California Department of Water Resources (DWR), which is responsible for compiling data for statewide and regional analysis and publishing the adopted documents online for public access. This report was prepared according to the requirements of the CWC, UWMP Act, and the 2020 UWMP Guidebook.

CWC Section 10620 (a) of the UWMP Act states, "Every urban water supplier shall prepare and adopt an urban water management plan in the manner set forth in Article 3 (commencing with Section 10640)." These plans are to be updated every five years and submitted to DWR.

Requirements for the UWMP include:

- Assessment of current and projected water supplies
- Evaluation of demand and customer types
- Evaluation of the reliability of water supplies
- Description of conservation measures implemented by the urban water supplier
- Response plan, in the event of a water shortage
- Comparison of demand and supply projections

In November 2009, the State legislation passed Senate Bill (SB) x 7-7, referred to as SBx7-7 or the Water Conservation Act of 2009. SBx7-7 set the goal of achieving a 20% reduction in urban per capita water use statewide by 2020. Retail water agencies were required to set targets and track progress toward decreasing daily per capita urban water use in their service areas, which would assist the State in meeting its 20% reduction goal by 2020.

This law requires that every UWMP include:

- Baseline per capita water use
- Urban water use target for 2020
- Compliance daily per capita water use

This 2020 UWMP has been prepared to comply with the UWMP Act and SBx7-7. In addition to meeting the requirements of the Act, this report will be used to support water supply assessments and written verifications of water supply required by SB 610 and SB 221 of 2001. These bills require that water supply information be provided to counties and cities for projects of a certain size, prior to discretionary project approval. Both bills allow an UWMP to be used as a source document to fulfill these legislative requirements. The UWMP Act has undergone significant expansion since it was originally passed, particularly since the City's previous UWMP was prepared in 2015. Prolonged droughts, groundwater overdraft, regulatory revisions, and changing climatic conditions affect the reliability of each water supplier as well as the statewide water reliability overseen by DWR, the State Water Resources Control Board, and the Legislature. Accordingly, the UWMP Act has grown to address changing conditions, and the current requirements are found in Sections 10610–10656 and 10608 of the CWC.

Since 2015, several amendments have been added to the UWMP Act. These require urban water suppliers to prepare a five-year consecutive drought supply and demand assessment and a five-year drought risk assessment to evaluate the functionality of the Water Shortage Contingency Plan (WSCP) in the event of a continuous five-year drought beginning next year.

There are also new requirements for the WSCP, and it is now required to be adopted as a separate plan from the UWMP. This 2020 UWMP was developed to incorporate these new requirements, under the guidance of DWR's 2020 UWMPs Guidebook for Urban Water Suppliers. A checklist to document compliance of this 2020 UWMP with the Act and the CWC is provided in **Appendix A**.

This 2020 UWMP includes all required DWR standardized tables for **Chapters 1 to 10** compiled in **Appendix B** and all required SBx7-7 tables in **Appendix C**. A selection of these tables is also provided in the body of this Plan, as necessary to present supporting data.

1.2 UWMP Organization

This 2020 UWMP is organized into the following chapters.

- **Chapter 1 - Introduction and Overview:** This chapter provides a discussion of the purpose and content of the 2020 UWMP and the extent of the City's water management planning efforts.
- **Chapter 2 - Plan Preparation:** This chapter provides information on the City's development of the 2020 UWMP, including the basis for plan preparation, planning type, data format, and coordination and outreach to nearby agencies.
- **Chapter 3 - System Description:** This chapter provides a description of the City's water system, including service area maps, climate information, service population and demographic information, and an overview of the City's organizational structure and history.
- **Chapter 4 - Customer Water Use:** This chapter describes the City's historic, current, and projected water uses, system losses, water savings, and water use by lower income households.
- **Chapter 5 - Conservation Target Compliance:** This chapter includes a description of the City's chosen method for calculating baseline per capita water use, the City's calculated baseline, 2015 interim and 2020 per capita demand targets, and compliance with the 2020 target.
- **Chapter 6 - System Supplies:** This chapter includes a discussion of the City's water system supplies, including groundwater, surface water, wastewater, and recycled water, the City's future water projects, and a summary of existing and future water sources.
- **Chapter 7 - Water Supply Reliability Assessment:** This chapter describes the reliability of the City's water supply through a 20-year planning horizon, including a supply and demand assessment and regional reliability evaluation. Supply reliability is presented for a normal, single dry year and five consecutive dry years.
- **Chapter 8 - Water Shortage Contingency Planning:** This chapter provides a description of the City's WSCP, including stages of action, prohibitions, penalties, reduction methods, and catastrophic supply interruption.
- **Chapter 9 - Demand Management Measures:** This chapter explains the City's existing and historic efforts to promote water conservation and the City's plans to use Demand Management Measures to achieve its 2025 water use targets.
- **Chapter 10 - Plan Adoption, Submittal, and Implementation:** This chapter details the steps taken by the City to adopt the 2020 UWMP in accordance with the CWC, make it available to the public, and implement it.

- **Appendices:** These include any additional information to support and clarify any information presented within the 2020 UWMP content.

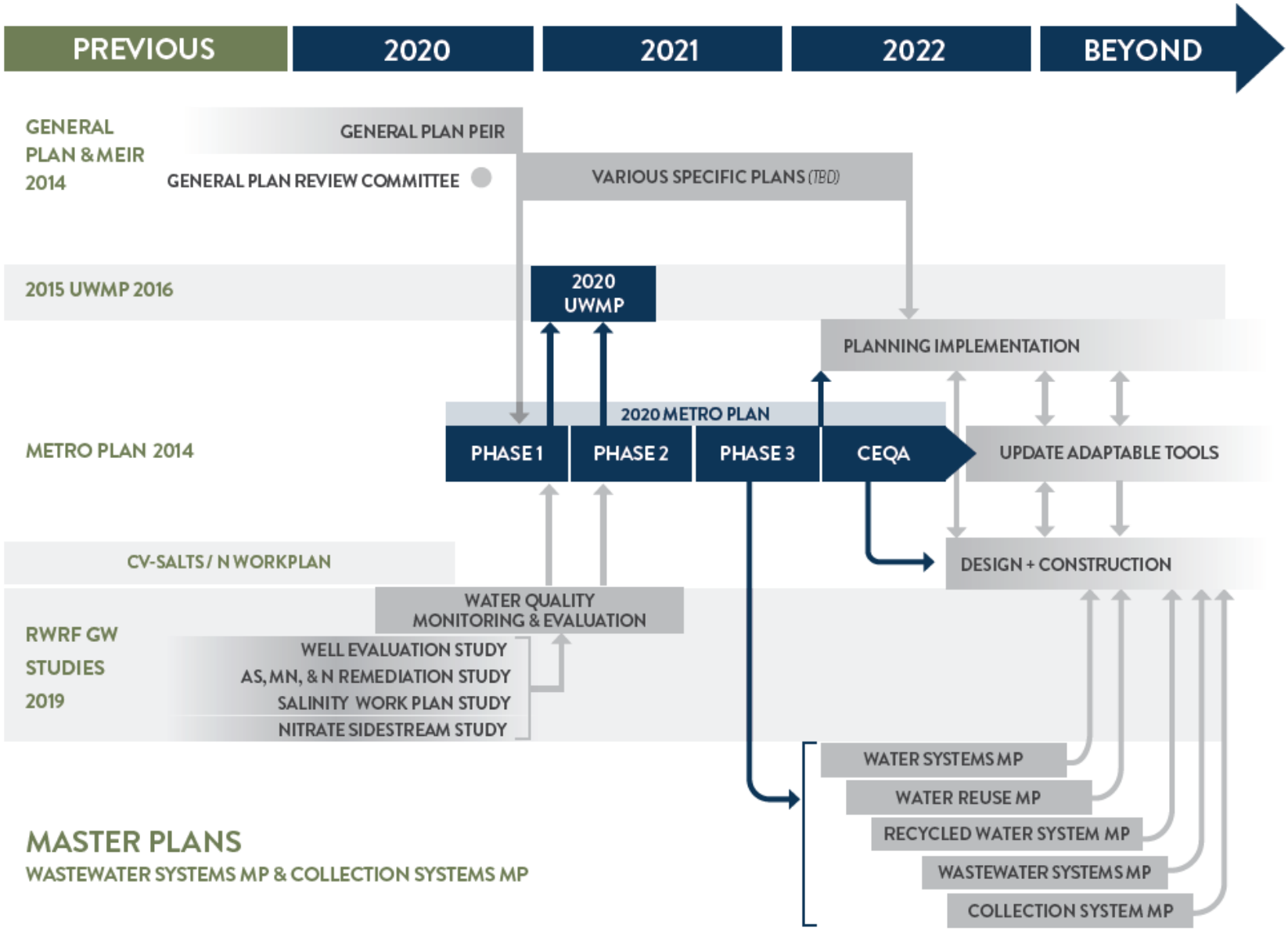
1.3 UWMPs in Relation to Other Efforts

The City previously prepared a 2005 UWMP, 2010 UWMP, and 2015 UWMP. This 2020 UWMP serves as an update to the 2015 UWMP and complies with new requirements and regulations. In addition to completing the 2020 UWMP, the City is presently updating its Fresno Metropolitan Water Resource Management Plan (Metro Plan). The last Metro Plan was completed in 2014, and the current Metro Plan update will prepare a fresh look at the City's water resources and consider new conditions and strategies for planning through 2070. **Figure 1-1** shows the City's ongoing and additional future water resources planning efforts.

1.4 Demonstration of Consistency with the Delta Plan

A new requirement for the 2020 UWMP is that agencies that anticipate participating in, or receiving water from, a proposed project utilizing Sacramento-San Joaquin Delta (Delta) Water or within the Jurisdiction of the Delta Stewardship Council (covered action) should demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta. Covered actions include, but are not limited to, projects such as multiyear water transfers, conveyance facilities, or new diversions that involve transferring water through, exporting water from, or using water in the Delta, per California Code of Regulations, Title 23, Section 5003. The City of Fresno contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 AF of Class 1 water. Although the Friant Division of the CVP does not directly divert or convey water from the Delta, the project was developed through an exchange with the Delta-Mendota supply. As restrictions on Delta exports have hindered USBR from making deliveries to the Delta-Mendota Canal, the Friant Division Class 1 allocations are reduced, and the water is transferred back to the users that would typically receive water from the Delta-Mendota Canal. As such, the City is required to demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta. **Appendix D** includes the reporting and calculations that demonstrate Fresno's reduced reliance on supply from their USBR CVP water supply.

Figure 1-1. Previous and Ongoing Water Resources Planning Efforts



2 CITY OF FRESNO
Plan Preparation

The City has coordinated the preparation of its 2020 UWMP with its water suppliers, the County, the City of Clovis, nearby water agencies, and community members to develop a UWMP that adheres to the requirements of the CWC and plans for a resilient water future.

IN THIS SECTION

- Coordination and Outreach

The City of Fresno provides water service to a variety of customer sector types within the City limits, inclusive of several historic County Waterworks Districts (county islands) which have been incorporated into the City's water system.

The City has approximately 139,500 service connections and produced just under 122,000 AF of potable water in 2020. The City meets the threshold identified in the CWC to be classified as an urban water supplier and in the California Health and Safety Code as a public water system. The City provides water directly to its customers and does not wholesale water to any other agencies for potable uses (defined as sales greater than 3,000 acre-feet per year). Therefore, the City is required to prepare and update a Retail UWMP every five years. This report was prepared on a calendar year basis.

2.1 Coordination and Outreach

The City has water supply contracts with USBR and Fresno Irrigation District (FID). Each of these water suppliers has been notified of the plan update and provided water supply projections for the time period covered by this plan. Additionally, the preparation of this 2020 UWMP was coordinated with other appropriate agencies to ensure regional stakeholders had the opportunity to provide input to this plan. The City has coordinated preparation of the 2020 UWMP and solicited participation and comments with the agencies indicated in **Table 2-1**. The City has also published notices in local newspaper and encouraged the active involvement of the population within the water service area to provide feedback on the UWMP and the WSCP during the public review period, as discussed in **Section 10.1**.

Table 2-1. Agency Coordination and Outreach

AGENCY	NOTIFIED 60 DAYS PRIOR TO PUBLIC HEARING	NOTIFIED OF PUBLIC DRAFT 14 DAYS PRIOR TO PUBLIC HEARING
Bakman Water Company	✓	✓
City of Clovis	✓	✓
County of Fresno	✓	✓
Fresno Irrigation District	✓	✓
Fresno Metropolitan Flood Control District	✓	✓
Friant Water Authority	✓	✓
Garfield Water District	✓	✓
Malaga County Water District	✓	✓
Pinedale County Water District	✓	✓
North Kings Groundwater Sustainability Agency	✓	✓
US Bureau of Reclamation	✓	✓

3 CITY OF FRESNO System Description

This chapter describes the history of the City's water system, its current service area, climate, population, and demographics.

The original Fresno water system began operations in 1876 as a non-profit organization inaugurated by a group of public-minded citizens. Initially, the water system consisted of one pumping station composed of small pumps and two storage tanks located above the second floor of one of the early store buildings. This building was located on Fresno Street between "J" and "K" Streets, presently known as Broadway and Fulton.

IN THIS SECTION

- Service Area
- Land Uses
- Water System
- Population and Demographics

By 1888, the town had grown to a small city, which demanded an improved water distribution system. This was necessary because of several large fires, including the destruction of the first permanent courthouse. In 1888, the first pumping station and water tower were constructed at Fresno and "O" Street. These facilities were designed to be an integral part of a larger and continually expanding water system. This No. 1 station was in continuous use until 1959, when it was retired having served its useful purpose. Today, this building is known as the "Water Tower" and has been declared a historic structure.

Between the years of 1887 and 1890, 4-inch and 2½-inch cast iron pipe, as well as 4-inch wrought iron water mains were laid out. Most of these original “permanent pipes” have since been replaced in the present water supply system. The owner and operator of the system in 1888 was the Fresno Water Company. In 1904, the Fresno Water Company was purchased by Balch, Kerckhoff & Wishon, and was reorganized as the Fresno City Water Company. In 1926, the facilities were purchased by the California Water Service Company. This company then sold the water system to the City of Fresno in 1931, which operated as a municipal utility. It was first managed under an appointed water board, but currently is a division of the Department of Public Utilities.

Historically, the City’s supply of water consisted of direct pumping from wells drilled into the underground aquifer. Today, groundwater remains one of the City’s primary water supply sources, including 202 active and 56 inactive groundwater wells. The production capacity from the active wells is approximately 403 million gallons per day (mgd) and the total production capacity is 487 mgd, including inactive wells. The wells are located around the City to provide equitable distribution throughout the City’s water system, as described below. Most wells are connected directly into the transmission grid main system (14- to 20-inch diameter pipelines) to convey water throughout the system.

In the 1960s, the City secured a surface water contract made available from the United States Bureau of Reclamation (USBR). The City contracted with USBR for 60,000 acre-feet of water per year from the Friant Division (Millerton Lake) and developed a system to recharge the groundwater basin by “intentional recharge,” percolating the imported surface water supplies in constructed recharge basins. The City’s USBR supplies are conveyed to the City via FID canals. In 1976, the City signed a contract with FID for delivery of surface water supplies from the Kings River based on the City’s pro rata share of FID’s water entitlements. The Kings River water is used for groundwater recharge and treated for potable use.

In 2004, the City also began treating surface water supplies for direct potable use at its first surface water treatment facility located in northeast Fresno (NESWTF). For the period of 2005–2014, this 30 mgd-rated facility provided 10–15% of the City’s potable water supplies. From 2016–2020, this facility produced 15% of the City’s potable water supply, an increase largely attributed to transmission system improvements, which permitted conveying water further into the City’s distribution system, and the City’s lower overall system demands. Also, in 2015, the City commenced operations of its new T-3 Water Storage and modular Surface Water Treatment Facility (T-3 SWTF) in southeast Fresno. In January 2013, the City completed the installation of meters on all single-family residences.

In 2018, the City completed construction of its new 54 mgd surface water treatment facility in southeast Fresno (SESWTF) and large diameter water mains that serve nearly one-half of the City. Production from this facility may ultimately be 80 mgd with the City demonstrating to the Division of Drinking Water (DDW) that the facility is capable of safely running at higher filter loading rates. With the SESWTF operational, along with the NESWTF and T-3 SWTF, the City provided greater than 50% of its potable supply through using surface water for the first time in 2019 and 2020. The City expects to provide half or more of its potable demand using its surface water supply sources going forward.

3.1 Service Area

The City of Fresno presently covers approximately 115 square miles (sq mi) (73,500 acres) consisting largely of single-family residential, commercial, public, and industrial development. It also includes several areas not within the City limits (e.g., County islands), as shown in **Figure 3-1**. With the exception of the Bakman Water Company (Bakman), Pinedale County Water District (Pinedale), Park Van Ness Mutual Water Company (Park Van Ness), California State University Fresno (CSUF), and private groundwater users located within County islands, the City currently serves water to the entire area encompassed by its City limits and will eventually serve out to the Sphere of Influence (SOI) boundary. The SOI is coincident with the City of Fresno General Plan Land Use and Circulation Map, which was adopted in the 2014 General Plan and therefore, includes all lands planned to be annexed by the City at the projected 2056 buildout of the General Plan (City of Fresno Development and Resource Management Department, 2014).

3.1.1 Land Uses within Service Area

According to the General Plan and the City's Planning and Development Department, the City's planning area covers approximately 106,000 acres (165.6 sq mi) comprised of approximately 73,500 acres (115 sq mi) of incorporated land and 32,500 acres (50.8 sq mi) of unincorporated land based on the City's current shapefiles. The total 106,000-acre planning area includes approximately 84,300 acres of developed or planned to be developed land, approximately 18,500 acres of roads, highways, and railroads with no corresponding water demand, and about 2,500 acres outside of the SOI north of the City's most northwesterly portion referred to as the North Area and shown on **Figure 3-1**.

Of the 106,000 acres within the City's planning area, the City's water service area covers 70,400 acres (110 sq mi) of land within the SOI, which includes most of the 73,500 acres of incorporated area and the unincorporated County Islands not within the City limits. As shown in **Table 3-1**, approximately 59,100 acres of the 70,400 acres within the water service area are developed and served water by the City. The remainder consists of vacant land that will be served by the City when it is developed. Residential units make up the largest portion of water demand served by the City, consisting of over 40% of the total served area and almost 90% of the total service connections.

The remaining areas within the City's SOI are served by other systems or are unserved by a water system, consisting of open space and agricultural land, land used by roads, highways, and railroads, as well as the North Area.

Table 3-1. Current Service Area Characteristics

LAND USE TYPE	AREA (ACRES)	% OF TOTAL AREA	SERVICE CONNECTIONS	% OF TOTAL CONNECTIONS
Single-Family Residential	27,700	39.3%	118,775	85.1%
Multifamily Residential	3,700	5.3%	6,087	4.4%
Commercial	4,500	6.4%	11,982	8.6%
Public	5,600	8.0%	2,504	1.8%
Industrial	4,500	6.4%	175	0.1%
Open Space/ Landscape Irrigation	13,100	18.6%	Note 1	
Total	**59,100**		**139,523[2]**	**100%**
Vacant / Partially Vacant[3]	11,300	15.9%	N/A	
Total	**70,400**	**100%**		

Source: Acreage from City of Fresno Geographic Information System Shapefile of Land Uses provided 8/12/20. Number of connections provided by the City for 2020.

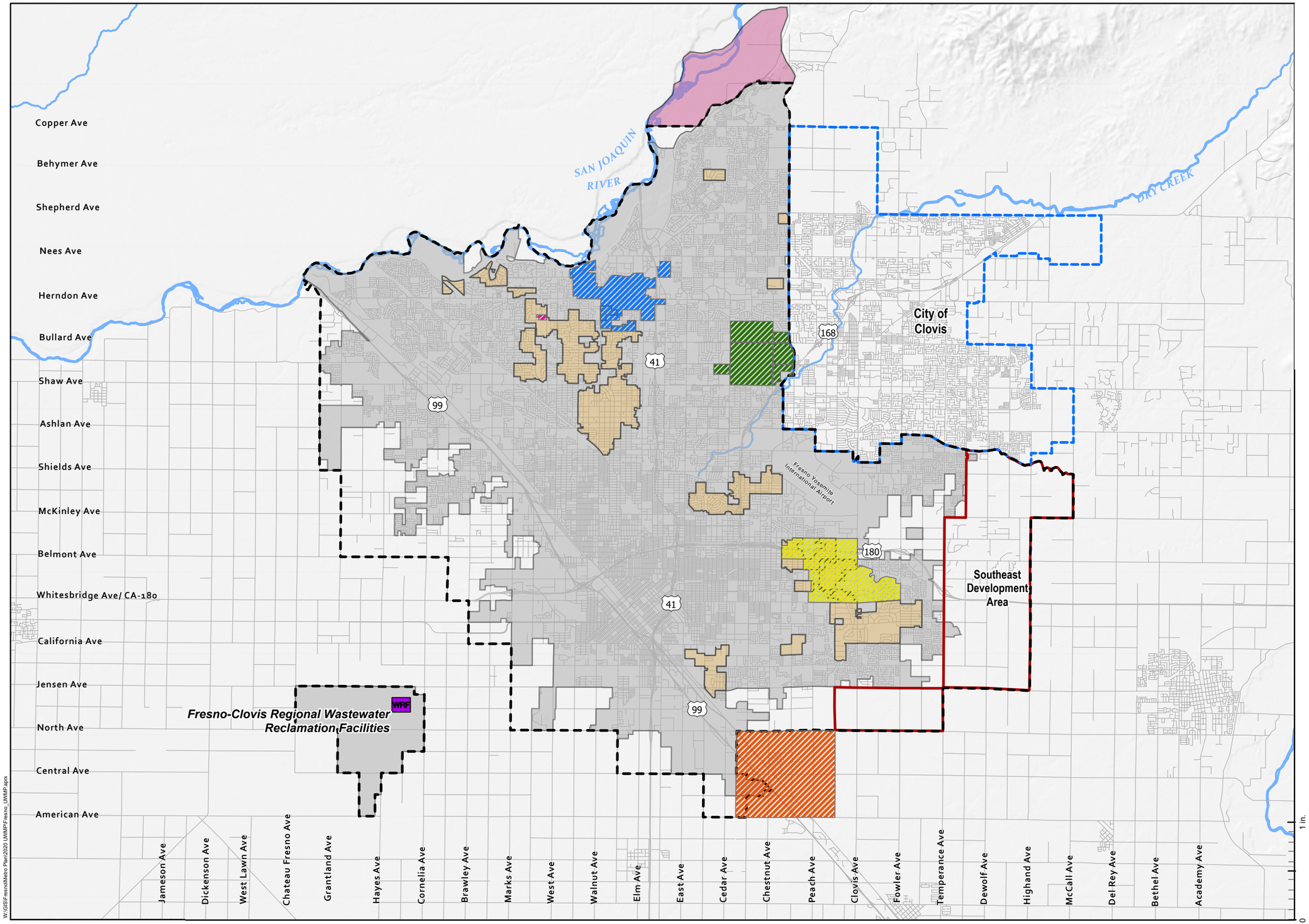
Notes:

1. Dedicated irrigation meters are included in commercial and public meter total.
2. Approximately 3,633 dedicated fire service connections are included in the total services connections, most of which are included in the commercial and public meter total.
3. For partially vacant land, half of the area is included in the zoned land use type and the other half is assumed vacant.

3.1.2 Water System

The City's water system consists of about 1,860 miles of distribution and transmission mains, 202 active municipal groundwater wells, three surface water treatment facilities (SWTFs) with current rated capacities ranging from 4 to 54 mgd, five water storage facilities with pump stations, including one at each of the SWTFs plus two in the distribution system, and three booster pump facilities.

The City's service area spans an approximate 120 feet of elevation difference, declining from northeast to southwest. To help regulate pressure throughout the water distribution system, the City utilizes five pressure zones, as shown on **Figure 3-2**: Highway 41, Shepherd, Sierra, Southwest, and Booster Pump 4 (BP04). The pressure zones are separated by a series of closed or partially closed valves between each zone to prevent or impede flow from one zone to the next, referred to as gate systems. There are four gate systems — Shepherd, Sierra, Southwest, and BP04 — separating the five pressures zones. The Highway 41 Pressure Zone was previously split into two pressure zones divided by a series of 26 gate valves closely following the alignment along Highway 41. However, these zones were combined into a single zone in 2015 by fully opening the Highway 41 gate valves, and as a result are not shown on **Figure 3-2**.



Legend

- Fresno Sphere of Influence
- Clovis Sphere of Influence
- Fresno City Limits
- County Islands
- North Area
- Southeast Development Area
- WRF Wastewater Reclamation Facility
- Streets

Areas Served Water by Others

- Bakman Water District
- Malaga Water District
- Park Van Ness Mutual Water District
- Pinedale County Water District
- CA State University, Fresno

Prepared by: WSC

N

1:140,000

0 0.75 1.5 3 Mi

0 3,750 7,500 15,000 US Feet

References:

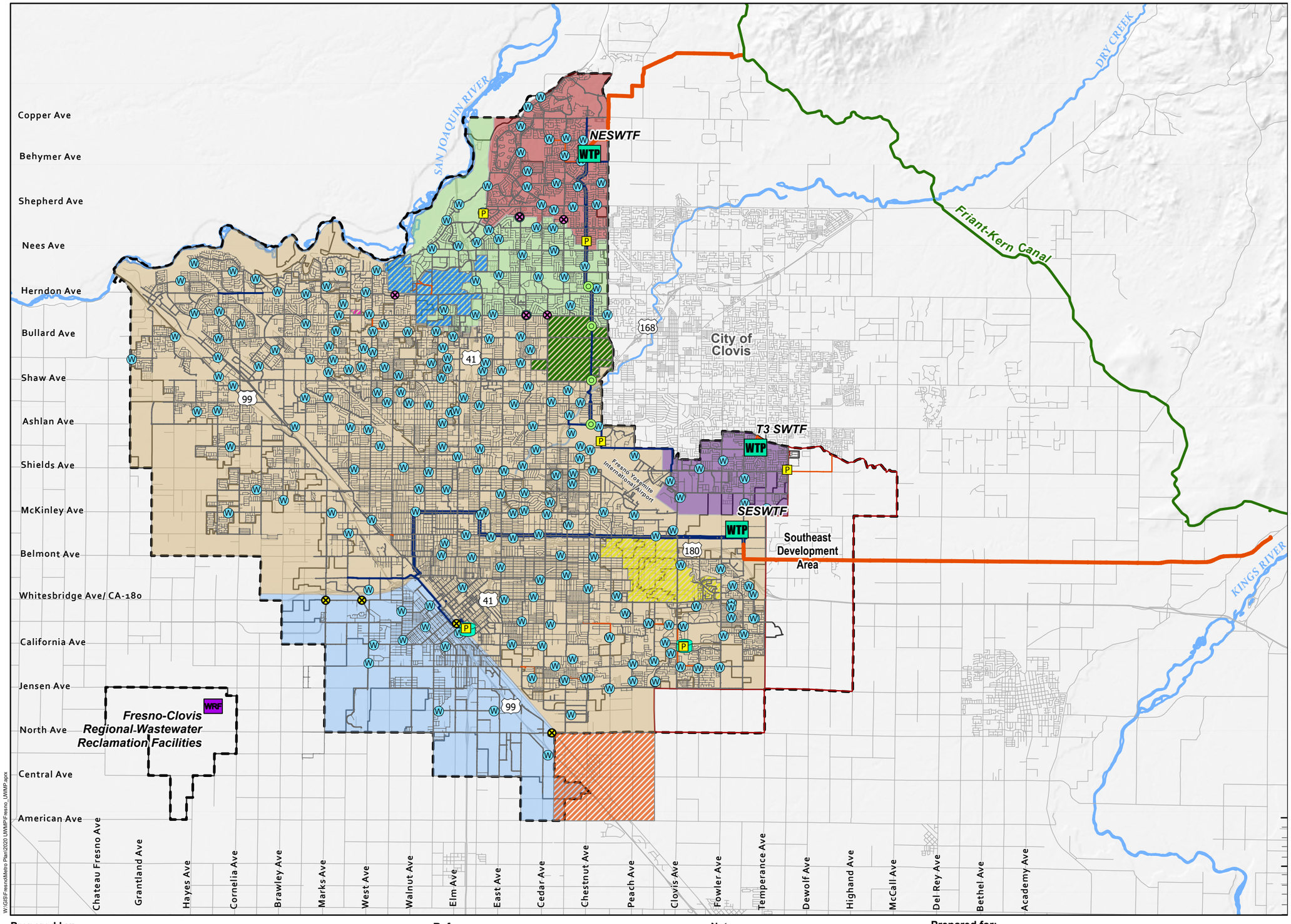
1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 3-1. City Service Area



Legend

City Facilities

- WTP — Water Treatment Plant
- P — Booster Pump Station
- Storage Facility
- W — Active Well
- Existing Turnout
- WRF — Wastewater Reclamation Facility

Gate System Valves

- Pressure Relief Valve
- Pressure Sustaining Valve

Water Mains by Diameter (inch)

- <10
- 10 - 16
- 16 - 30
- 30 - 72

Raw Water Mains by Diameter (inch)

- <10
- 10 - 16
- 16 - 30
- 30 - 72
- Friant-Kern Canal

Areas Served Water by Others

- Bakman Water District
- Malaga Water District
- Park Van Ness Mutual Water District
- Pinedale County Water District
- CA State University, Fresno

Pressure Zones

- Highway 41
- Booster Station 4
- Shepherd
- Sierra
- Southwest

City Features

- Southeast Development Area
- Fresno Sphere of Influence
- Fresno City Limits
- Streets

W:\GIS\FresnoMetro Plan\2020 UWMP\Fresno_UWMP.aprx

Prepared by: WSC

N

1:136,886

0 0.75 1.5 3 Mi

0 3,500 7,000 14,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 3-2. Water System

3.2 Service Area Climate

The City's service area is in California's San Joaquin Valley in Fresno County along Highway 99. The climate of the area is best described as Mediterranean, characterized by hot dry summers and cool winters. Precipitation in the area averages around 11 inches per year, as shown in **Table 3-2**. However, rainfall can significantly vary year to year, with over 18 inches received in 2011 and less than 4 inches received in 2014. The recent drought was marked by four consecutive years (2012 to 2015) of less than 10 inches of rainfall. As shown by the average evapotranspiration (ET_o) and temperature values in **Table 3-2**, the City's water use in the summer months is significantly higher than in the winter, reflecting increased water use for irrigation purposes during the hot, dry summers.

Table 3-2. Average Climate Characteristics

MONTH	ET_o (INCHES)	RAINFALL (INCHES)	TEMP-HIGH (°F)	TEMP-LOW (°F)
Jan	1.17	2.33	56.9	37.4
Feb	1.98	1.8	62.6	39.8
Mar	3.73	1.99	68.4	43.6
Apr	5.43	0.99	73.7	46.9
May	7.33	0.54	81.3	53.2
Jun	8.41	0.19	89.6	59.1
Jul	8.8	0.02	95.7	63.8
Aug	7.82	0.01	94.6	62.5
Sep	5.69	0.07	89.6	57.9
Oct	3.68	0.59	79.3	49.3
Nov	1.85	0.98	66.2	40.6
Dec	1.10	1.83	56.5	36.1
Total/ Average	**56.99**	**11.34**	**76.2**	**49.2**

Source: CIMIS Website: http://www.cimis.water.ca.gov, Station 80 Fresno State (1988 to 2020) Monthly Average Report, October 2020 (downloaded November 30, 2020)

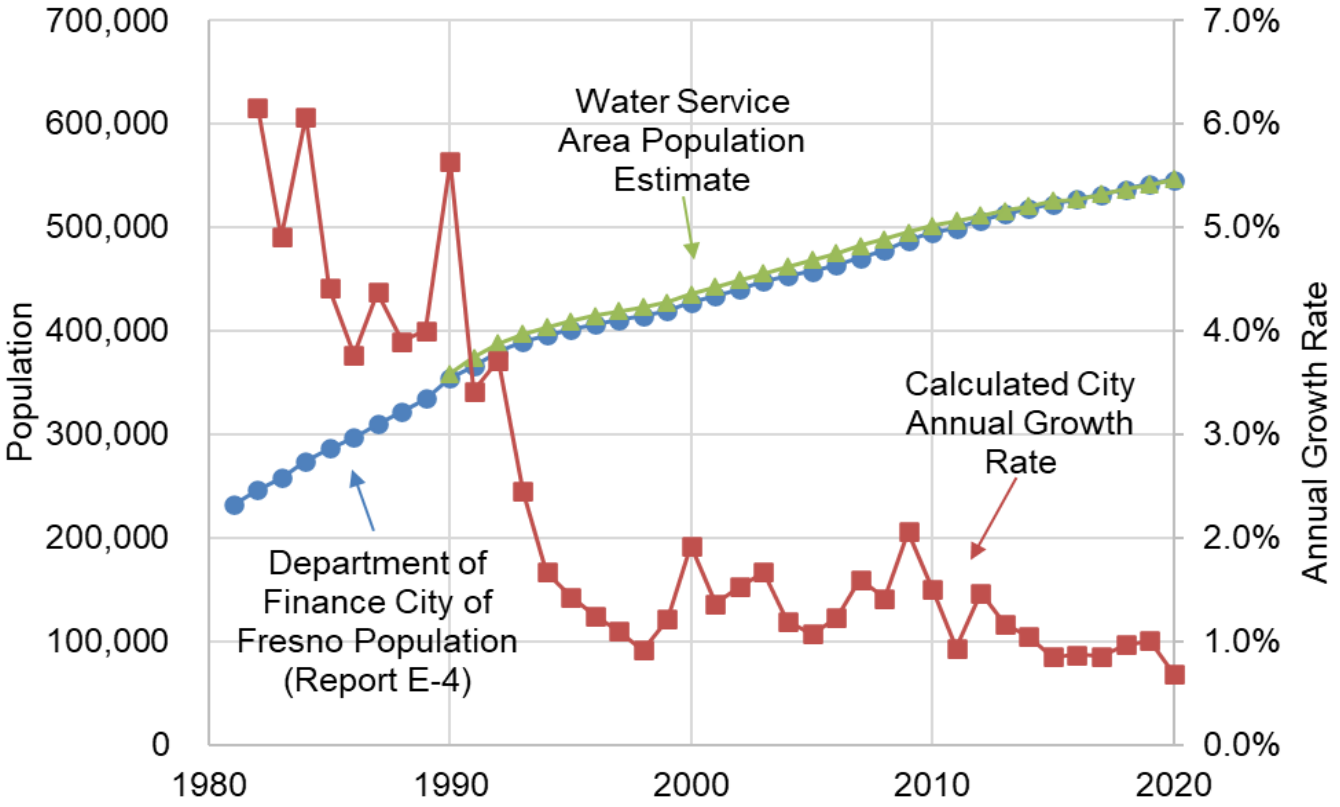
3.3 Service Area Population and Demographics

The City experienced rapid growth since it was founded by the Central Pacific Railroad in 1872 up through the mid-1990s, when the City's annual growth rate was typically greater than 2%. From 1995 to 2015, the annual growth rate has decreased to an average of 1.3%, and since 2015, the rate has not surpassed 1.0%.

The population served by the City Water Division is slightly higher than the City's population after adding unincorporated areas served by the City and removing areas within the City limits served by private water companies, special districts, or private wells. The City acquired County service areas and facilities in 1989, which increased the service area population to slightly greater than the City population since 1990.

Figure 3-3 compares the historic City population to the water service area population since 1990. Water service area population estimates prior to 1990 were unavailable for comparison to the City's population. The City Water Division's methodology for calculating the population of the City's water service area involves summing all the Census tract data for the City's overall service area and subtracting out tracts not served by the City. These tracts included areas served by Pinedale, Bakman, and CSUF, as well as areas outside the City service area, unserved areas within County areas, unserved areas within City areas, and areas with only partial service (i.e., straddling City service areas). Based on the City's methodology, the water service area population was estimated to be 546,502 in 2020, compared to 545,769 for the total City population in January 2020 (California Department of Finance, 2020). For comparison, in the 2015 UWMP, the City Water Division population served was 525,575 compared to the total City population of 522,369 (California Department of Finance, 2020). The City's water service area population in 2020 using the DWR Population Tool is 550,217 and is similar to the population estimate using the City's methodology.

Figure 3-3. City of Fresno and Water Service Area Historic Population



The City's General Plan is the City's primary growth planning document from which the baseline water service area population projection for this UWMP was developed. The General Plan includes population estimates for the City planning area, which includes all areas within City limits and unincorporated areas outside of City limits within the City's SOI, based on projections developed by the Fresno Council of Governments and estimates a buildout population of 921,057 in 2056. In 2017 the Fresno Council of Governments developed population projections in 5-year increments through 2050 for all cities within Fresno County (Applied Development Economics, Inc. and Mintier Harnish Associates, 2017). The Fresno Council of Governments' 2017 report projects the City's population will grow at an annual growth rate ranging from 0.92–1.44%, with an average annual growth rate between 2020 and 2056 (buildout) of 1.03% per year. These population projections and growth rate have been incorporated in the City's General Plan population projections.

According to the City's Planning and Development Department, the City's water service area population is anticipated to continue to grow along with the City, with some slightly higher growth years anticipated within the next 10 years due to multiple large developments planned for completion in the near term. For planning purposes, this UWMP assumes the City will slowly incorporate areas served by others within the City's SOI by buildout in year 2056. As such, the long-term water service area population annual growth rate is expected to be 1.44% between 2020 and 2056 to account for absorbing these areas into the City's water system.

The baseline population projection starts with the 2020 water service area population determined using the DWR Population Tool and grows based on areas expected to be developed by 2030,

as provided by the City's Planning Department, and then linearly beyond 2030 to meet the buildout population in 2056. The City's 2020 population estimate includes the entire City planning area, including areas not served water by the City and areas currently outside the City limits but within the SOI, and is higher than the current water service area population. The water service area population projection assumes the City will incorporate all areas currently served by others and grow to provide water service to all areas within the SOI by buildout. Because the water service area has more growth potential than the City planning area, the annual average growth rate as calculated ranges from 1.1–2.1% between 2020 and 2056, with an average annual growth rate of approximately 1.56% between 2020 and 2045 that continues to slow through the buildout. **Table 3-3** shows the water service area population projections through 2045 in five-year increments.

Table 3-3. Current and Projected Population (DWR 3-1R)

POPULATION SERVED	2020	2025	2030	2035	2040	2045
TOTAL	**550,217**	**609,433**	**674,677**	**719,327**	**765,278**	**812,529**

3.3.1 Other Social, Economic, and Demographic Factors

Most recently, the City is experiencing significant impacts due to the global pandemic caused by COVID-19 (SARS-CoV-2) virus. In March 2020, the State issued a stay-at-home order that forced many businesses to close and other businesses to require residents to continue work only from their home to slow the spread of the virus. Additionally, the forced closure of several businesses caused a historic increase in unemployment across the US and a resulting economic recession. While all the impacts of COVID-19 are not entirely known at this time, it has caused a shift in water use by customer class. In 2020, residential demands increased by over 8% from 2019 demand, while commercial and industrial water use decreased by over 5%. This shift is expected to be temporary with an anticipated return to previous levels once all stay at home orders are lifted and businesses can reopen. However, the economic recession could have longer term impacts to the region.

CITY OF FRESNO

4 Water Use Characterization

This chapter describes and quantifies 2020 water use and projected water use through 2045 within the City's service area.

Water consumption in the City is characterized by the typical demand sectors of residential, commercial, institutional, industrial, and irrigational. The difference between production and consumption is losses, which may be attributed to system leaks, meter inaccuracies, fire flows, theft, unmetered use, or other factors.

IN THIS SECTION

- Distribution System Water Losses
- Past and Current Water Use
- Projected Water Use

4.1 Non-Potable Versus Potable Water Use

The City serves its customers potable water for residential, commercial, institutional, industrial, and landscape irrigational demands through its potable water distribution system.

The City also diverts raw surface water obtained from the United States Bureau of Reclamation (USBR) and Fresno Irrigation District (FID) to recharge basins throughout the service area. The City coordinates with FID for the delivery of the recharge water, utilizing FID's existing system of channels and pipelines to convey the raw water, and with Fresno Metropolitan Flood Control District (FMFCD) to deliver water to FMFCD's stormwater retention and recharge basins or its own recharge basins. The raw surface water recharges the groundwater basin to sustain the groundwater supply for the City. The groundwater recharge volume can vary based on surface water supply availability and is represented as an addition to annual groundwater supplies as discussed in **Chapter 6**. In addition, the City serves a limited number of customers secondary treated or tertiary treated and disinfected recycled water for agricultural irrigation or landscape irrigation, respectively. The recycled water demands are discussed in **Section 6.4**.

4.2 Past, Current, and Projected Water Use by Sector

The following sections document the past and current water use for each sector, and the projected water use through 2045.

4.2.1 Water Use Sectors

Records of historical water consumption serve as the basis for developing water demands by water use sector. Water consumption is the volume of water measured at each metered service.

The City tracks water consumption across different water use sectors listed in the California Water Code (CWC), including:

- Single-Family Residential
- Multifamily Residential
- Commercial and Institutional / Governmental
- Industrial
- Landscape
- Distribution System Losses

In addition to the water uses listed in the CWC, the City participates in exchanges and transfers, provides temporary travel meters for temporary water use, and diverts non-potable surface supplies for groundwater recharge, described below. The City does not provide water for sales to other agencies, saline water intrusion barriers, or agricultural use.

4.2.1.1 Exchanges

Since 1976, the City has had a water exchange agreement with FID for delivery of the City's percolated wastewater effluent — considered equivalent to tertiary treatment — to FID canals. This is not counted as a water use in this chapter and is discussed as a water supply in **Section 6.6.1.2**.

4.2.1.2 Other

A small, quantified water demand has been classified as “other” to account for temporary travel or construction meters for water used for dust control. This use type typically accounts for less than one percent of total water use.

4.2.2 Distribution System Water Losses

Real losses, as defined in the American Water Works Association (AWWA) Water Audit tool are:

“Physical water losses from the pressurized system (water mains and customer service connections) and the utility’s storage tanks, up to the point of customer consumption. In metered systems, this is the customer meter; in unmetered situations, this is the first point of consumption (stop tap/tap) within the property. The annual volume lost through all types of leaks, breaks, and overflows depends on frequencies, flow rates, and average duration of individual leaks, breaks, and overflows.”

The past five years of distribution system losses are listed in **Table 4-1**, and the results of the 2016-2019 AWWA Water Audit Tool are provided in **Appendix E**. The AWWA Audit Worksheet was not completed for 2020 prior to the submittal of this plan, and the volume of water loss is estimated as the difference between water produced and metered water consumed for each calendar year period.

The overall consumption of water in the system is placed into four different categories:

- Billed Metered Usage
- Billed Unmetered Usage
- Unbilled Metered Usage
- Unbilled Unmetered Usage

The water losses for the system were found by determining the difference between the overall amount of water supplied to the community and the apparent system losses. The City’s system losses have many different possible causes such as hydrant flushing/testing, construction, firefighting, system leaks, water main breaks, and meter error. The estimated loss in 2020 is 9,568 acre-feet (AF), which is the difference between metered production and metered consumption and is approximately 8% of the overall system production. Based on the previous four years of audits, the City has not had to apply meter adjustments in the AWWA Water Audit Tool, and the water losses report is the difference between water produced and metered water consumed each year. It is anticipated that the estimated 2020 water loss volume in **Table 4-1** will be the water losses reported on the 2020 AWWA Audit when it is certified.

Currently, the City does not have a water loss standard but intends to evaluate programs to reduce water losses in their Metro Plan that is currently being updated. The City is also tracking forthcoming water use standards, which will include a water loss standard that is planned to be adopted by the Water Board within the next few years.

Table 4-1. DWR 4-4R 12 Month Water Loss Audit Reporting

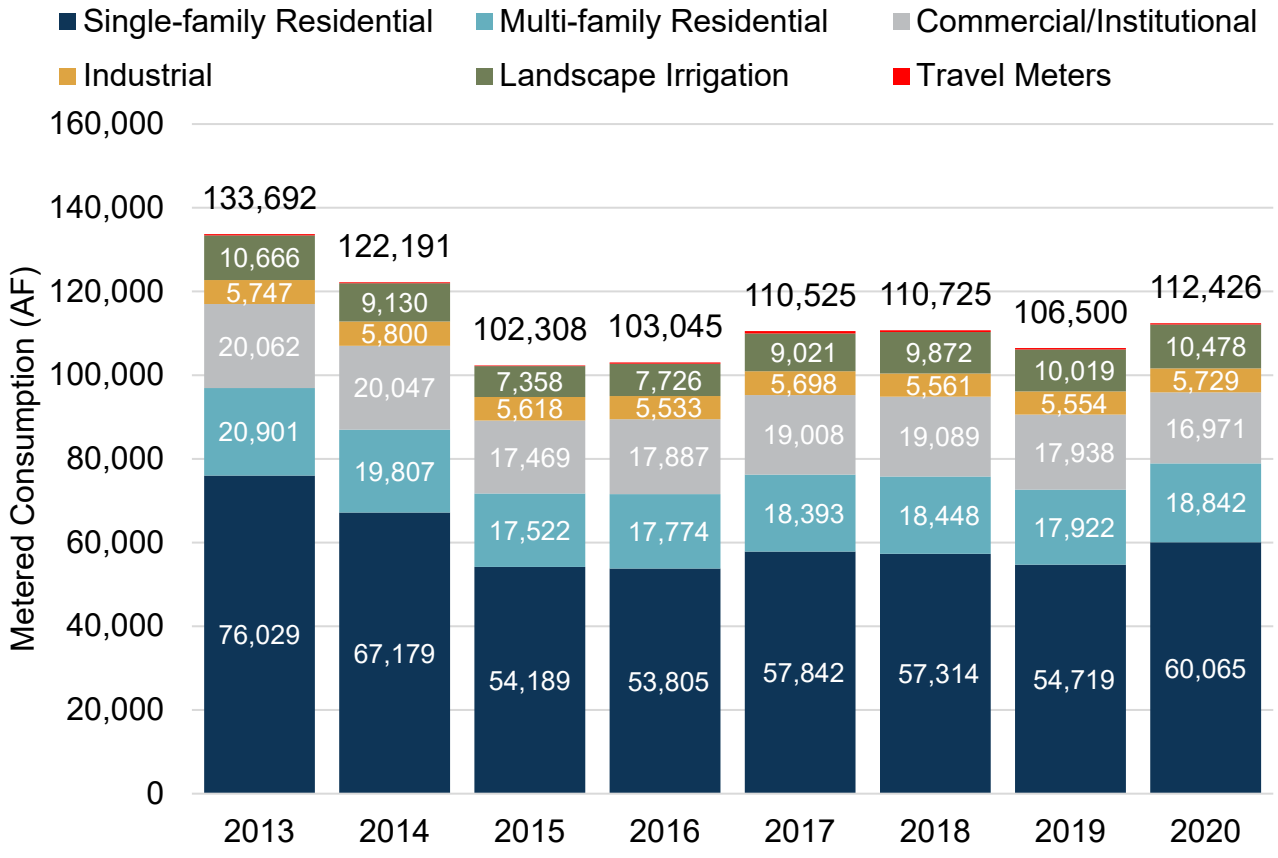
REPORT PERIOD START DATE		VOLUME OF WATER LOSS, AFY	PERCENT LOSS OF PRODUCTION
MM	YYYY		
1	2016	9,036	8.0%
1	2017	10,235	8.5%
1	2018	9,028	7.5%
1	2019	9,059	7.8%
1	2020	9,568	7.8%

For 2016 through 2019, volume of water loss is taken from the AWWA Water Audit Tool. For 2020, the volume of water loss is the difference in metered production and metered consumption.

4.2.3 Past and Current Water Use

Since 2013, all water services in the City's water service area have been metered. Prior to 2013, the City estimated single-family residential water use, since these services were not equipped with meters, by subtracting all other metered uses (commercial, institutional, industrial, and irrigational), plus 10% assumed losses, from production data. Water consumption for the City's water service area by customer type for 2013–2020 is shown on **Figure 4-1**.

Figure 4-1. Historical Consumption by Customer Type (2013–2020)



As shown in the figure, single-family residential water use has decreased more than 20,000 AFY since the Single-Family Metering Program was completed in 2013. Multifamily residential, commercial, and institutional services have historically been metered, and consumption has also decreased since 2013, with industrial users and landscape irrigation consumption at similar levels to 2013 consumption, even as new customers are connected to the City's water system. Landscape irrigation demands did decrease in 2015 and 2016, likely due to the drought restrictions, and continue to recover after the drought ended in 2017.

Table 4-2 provides the breakdown of actual water use by sector type in calendar year 2020. As shown in **Table 4-2**, single-family residential water use is the largest use type in the City and accounted for almost 50% of potable water use in 2020. Multifamily residential use was the second largest, accounting for approximately 15% of water sales in 2020. Together, residential water use accounts for about 65% of all potable water uses in the City's service area. The remaining potable water uses consist of mainly commercial and institutional water use, which are tracked together and included only on the commercial use row on **Table 4-2**, followed by landscape irrigation and industrial usage. Distribution losses accounted for approximately 8% of potable water used in 2020 (per **Section 4.2.2**).

Table 4-2. Actual Demands for Water: Potable (DWR 4-1R)

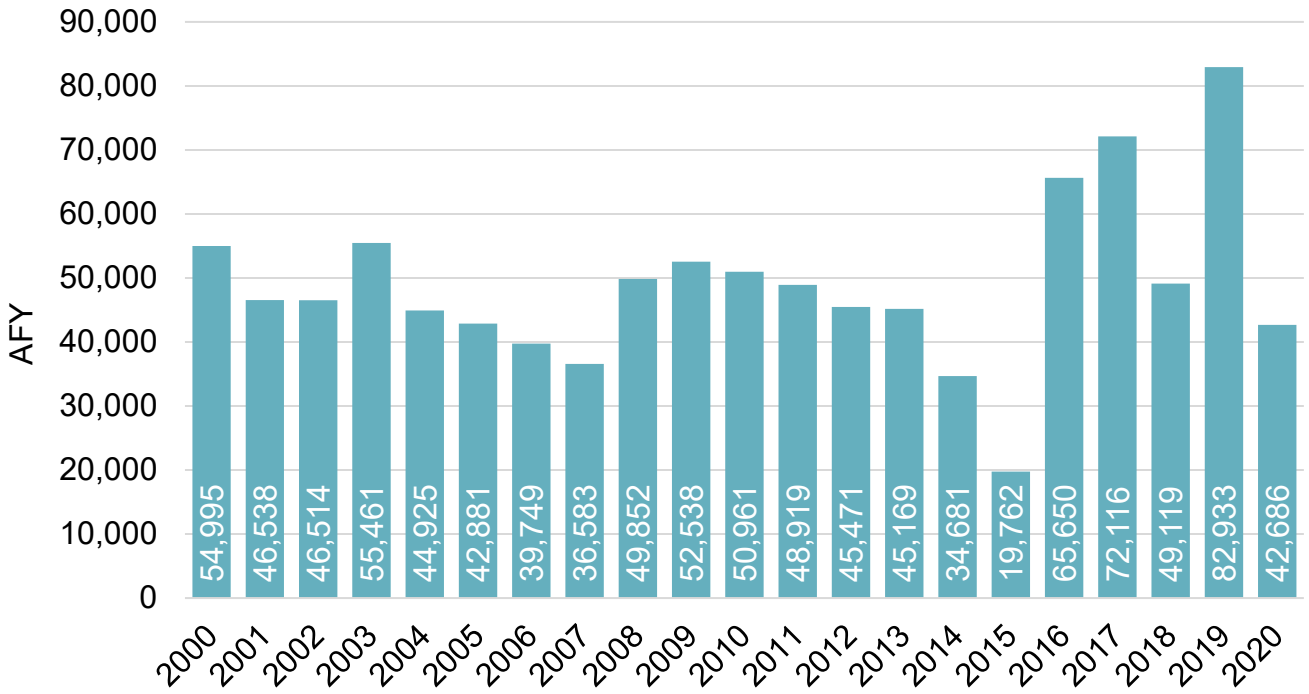
USE TYPE	ADDITIONAL DESCRIPTION	LEVEL OF TREATMENT WHEN DELIVERED	2020 VOLUME	PERCENT OF TOTAL
Single Family		Drinking Water	60,065	49.2%
Multi-Family		Drinking Water	18,842	15.4%
Commercial		Drinking Water	16,971	13.9%
Industrial		Drinking Water	5,729	4.7%
Institutional/ Governmental	See Note 1	Drinking Water	---	---
Landscape		Drinking Water	10,478	8.6%
Other	Travel Meters	Drinking Water	340	0.3%
Losses		Drinking Water	9,568	7.8%
Total:			**121,993**	**100%**

Note:

1. Institutional and Governmental water usage is included in the Commercial use type.

Figure 4-2 shows the historic volume of the City's raw surface water used for groundwater recharge since 2000. Over the last 20 years (2000–2020), the average annual intentional recharge of surface water was 49,240 AFY. Total recharge has ranged from a high of 82,900 AF in 2019 and a low of 19,700 AF in 2015. Also, total recharge volumes in 2016, 2017, and 2019 were three of the highest volumes in the last 20 years. The increases were due to over 30% increase in recharge at City basins from the addition of several basins (Nielsen, Fancher) and proactive maintenance of basins to maximize percolation capacity. The annual variability between years is caused by several factors, including basin availability, water delivery season, pond maintenance, or length of wet seasons.

Figure 4-2. Historic Recharge of City Surface Water



4.2.4 Projected Water Use

4.2.4.1 Land Use Projections

The potable demand projections through 2045 for normal water use follow the methodology for land use-based projections described in Appendix K of the 2020 Urban Water Management Plan (UWMP) Guidebook. Under this methodology, existing land use and demand is accounted separately from future land use and demand. This allows different demand factors to be applied to current land use areas and future land use areas. Future land use areas represent future customers and developments that are expected to be more water efficient than existing land uses and buildings due to the California Plumbing Code (CPC) and use of higher efficiency appliances and landscapes.

The existing and future land use acreage was sourced from the City's Geographic Information System (GIS) database and the City's General Plan. The existing land use shapefile and associated acreage for each land use classification were used to represent 2020 land use data. Areas not served by the City were excluded from the existing land use shapefile. The future land use shapefile corresponds with the planned land use at buildout as described in the City's General Plan representing the year 2056. Although the City does not have any plans to serve areas currently served by others within the City limits, all areas within the City Sphere of Influence (SOI) were assumed to be served by the City by buildout for conservative planning purposes. **Table 4-3** lists the land use acreage by land use category for the 2020 and buildout 2056 water service areas.

The land use acreage between 2020 and 2056 was estimated in 5-year increments based on areas planned to be developed by 2030 from the City's Planning Department, and by linearly interpolating the remainder of the change in acreage for each land use category between 2030 and 2056. **Figure 4-3** shows the existing and projected land use by customer class used to develop the projections.

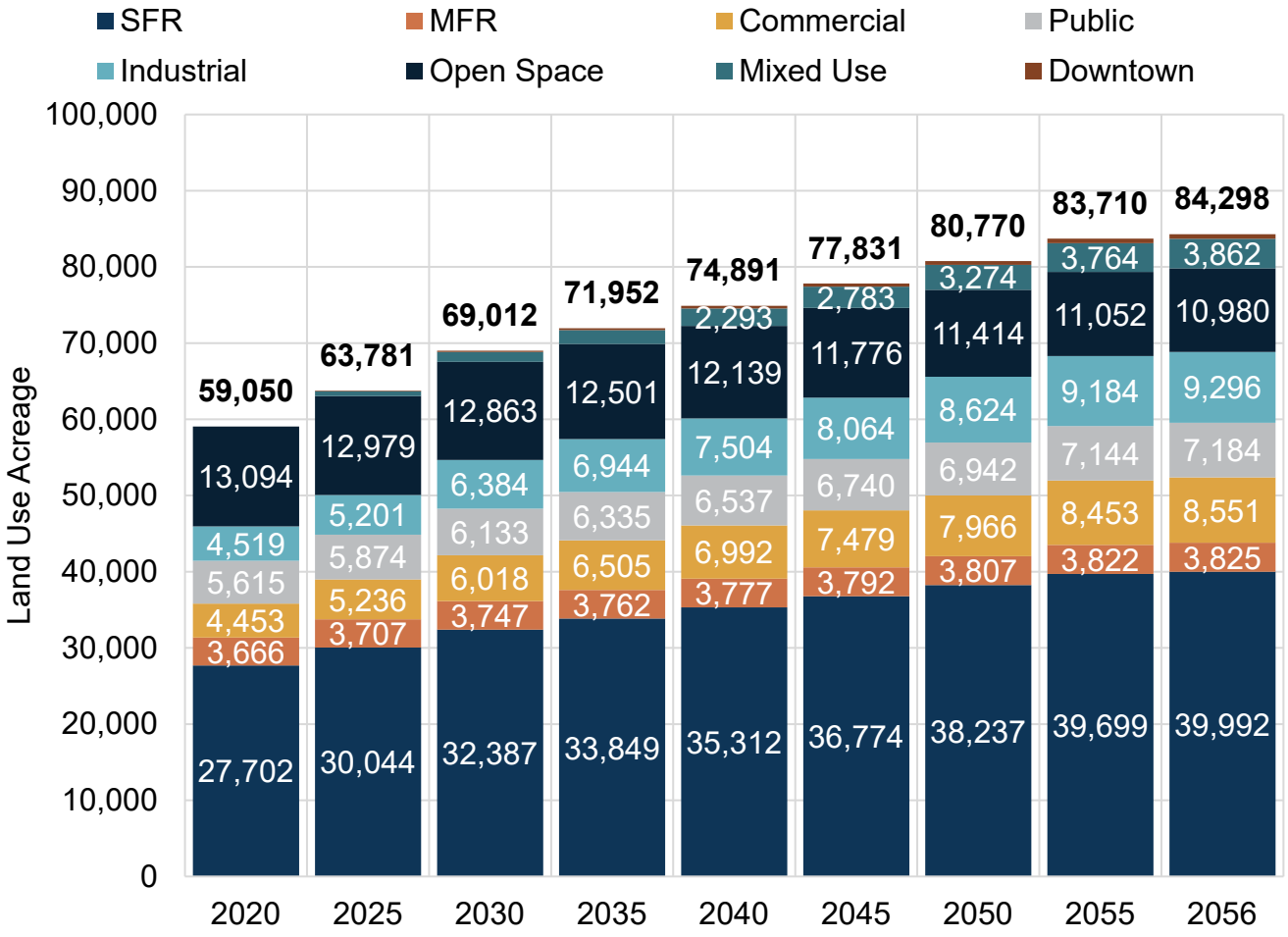
Table 4-3. Existing and Future Water Service Area Acreage

LAND USE CATEGORY	2020 WATER SERVICE AREA[1, 3, 4]		2056 WATER SERVICE AREA[2]	
	ACRES	PERCENT	ACRES	PERCENT
Single-Family Residential	27,700	47%	40,000	47%
Multifamily Residential	3,700	6%	3,800	5%
Commercial	4,500	8%	8,600	10%
Public Facility	5,600	9%	7,200	9%
Industrial	4,500	8%	9,300	11%
Open Space/ Landscape Irrigation	13,100	22%	11,000	13%
Mixed Use[3]	0	0%	3,900	5%
Downtown[3]	0	0%	600	1%
TOTAL	**59,100**	**100%**	**84,300**	**100%**

Notes:

1. Acreage from City of Fresno GIS Shapefile of Land Uses provided 8/12/20 and reduced to the City's water service area (excludes Pinedale, Bakman, and California State University Fresno and unserved areas outside the City limit and SOI).
2. Future Land Use Shapefile provided by the City on 8/12/20 and aligns with the General Plan for buildout in year 2056. The buildout service area acreage listed excludes the Fresno-Clovis Regional Wastewater Reclamation Facility, land used for road, highways, and railroads, and the north area outside of the SOI.
3. Mixed use and downtown land use categories are not in the existing land use shapefile. They are described in the General Plan as new designations for redevelopment of existing areas that contain a mix of land uses.
4. Approximately 11,300 acres of non-water demanding vacant/partially vacant land is excluded from the 2020 water service area acreage.

Figure 4-3. Existing and Projected Land Use



Note: Acreage for Mixed-use and Downtown land use types are not shown every year for clarity, but are included in the total acreage value.

4.2.4.2 Demand Factors and Future Savings

Land use-based water demand factors were developed using 2018 metered consumption data matched to 72 categories of land use data. These demand factors were applied to the 2020 land use acreage by category to develop the demand projection beginning in 2020. Demand factors for land uses that grow over time and represent new developments were assigned a lower demand factor than the demand factors for existing development. Additionally, demand factors were assumed to slowly reduce over time due to passive conservation, which includes the replacement of older water fixtures and appliances with more efficient types now required as part of the CPC. The passive conservation savings are projected to be greater for existing customers than future customers because future customers are already assumed to have a lower water demand factor and meet the plumbing code.

Future savings due to passive conservation were developed using the Alliance for Water Efficiency (AWE) Water Conservation Tracking Tool. The Tracking Tool is an Excel tool that can

incorporate water service area-specific data to estimate natural replacement rates of fixtures and future savings based on the CPC.

Table 4-4 lists the passive conservation savings assumption incorporated in the potable demand projections. Existing unit demand factors are reduced by the percentages listed to develop the future development unit demand factors. As shown in the table, this assumes future residential and non-residential dwelling units are 10% and 5% more water efficient, respectively, than existing dwelling units due to changes in the plumbing code and ever-increasing new water efficient technology. **Table 4-5** compares the total potable demand projections without the estimated savings due to passive conservation from 2025–2045.

Table 4-4. Passive Conservation Savings Assumptions

LAND USE TYPE	FUTURE DEVELOPMENT UNIT DEMAND FACTOR REDUCTION[1]	EXISTING DEVELOPMENT ANNUAL PASSIVE CONSERVATION SAVINGS[2]	FUTURE DEVELOPMENT ANNUAL PASSIVE CONSERVATION SAVINGS[3]
Residential/Mixed Use	10%	0.20% per year	0.04% per year
Commercial/Downtown	5%	0.05% per year	0.01% per year
Public	5%	0.05% per year	0.01% per year
Industrial	5%	0.05% per year	0.01% per year
Open Space/ Landscape Irrigation	0%	0% per year	0% per year

Notes:

1. Existing (2020) unit demand factors are reduced by the percentages listed to develop the future development unit demand factors.
2. Existing development annual passive conservation savings were developed using the AWE Water Conservation Tracking Tool.
3. Future development passive conservation savings are assumed to be one-fifth the rate of existing development passive conservation savings.

Table 4-5. Projected Future Savings for Potable Demands, AF

	2025	2030	2035	2040	2045
Total Potable Demand with no conservation	137,521	149,361	157,204	165,047	173,160
Estimated Passive Conservation	1,017	2,005	2,994	3,973	5,213
TOTAL POTABLE DEMAND WITH PASSIVE CONSERVATION	**136,504**	**147,356**	**154,210**	**161,074**	**167,947**

4.2.4.3 Demand Projections

Table 4-6 provides the projected demands by use type based on the methodology described above. **Table 4-7** includes the projected raw surface water used for groundwater recharge through the planning period for normal years. The City intends to recharge an average of 60,000 AFY beyond 2020, corresponding with the average recharge volume from 2016 through 2020, and gradually increase recharge by about 540 AFY each year. In 2025, the normal year groundwater recharge is projected to be 62,700 AFY and will continue to increase to 73,500 AFY by 2045. The actual volume recharged is based on the available surface water supplies each year, as well as available basin capacity and other factors, and may be lower in dry years or higher in wet years.

Table 4-6. Projected Demands for Water: Potable (DWR 4-2R)

USE TYPE	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
		2025	2030	2035	2040	2045
Single Family		76,255	80,429	82,934	85,437	87,936
Multi-Family		19,000	20,654	21,737	22,831	23,935
Commercial		19,052	21,135	22,587	24,041	25,496
Industrial		7,410	9,003	9,922	10,841	11,758
Institutional/ Governmental	See Note 1					
Landscape		4,490	5,035	5,422	5,809	6,196
Other	Travel Meters	200	200	200	200	200
Losses		10,097	10,900	11,408	11,917	12,426
TOTAL:		**136,504**	**147,356**	**154,210**	**161,076**	**167,947**

Note 1: Institutional and Governmental water usage is included in the Commercial use type.

Table 4-7. Projected Demands for Water: Non-Potable (DWR 4-2R)

USE TYPE	ADDITIONAL DESCRIPTION	PROJECTED WATER USE				
		2025	2030	2035	2040	2045
Groundwater Recharge	Raw-Water	62,700	65,400	68,100	70,800	73,500
TOTAL:		**62,700**	**65,400**	**68,100**	**70,800**	**73,500**

4.2.4.4 Future Conservation

In 2018, following the unprecedented drought, California Legislature established a framework centered on "Making Water Conservation a California Way of Life." The goal was to help the State better prepare for droughts and climate change by establishing statewide water efficiency standards and incentivizing recycled water (California Department of Water Resources, State Water Resources Control Board, November 2018). The resulting legislation of Senate Bill 606 and Assembly Bill 1668, along with future regulations, will have impacts on water providers over the coming years, requiring indoor, outdoor, and commercial, industrial, and institutional water use goals, water loss standards, annual water budgets, and documented preparation for long-term water shortages. All the water use goals together will form a total urban water use objective specific for each water agency. The Department of Water Resources (DWR) has provided recommended standards for indoor residential water use, and other urban water use goals are currently being developed and are expected to be released in late 2021. The State Water Resources Control Board is anticipated to adopt the element that includes the total water use objective in 2022, and agencies will begin reporting their water use in accordance with their urban water use objective beginning in 2024, with compliance anticipated by 2027. Because most of the water use goals are unknown, and none has been adopted by the State, the City's total urban water use objective is unknown and was not incorporated into the demand projections herein. However, the City is tracking the water use efficiency standards and goals and is aware it may need to implement additional conservation above what is presented in these projections to meet its total urban water use objective as mandated by the State in the future. The City is considering these higher conservation demand projections within a demand envelope in the current Metro Plan update.

4.2.5 Characteristic Five-Year Water Use

A new component of the UWMP is to prepare a five-year drought risk assessment (DRA) to evaluate water service reliability for a drought lasting five years from 2021–2025. The five-year DRA assumes potable water demand is unconstrained, and the City will continue to meet all projected potable demands. The raw water demand varies based on the availability of surface water supplies for groundwater recharge. The recycled water supply is not impacted by the drought, and recycled water demands are at normal year projections for the five-year drought. Projected water demands for years 2021–2025 for the DRA are included in **Section 7.2**.

4.3 Water Use for Lower Income Households

The Fresno Council of Governments (COG) prepared an update to the Regional Housing Needs Allocation (RHNA) to cover the period of January 1, 2015–December 31, 2023. The City subsequently developed its own Housing Element based on the COG RHNA for the planning period of December 31, 2015–December 31, 2023. The City's current Housing Element was adopted on April 13, 2017.

The City's Housing Element specifies the City will develop 8,955 new housing units through 2023 for extremely low, very low, and low income levels (City of Fresno Development and Resource Management Department, 2017). The City's Planning and Development Department prepares Housing Element Annual Progress Reports to report the progress of the RHNA and housing goals. The City of Fresno 2019 Housing Element Annual Progress Report details that 909 lower income units are approved or permitted (City of Fresno Planning and Development Department,

2020). The remaining number of lower income units needed over the RHNA 2013–2023 period, when subtracting the approved and permitted units, is 8,046.

Table 4-8 includes the Housing Element identified available single-family and multifamily acres to be developed and dwelling units for Extremely Low, Very Low, Low, Moderate, and Above Moderate income levels (City of Fresno Development and Resource Management Department, 2017). This data was used to determine the number of acres of both single-family and multifamily land use that needs to be developed by 2023 to meet the remaining 8,046 lower income units target for RHNA. The identified acres needed for low-income development by 2023 was applied to the average water demand factor for single-family and multifamily land uses to project the lower income water demands through 2023 to meet RHNA, shown in **Table 4-8**.

Table 4-8. Lower Income Dwelling Units and Acres to be Developed through 2023 and Estimated Water Demand

FRESNO HOUSING ELEMENT	SINGLE-FAMILY RESIDENTIAL	MULTIFAMILY RESIDENTIAL	TOTAL
Acres Available for Low-Income Development	3,163.6	1,310.9	4,474.5
Total Dwelling Units	13,457	21,526	34,983
Dwelling Unit per Acre	4.25	16.42	
Dwelling Unit Needed to Meet RHNA	3,095	4,951	8,046
Acres to be developed to Meet RHNA	727.6	301.5	1,029.1
Average Water Demand Factor (AF/ Acre)	2.54	5.13	
Low-Income Demand to meet RHNA from years 2020 – 2023 (AF)	1,847	1,545	3,392
Annual Low-Income Demand to meet RHNA (AFY)	**462**	**386**	**848**

Based on the estimated low-income water demand to meet the RHNA requirements by 2023, the annual projected low-income households demand is 462 AFY for single-family residential and 386 AFY for multifamily residential. For the purposes of this plan, the current RHNA projected low-income growth and water demands was applied through the UWMP planning period of 2045 and is presented in **Table 4-9**. However, lower income demands beyond 2023 will be based on the next Housing Element and RHNA Update expected in 2023 and may change in the future. All housing units and associated population are included in the adopted General Plan, and the demands for these units that occur within the water service area boundaries are included in the future water demands presented in this plan.

Table 4-9. Lower Income Household Projected Water Demands

LOW INCOME DEMAND	2025	2030	2035	2040	2045
Single-Family Residential Demand	2,308	2,308	2,308	2,308	2,308
Multifamily Residential Demand	1,932	1,932	1,932	1,932	1,932
TOTAL (AF)	**4,240**	**4,240**	**4,240**	**4,240**	**4,240**

4.4 Climate Change Considerations

Climate change impacts were considered in the North Kings Groundwater Sustainability Plan (NKGSP) based on DWR's Guidance for Climate Change Data Use during Groundwater Sustainability Plan (Department of Water Resources, 2018) and the related Sustainable Groundwater Management Act climate change website.[1] As documented in the NKGSP, the DWR climate change datasets were developed for the California Water Commission's Water Storage Investment Program (WSIP), are consistent with other DWR programs, are based on the best available science, build on previous efforts, incorporate the latest advances in projections, and follow the Climate Change Technical Advisory Group guidance (Provost & Pritchard, November 2019).

Changing precipitation and evapotranspiration (ETo) rates are expected to have the greatest impact on future demands, especially for outdoor water use. The WSIP climate change data sets estimate minimal changes to precipitation due to climate change from the historic period. The same datasets predict the ETo rate estimates with climate change will increase 3% by 2030 and up to 8% by 2070. More specifically, the ETo rate is predicted to increase the most in typically low ETo months (winter) and when irrigation is limited. The ETo rate is also predicted to be only slightly higher than historic in warmer months during the irrigation season. While higher ETo rates would increase irrigation demands, they are not anticipated to substantially impact the City's urban water use. The climate change impacts to supply sources are discussed in the supply chapter of **Section 6.8.2.1**.

[1] https://data.cnra.ca.gov/dataset/sgma-climate-change-resources

CITY OF FRESNO

5 SBX7-7 Baseline, Targets and 2020 Compliance

Senate Bill x 7-7 (SBx7-7) was signed into law in 2009 and requires the State to achieve a 20% reduction in per capita water use by December 31, 2020, with an interim target of 10% reduction by December 31, 2015.

IN THIS SECTION

- Baselines & Targets
- 2020 Compliance

The legislation requires each urban water supplier to develop and include in its Urban Water Management Plans (UWMPs) estimates of: 1) *baseline* daily per capita water use; 2) daily per capita water use *target*; 3) daily per capita water use *interim target*; and 4) *compliance* daily per capita water use. The UWMP must also include the basis for determining the estimates, with references to supporting data.

The Department of Water Resources (DWR) developed the Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use Guidebook (GPCD Methodologies Guidebook) to provide appropriate methodologies and criteria guidance (California Department of Water Resources, Feb 2016).

The baseline and 2020 per capita water use targets were calculated in the 2015 UWMP and are provided in **Appendix C**. There have not been significant changes in the City's service area since 2015, thus the calculations included in the 2015 Plan are still valid for compliance in this 2020 UWMP.

5.1 General Requirements for Baseline and Target

Methodologies consistent with those described in the GPCD Methodologies Guidebook were used to develop baselines and targets. The selected procedure used to develop the required SBx7-7 estimates includes the following basic steps:

1. Calculate baseline water use, which is the average gross daily water use per capita, reported in gallons per capita per day (GPCD), based on gross water use and service area population for a continuous 10-year period ending no earlier than December 31, 2004.
2. Calculate urban water use target using one of the four methods described below.
3. Check and confirm the urban water use target using the five-year running average.
4. Calculate the interim urban water use target (equal to the average of the baseline and confirmed urban water use target).
5. Calculate the compliance daily per capita water use (equal to the gross daily water use per capita during the final year of the reporting period).

DWR allows the urban water supplier to choose one of four different methods to calculate the urban water use target in Step 2 above.

- **Method 1** involves calculating the target based on 80% of baseline daily per capita water use and the interim target based on 90% of the baseline daily per capita water use.
- **Method 2** involves calculating the per capita daily water use by using the sum of performance standards applied to indoor residential use, landscaped area water use, and commercial, industrial, and institutional uses.
- **Method 3** calculates the water use target as 95% of the applicable state hydrologic region target as stated in the draft 20x2020 Water Conservation Plan.
- **Method 4** is an approach developed by DWR that uses a spreadsheet to calculate estimated water savings factors to estimate targets.

The City selected Method 1 for determining its 2015 Interim and 2020 Final urban water use targets during the preparation of its 2010 UWMP. This selection was made after reviewing the four alternative methods available. Rather than duplicating the evaluation for this plan update, the reader is directed to Appendix I of the City's 2010 UWMP for details, as the previous City adopted evaluation is still applicable and results in the same target method selection.

5.2 Service Area Population

The City's 2020 service area population was estimated using the DWR Population Tool consistent with DWR Methodology 3 (Service Area Population) and the 2015 UWMP. Shapefiles of the City's water service area were loaded into the DWR Population Tool along with available residential service connection numbers to develop service area populations for the corresponding census years. The DWR Population Tool, provided in **Appendix F**, estimated the City's water service area population is 550,217. The DWR Population Tool provides a population based on the 2000 and 2010 census data and, published effective as of April 1 of the census year, the water service area during each census year and the number of water service connections. For the 2020 population, the number of services from December 31, 2020, was used, and the 550,217 population is estimated as of the end of 2020.

5.3 Gross Water Use

The City's gross water use is comprised of surface water contracted for delivery of allocated supplies from USBR and FID and groundwater produced by its municipal wells. The basis of gross water use are the meters installed at the City's North Fresno Wastewater Reclamation Facility, Southeast Surface Water Treatment Facility, and T-3 Water Storage and modular Surface Water Treatment Facility, and each of its municipal groundwater wells, which are equipped with flow meters. DWR Methodology 1 (gross water use) provides the opportunity to make adjustments and deductions in the reported gross water use for factors such as: meter errors, changes in distribution storage, indirect recycled water use, agricultural water use, and process water use. The City's gross water use has not been adjusted for any of these factors. Therefore, the total water use shown in **Table 4-2** is the City's gross water use.

5.4 Baselines and Target Summary

The City's 2015 UWMP reviewed and updated the 10-year and five-year Baseline Daily Per Capita Water Use and 2020 Target, included in **Table 5-1**. The continuous time period used in the 2015 UWMP for the 10-year baseline period is 1999–2008 and has an associated average daily per capita water use of 309 GPCD. The continuous time period that was used in the 2015 UWMP for the five-year target confirmation baseline period was 2003–2007, which has an associated average daily per capita water use of 304 GPCD. The confirmed 2020 target was established as a 20% reduction from the 10-year baseline per capita use and is 247 GPCD. Refer to **Chapter 5** of the City's 2015 UWMP for more information on how the baselines and targets were developed.

Table 5-1. Per Capita Water Use Baseline and 2020 Target

BASELINE PERIOD	TIME PERIOD	AVERAGE BASELINE GPCD (GPCD)	CONFIRMED 2020 TARGET (GPCD)
10 Year	1999 – 2008	309	247
5 Year	2003 – 2007	304	

5.5 2020 Compliance Daily Per-Capita Water Use (GPCD)

This section presents the procedure used to meet the requirements of SBx7-7 as defined in the Water Conservation Act of 2009 as incorporated into Division 6 of the California Water Code, commencing with Section 10608 of Part 2.55.

5.5.1 Meeting the 2020 Target

The determination of 2020 target compliance is based on gross water use for the 2020 calendar year, which was 121,993 acre-feet (see **Table 4-2**), and a service area population of 550,217 as of December 31, 2020 (see **Table 3-1**). The resultant actual per capita water use for the City in 2020 was 198 GPCD. As such, the City has met and exceeded the 2020 target of 247 GPCD.

The overall water usage patterns of the City have been greatly reduced due to its conservation measures and metering of all services. Prior to January 2013, nearly all of the City's single-family residential water customers had been billed on a monthly flat rate structure; they were unaware of the water they actually used and had no real incentive to conserve water. As of January 2013, the City has completed its residential water meter program, which installed approximately

113,000 water meters for single-family homes. With the completion of this program, all the City's water service connections are now metered, and the City and its customers can work more closely together to optimize water use. Since completion of the project, residential water demands have dramatically decreased. Attainment of the 2020 target has been influenced by the City's investments in metering and the proactive conservation education and outreach to customers. These factors have played a significant role in the City's ability to meet and surpass the 2020 target. In the future, the City will need to remain diligent in monitoring water use and continuing incentive programs to further reduce water consumption. These efforts are necessary so when the current strict reduction requirements are lifted, all water users remain diligent in avoiding unnecessary use of water and upgrade fixtures to eliminate water wasting.

5.5.2 2020 Adjustments to 2020 Gross Water Use

No extraordinary events or economic adjustments have taken place that would cause any adverse effects with regards to overall water usage. As was previously mentioned, the City did not make any adjustments to the 2020 gross water use as is permissible with Water Code 10608.24 cited above.

CITY OF FRESNO

6 Water Supply Characterization

This chapter identifies and quantifies, to the extent practicable, the existing and planned sources of water supplies for the City through 2045.

The City relies on groundwater from the North Kings Subbasin; surface water from Central Valley Project (CVP), through a contract with the United States Bureau of Reclamation (USBR); Kings River water, through a contract with Fresno Irrigation District (FID); and recycled water. This chapter also provides a discussion of supply availability and reliability under normal supply conditions (normal water year), during a single dry year, and for a drought lasting five years.

IN THIS SECTION

- Groundwater
- Surface Water
- Recycled Water
- Projected Water Supply

Water production in the City has consisted of 100% groundwater prior to the commissioning of the City's first surface water treatment facility (SWTF) in 2004. Since 2004, the City has invested in expanding its surface water treatment capabilities and now has three SWTFs that provide approximately half of all potable water demands in the service area.

6.1 Groundwater

The City overlies the Kings Subbasin, which is part of the greater San Joaquin Valley Groundwater Basin. The City is one of many water purveyors that use groundwater from the Kings Subbasin. The City has a network of over 270 municipal wells and currently operates approximately 202 municipal supply wells within the Kings Subbasin. Until late 2004, the City relied solely on groundwater to meet the water demands. The City's desire is to continue to use groundwater within a larger conjunctive use program that maximizes its existing water rights and surface water supply sources.

6.1.1 Basin Description

The Department of Water Resources (DWR) has partitioned the State into 10 major hydrologic regions (also referred to as "basins") and then further divided each basin into subbasins. The City is located in the Kings Subbasin (DWR Groundwater Subbasin Number 5-22.08) and lies within the larger San Joaquin Valley Groundwater Basin in the Central Valley of California. The Kings Subbasin covers approximately 1,530 square miles (sq mi).

6.1.1.1 Basin Location

The San Joaquin Valley Groundwater Basin is bounded to the north by the Sacramento-San Joaquin Delta and Sacramento Valley, to the east by the Sierra Nevada Mountains, to the south by the San Emigdio and Tehachapi Mountains, and to the west by the Coast Ranges. The Kings Subbasin, located within the southern half of the San Joaquin Valley Groundwater Basin, is bounded to the north by the San Joaquin River, to the east by the alluvium-granite rock interface of the Sierra Nevada foothills, to the south by the southern fork of the Kings River, and to the west by the Delta-Mendota and Westside Subbasins (California Department of Water Resources, January 2006). The Kings Subbasin is split into seven Groundwater Sustainability Agency (GSA) management areas, with Fresno located in the North Kings GSA. **Figure 6-1** illustrates the location of the City within the Kings Subbasin.

6.1.1.2 Area Geology

The upper several hundred feet of geology within the Kings Subbasin generally consists of highly permeable, coarse-grained deposits, which are termed older alluvium. **Figure 6-2** presents an idealized hydrogeologic cross-section that illustrates the general depth of various lithologic features within the Kings Subbasin, near the City.

Coarse-grained stream channel deposits, associated with deposits by the ancestral San Joaquin and Kings Rivers, underlie much of northwest Fresno (Layer 3 and 4 in **Figure 6-2**). There is a laterally extensive clay layer, at an average depth of approximately 250 feet below the ground surface, beneath most of the south and southeastern portions of the City.

Below the older alluvium, to depths ranging about 600–1,200 feet below ground surface, the finer-grained sediments of the tertiary-quaternary continental deposits are typically encountered (Layer 5 in **Figure 6-2**). Substantial groundwater has been produced and utilized from these depths by the City. However, deeper deposits located in the southeastern and northern portions of the City have produced less groundwater.

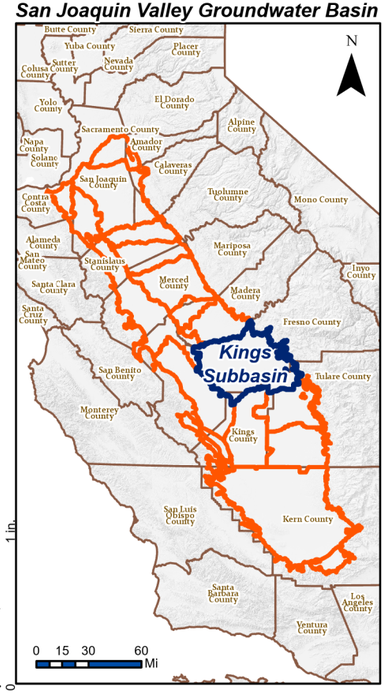
There are also reduced deposits in the northern and eastern portions of the City, at depths generally below 700 or 800 feet, which are associated with high concentrations of iron, manganese, arsenic, hydrogen sulfide, and methane gas. Groundwater at these depths does not generally provide a significant source for municipal supply wells.

Legend

Groundwater Sustainability Agency

- Central Kings GSA
- James Irrigation District
- Kings River East GSA
- McMullin Area GSA
- North Fork Kings GSA
- North Kings GSA
- South Kings GSA
- Fresno City Limits
- Fresno Sphere of Influence
- Kings Groundwater Subbasin
- Major Watercourses
- Lakes and Reservoirs
- County Boundary
- Canal

San Joaquin Valley Groundwater Basin



Prepared by: WSC

N

1:353,650

0 2 4 8 Mi

0 5,000 10,000 20,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum North American 1983

Notes:

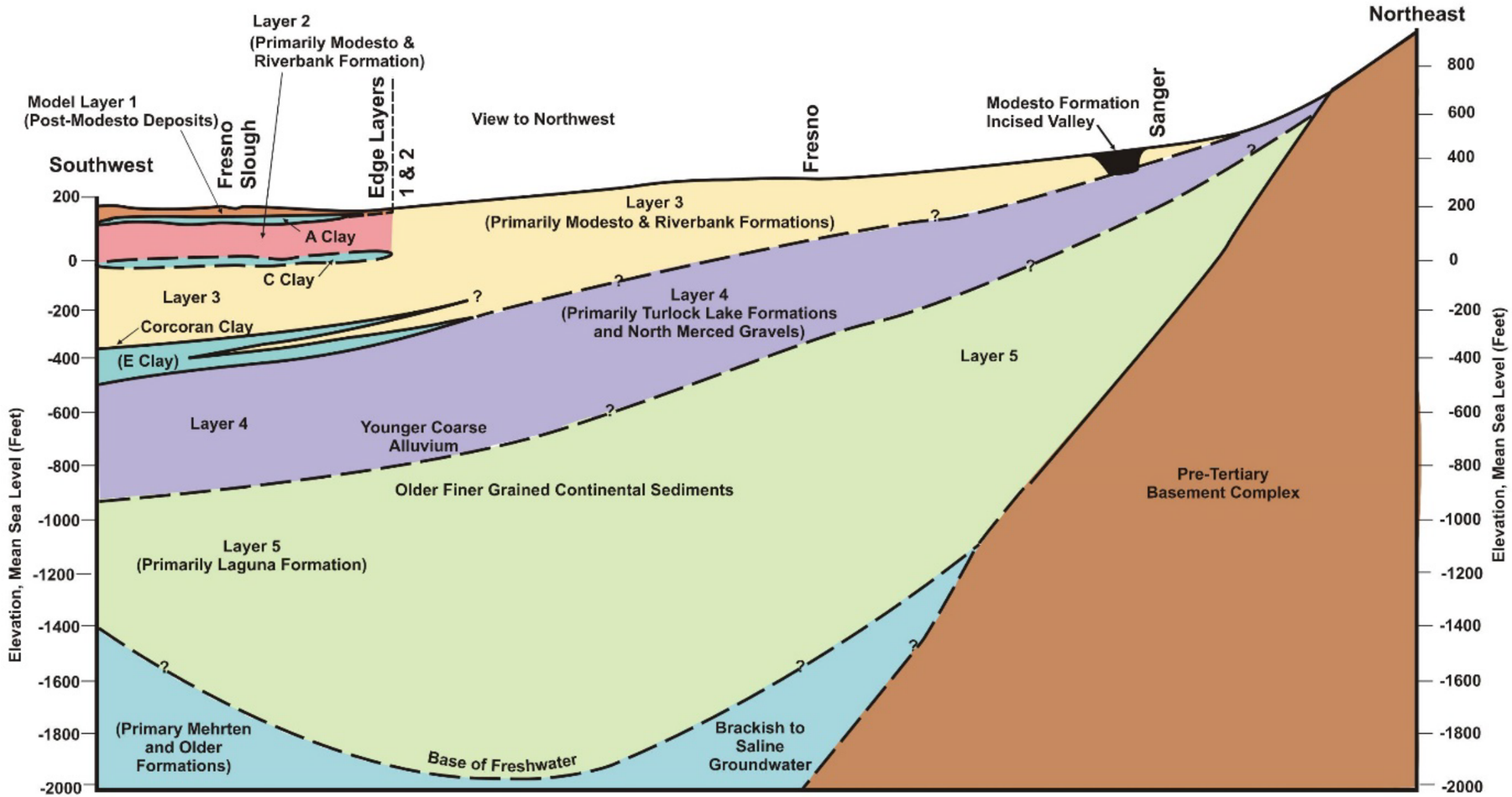
Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-1. Kings Subbasin

\\EgnyteDrive\W Drive\GIS\Fresno\Metro Plan\2020 UWMP\Fresno_UWMP.aprx

Figure 6-2. Kings Groundwater Subbasin Conceptual Hydrogeologic Cross-Section, Southwest-Northeast



Primary Sources

Croft, 1969
Muir, 1977
Lettis, 1982
Page and LeBlanc, 1969
Cehrs, et. al. 1980
Wiseman, et. al: 2002b

Figure from *Kings Basin Integrated Hydrologic Modeling Hydrogeologic Investigation Technical Memorandum*, dated February 2006, prepared by Brown & Caldwell and Wrime.

6.1.1.3 Aquifer Characteristics

The aquifer beneath the City was characterized using data compiled during aquifer tests performed at the City's production wells. As part of updating the detailed hydrogeologic evaluation, aquifer test data (pump tests) were reviewed to update the hydrogeologic analysis and evaluate the specific capacity data. The specific capacity indicates the ability of a particular well to produce water. **Figure 6-3** presents the estimated specific capacity of each active well from early 2020 pump test data. As shown in the figure, the northwestern and southwestern portions of the City have wells with higher specific capacities.

6.1.2 Groundwater Management

In 2014, a three-bill legislative package was signed into law, composed of Assembly Bill 1739, Senate Bill (SB) 1168, and SB 1319, collectively known as the Sustainable Groundwater Management Act (SGMA) of 2014, which is codified in Section 10720 et seq. of the California Water Code. This legislation created a statutory framework for groundwater management in California that can be sustained during the planning and implementation horizon without causing undesirable results. SGMA requires governments and water agencies of "critically overdrafted" basins to reach sustainability by 2040. The Kings Subbasin was designated a critically overdrafted basin in the DWR's Bulletin 118. The North Kings GSA is working within the SGMA framework to reach groundwater sustainability.

The City was a founding member of the North Kings GSA, which consists of the following public agencies and participating agencies:

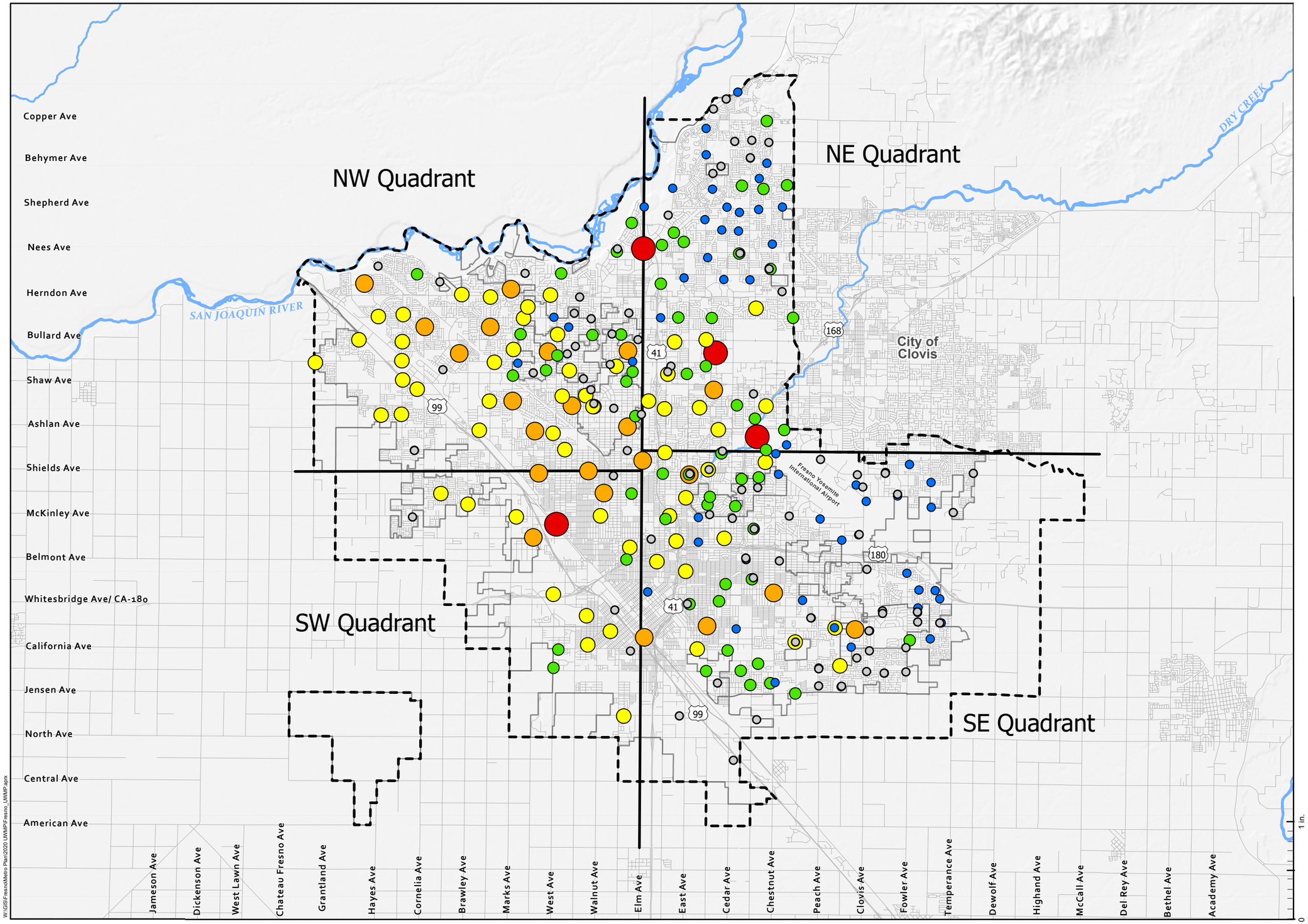
- Fresno Irrigation District (member)
- City of Fresno (member)
- City of Clovis (member)
- City of Kerman (member)
- County of Fresno (member)
- Bakman Water Company (participating agency)
- Biola Community Services District (member)
- Garfield Water District (member)
- International Water District (member)
- Fresno Metropolitan Flood Control District (participating agency)

The Kings Subbasin contains seven GSAs, including the North Kings GSA, as listed below and shown in Figure 6-1:

- Central Kings GSA
- James Irrigation District GSA
- Kings River East GSA
- McMullin Area GSA
- North Kings GSA
- North Fork Kings GSA
- South Kings GSA

The seven GSAs operate cooperatively across the basin via a coordination agreement that ensures common approaches to sustainability items such as similarity of data usage and methodologies, consistent interpretations of the basin setting, and common assumptions and development of water budgets, monitoring networks, sustainable management criteria and data management systems.

The North Kings GSA prepared and submitted its GSP in January 2020 (Provost & Pritchard, November 2019) and is awaiting DWR review by January 2022.



Legend

Well Specific Capacity (gpm/ft)

- Unknown
- < 20
- 20 - 50
- 50 - 100
- 100 - 200
- 200 - 450
- Groundwater Quadrant Divide
- Fresno Sphere of Influence
- Fresno City Limits
- Streets

Prepared by:

WSC

N

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0 0.75 1.5 3 Mi

0 3,500 7,000 14,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

1. Well specific capacity was provided by the City and calculated using 2020 data.

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Figure 6-3. City Wells Specific Capacity

As required by SGMA, the North Kings considers six sustainability indicators:

- Chronic lowering of groundwater levels indicating significant and unreasonable depletion of supply
- Significant and unreasonable reduction of groundwater storage
- Significant and unreasonable seawater intrusion
- Significant and unreasonable degraded water quality
- Significant and unreasonable land subsidence
- Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water

Each indicator has an identified undesirable result, measurable objective, and minimum threshold. The measurable objective and minimum threshold allow the North Kings GSA to evaluate their progress for the subject indicator and determine if conditions are improving, remaining stable or degrading. The sustainability indicators of primary concern within the City are groundwater levels, groundwater storage, and groundwater quality. The methodology for the water quality indicators has been developed and the methodology is still being developed for the groundwater levels and groundwater storage indicators. A copy of the GSP is provided in **Appendix G** of this UWMP[1].

6.1.3 Overdraft Conditions

SGMA directs DWR to identify groundwater basins and subbasins in conditions of critical overdraft. As defined by SGMA, "A basin is subject to critical overdraft when continuation of present water management practices would probably result in significant adverse overdraft-related environmental, social, or economic impacts." As mentioned, DWR classifies the Kings Basin as being in a state of critical overdraft in its Bulletin 118, and the future of the groundwater basin has been projected to see continued overdraft conditions.

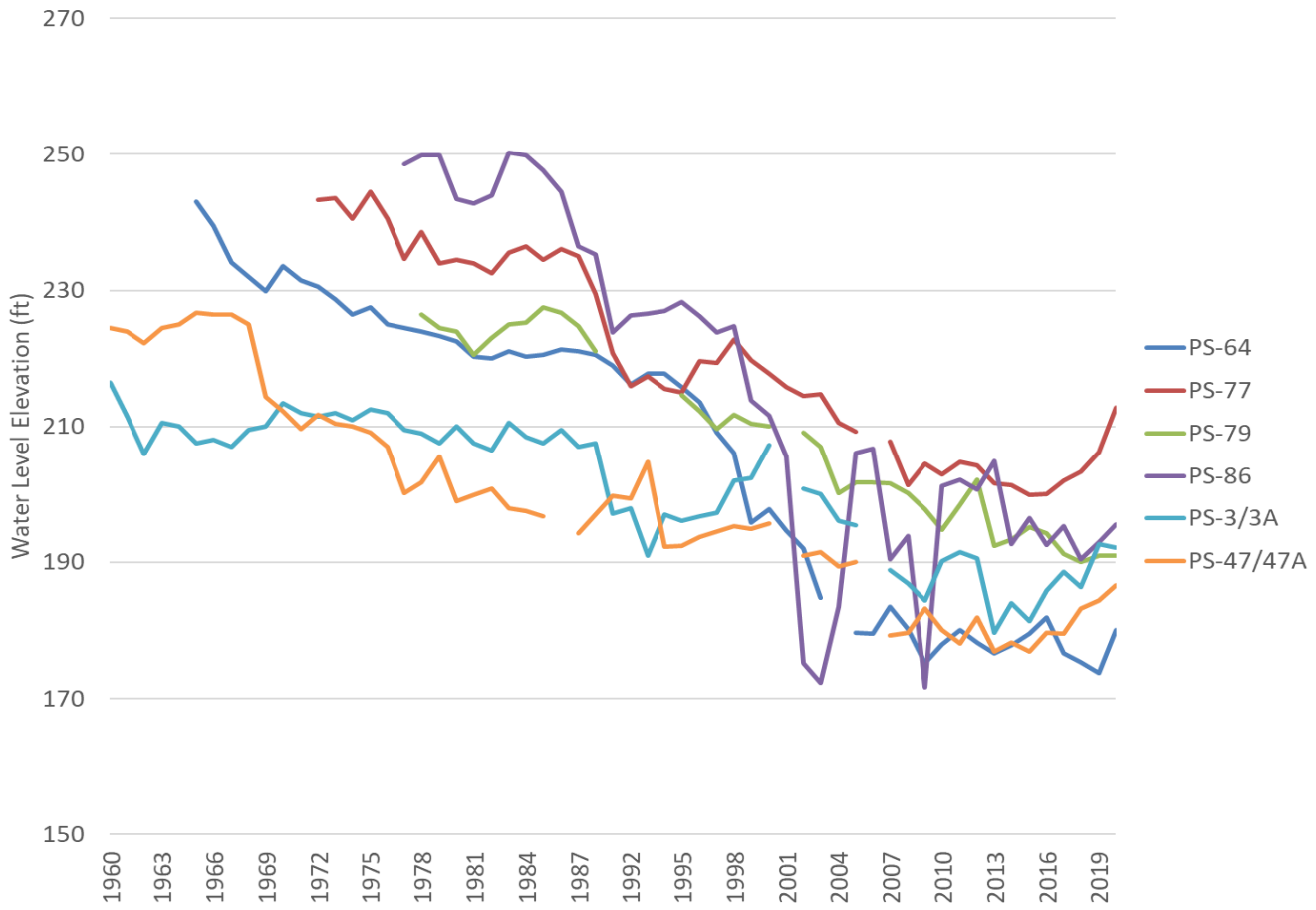
The Kings Subbasin groundwater aquifer supplies the City, other municipalities, agriculture, and rural residential areas with a consistent source of water. Like much of the Kings Subbasin, groundwater levels beneath the City were relatively shallow at 25 feet below ground surface in 1940, prior to the start of World War II (Fresno City Water, Engineering Department, 1940). After the war, the State, including the City, began growing at a rapid rate. For the period from 1959 to 1968 it was reported groundwater levels declined at a rate of 2.8 feet per year (John Carollo Engineers, 1969). The City continued to rely on the groundwater aquifer for decades, monitoring groundwater levels continuously. Groundwater levels since 1990 have declined at a lower rate than previously. Rates of decline slowed further starting in 2004 when the Northeast Surface Water Treatment Facility (NESWTF) started operations and the City renewed focus on increasing groundwater recharge. In 2019 and 2020, surface water accounted for more than half of the total water supply in the City. With the reduced pumping due to higher reliance of surface water, the groundwater levels have begun to increase in certain areas of the City in the last few years. **Figure 6-4** provides a depiction of the City's depth to groundwater for six representative wells across the Sphere of Influence (SOI) since 1960.

The City expects to continue to operate its three SWTFs and pump groundwater at a lower rate than historically so that the groundwater basin can recover. One of the primary objectives for the City as described in its current Metro Plan is to maximize the use of available surface water

[1] Available at https://www.northkingsgsa.org/groundwater-sustainability-plan/

treatment supplies to reduce overall reliance on groundwater. Additionally, as described in **Chapter 4**, the City plans to continue their groundwater recharge program to protect the groundwater basin. **Figure 6-5** shows the active and proposed recharge basins and FID Canals the City utilizes as part of groundwater recharge program.

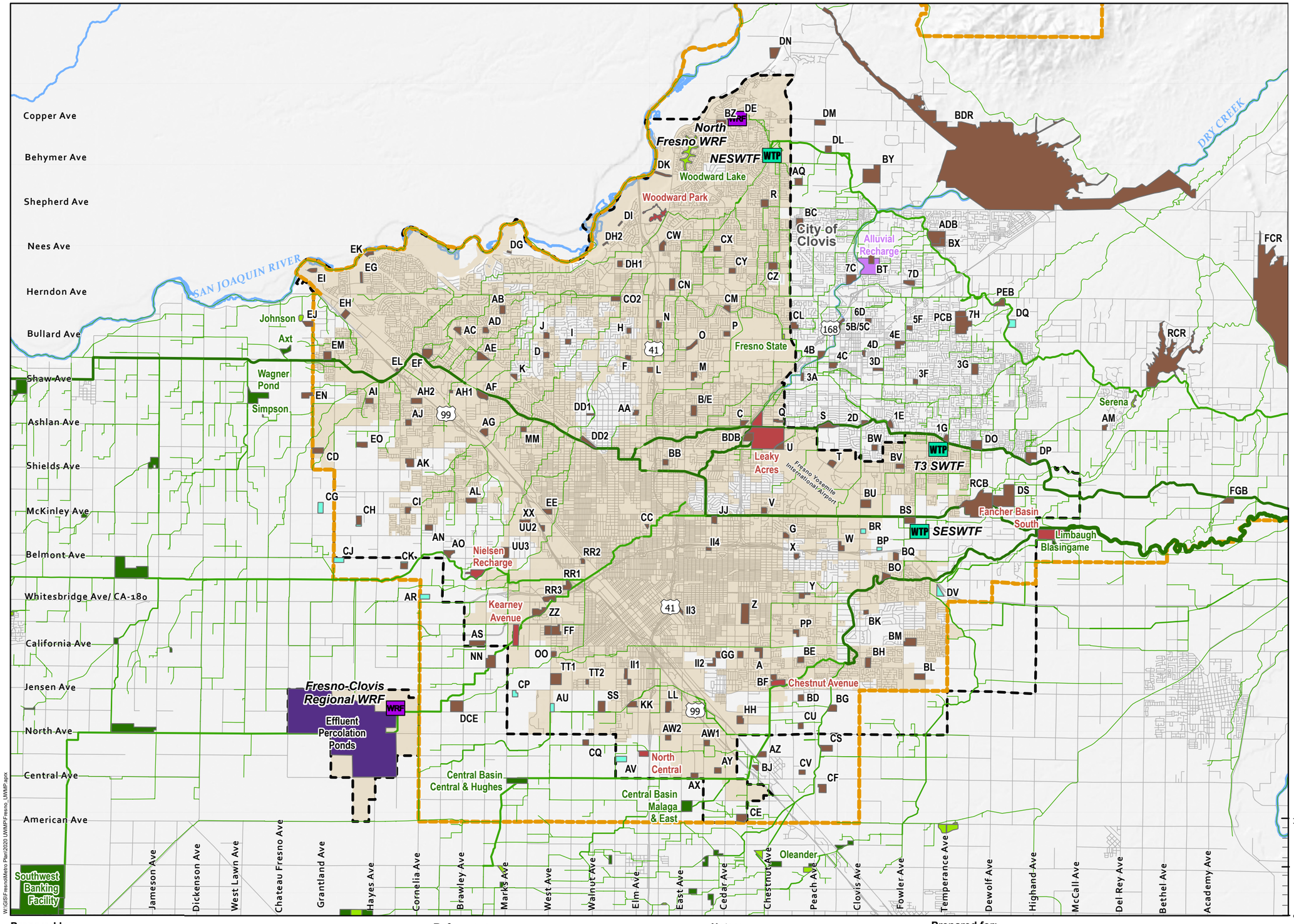
Figure 6-4. Time Series of Groundwater Levels at Representative Wells



6.1.4 Groundwater Quality

Groundwater within the North Kings Subbasin generally meets primary and secondary drinking water standards for municipal water use and is described as being bicarbonate type water, including calcium, magnesium, and sodium as the dominant ions (California Department of Water Resources, January 2006). Total dissolved solids (TDS) concentrations rarely exceed 600 mg/L and range from 200 to 700 mg/L (California Department of Water Resources, January 2006). However, the groundwater basin has been impacted by multiple chemical contaminants that affect the City's ability to fully utilize the groundwater basin resources without some type of wellhead treatment in certain areas.

Figure 6-6 presents the general location of regional plumes and major point sources within the City. The primary contaminants are nitrate, 1,2-dibromo-3-chloropropane (DBCP), 1,2,3-trichloropropane (1,2,3-TCP), and other volatile organic compounds like trichloroethylene (TCE) and and perchloroethylene (PCE). The City has received settlements in a number of lawsuits related to these contaminants and has constructed wellhead treatment systems and implemented blending plans for a number of wells.



Legend

Groundwater Recharge Basins

- FID Basin
- Privately Owned Basin
- City of Clovis Basin
- City of Fresno Basin
- RWRF Effluent Percolation Area
- FMFCD Basin
- FMFCD Proposed Basin
- FMFCD Boundary
- WRF Wastewater Reclamation Facility
- WTP Water Treatment Plant

FID Facilities by Capacity

- Less than 35 cfs
- 35 - 150 cfs
- 150 - 350 cfs
- 350 - 900 cfs
- 900 - 1500 cfs

- Fresno Sphere of Influence
- Fresno City Limits
- Streets

Recharge Basin Summary

Owner/ Operator	No. of Basins	Total Area (acres)
FID	25	2,900
Private Owner	8	300
City of Clovis	1	90
City of Fresno	11	450
City of Fresno RWRF	---	2,000
FMFCD (Existing)	166	8,500
FMFCD (Proposed)	12	140

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Prepared by: WSC

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References:

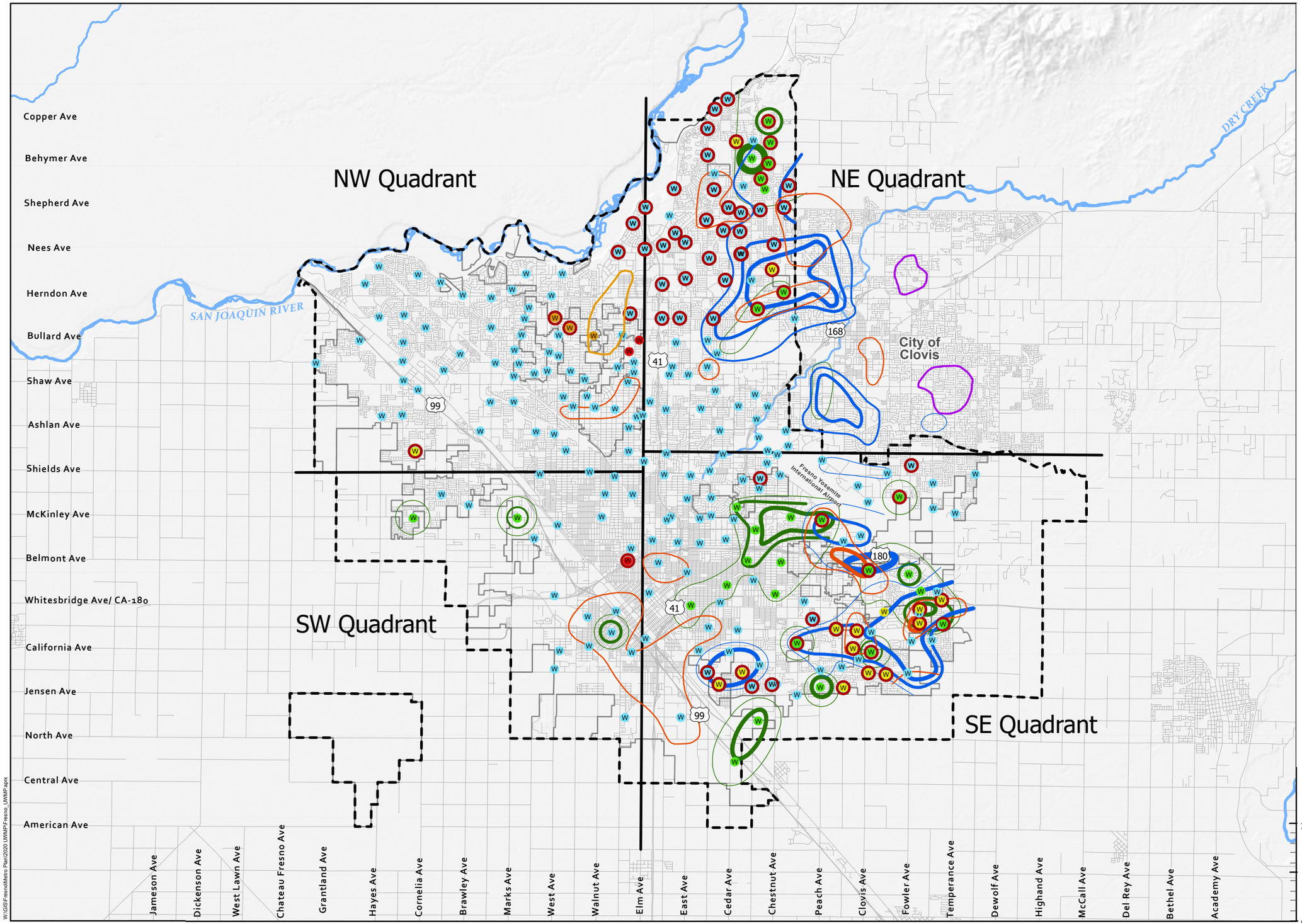
1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-5. Groundwater Recharge System



Legend

Nitrate-Nitrogen Contamination and Concentration

- 5 mg/L
- 10 mg/L

DBCP Contamination and Concentration

- 0.01 ppb
- 0.02 ppb
- 0.05 ppb
- 0.1 ppb
- 0.2 ppb

1,2,3-TCP Contamination and Concentration

- 5 ppt
- 10 ppt
- 20 ppt
- 50 ppt
- 100 ppt

Other Plumes

- TCE Plume
- EDB Plume (old)

Well Pumped to Control Contaminant Plumes

- DBCP
- PCE
- TCE
- TCP
- No Minimum Pumping
- Well Head Treatment
- Groundwater Quadrant Divide
- Fresno Sphere of Influence
- Fresno City Limits
- Streets

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Prepared by:

WSC

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0 3,500 7,000 14,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983

Notes:

1.A list of wells with treatment was provided by the City as of September 2020. Some wells share treatment and convey water via a raw water pipeline to another well's treatment site. Wellhead treatment types includes activated carbon for VOC/SOCs, air stripping for VOCs, blending, degassing tank, corrosion control treatment, H2S odor control, and manganese treatment, or a combination of such.

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Figure 6-6. Regional Groundwater Contamination

Approximately 40 City wells are being treated for contaminants such as PCE, DBCP, TCE, 1,2,3-TCP, perfluorooctanoic acid, perfluorooctanesulfonic acid, ethylene dibromide, and nitrate, and an additional 20 wells include treatment for iron, manganese, and hydrogen sulfide removal or corrosion control.

As shown in the figure, extensive groundwater contamination nearly covers the City's entire water service area; only areas located in the northwest appear to be relatively unaffected by regional groundwater contamination. Also, many of the City's wells are impacted by one or more of the contaminant plumes (indicated by the presence of overlapping plumes on the figure). The figure also shows the approximately 93 existing active wells that are impacted by at least one contaminant plume and the 60 existing wells with wellhead treatment. The City is also managing contamination from spreading by pumping specific wells to control the plumes.

6.1.5 Estimated Groundwater Yield

As part of the ongoing Metro Plan update, the City is developing a storage accounting framework to estimate groundwater yield. The storage framework will track the City's groundwater recharge, pumping, and flows into and out of the City's SOI and incorporate bi-annual monitoring well water level readings on a grid basis. This work is ongoing, and the City reserves the right to update this analysis with more recent data when available.

Currently, the best available information on the City's groundwater yield is from a hydrologic groundwater and surface water model that was prepared for the Upper Kings Basin Integrated Regional Water Management Authority. The City contributed additional funding to the effort so the model would be more refined for its service area and capable of assisting in the development of the City's previous Metro Plan. The Kings Basin Integrated Groundwater and Surface Water Model (IGSM) was completed in 2007 and provided outputs specific to the City SOI (WRIME, 2007). The IGSM was developed and calibrated utilizing data for the period of 1964–2004. Building off the calibrated IGSM, additional modeling was conducted in 2008 to evaluate the City's proposed water supply plan and its ability to attain the balanced use of groundwater by the buildout year of 2025. The estimated groundwater yield within the City's SOI presented in this section is based on the modeling efforts to establish the various natural elements of the underlying aquifer.

6.1.5.1 Natural Recharge

As a result of the IGSM effort, the long-term average deep percolation from rainfall and irrigation-applied water for the period of 1964–2004 was found to be 42,700 acre-feet per year (AFY) for the entire SOI (West Yost Associates, January 2014). However, as urbanization continues within the SOI, the amount of deep percolation will decline because of increased runoff and less open land for natural recharge. For 2005, it was estimated deep percolation would be about 37,000 AFY and would reduce annually, ultimately declining to and remaining at 27,000 AFY by buildout in 2025. The new General Plan now anticipates SOI buildout will occur in 2056. Holding the 2005 value of 37,000 AFY and extending the 27,000 AFY to 2056, intermediate values were straight-line interpolated. Additionally, the City currently covers 73,500 acres of the 100,277 acres within its SOI, representing 73% urbanization, which would approximate the City's water system service area. **Table 6-1** shows estimated natural recharge through 2045.

6.1.5.2 Net Subsurface Inflow

Again, utilizing information developed from the IGSM, average net subsurface inflow into the SOI was characterized as being 64,800 AF annually for the period of 1964–2004. Applying the

previously described 73% proportioning factor of the developed SOI area to overall SOI area, approximately 47,510 AFY would be attributed to the City's water service area in 2020. This value will increase in future years as the City annexes more land until the SOI is built out. **Table 6-1** shows the estimated subsurface inflows for future years based on the land use growth presented in **Figure 4-3**. The City has historically benefitted from the net subsurface inflows and requires these flows for replenishment necessary to maintain the sustainable yield of the groundwater aquifer system.

6.1.5.3 Intentional Groundwater Recharge

The City has long made efforts toward offsetting the decline of groundwater levels and minimizing overdraft conditions through an active intentional recharge program that started in 1971 (CH2MHill, 1992). Through cooperative agreements with Fresno Metropolitan Flood Control District (FMFCD) and FID, the City has access to not only City-owned basins, but also those of these two agencies. Utilizing available surface water supplies, the City recharged on average approximately 60,000 AFY from 2000–2019; however, with the reduction in available surface water supplies, intentional recharge declined to 34,700 AF in 2014 and 19,800 AF in 2015, followed by an increase in recharge in years 2016, 2017, and 2019 to help replenish the aquifer. In 2019, City recharge of 82,993 AF was the maximum annual recharge attained during this period. The City has averaged over 60,000 AFY the previous five years and plans to gradually increase recharge by about 540 AFY each year. However, during wet years the City will recharge more water when it is available to allow to the City to draw on additional groundwater during dry years when surface water is not available. Intentional recharge is included in the non-potable demand projections as well as contributing to the estimated groundwater yield presented in **Table 6-1**.

Table 6-1. Components to Groundwater Yield for Normal Years

	QUANTITY (AFY)					
GROUNDWATER COMPONENT	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Natural Recharge[1]	24,970	25,480	25,910	26,280	26,570	26,790
Net Subsurface Inflow[1]	47,510	49,910	52,320	54,720	57,120	59,530
SUSTAINABLE YIELD	**72,480**	**75,390**	**78,230**	**81,000**	**83,690**	**86,320**
Intentional Recharge[2]	60,000	62,700	65,400	68,100	70,800	73,500
TOTAL ESTIMATED GROUNDWATER YIELD	**132,480**	**138,090**	**143,630**	**149,100**	**154,490**	**159,820**

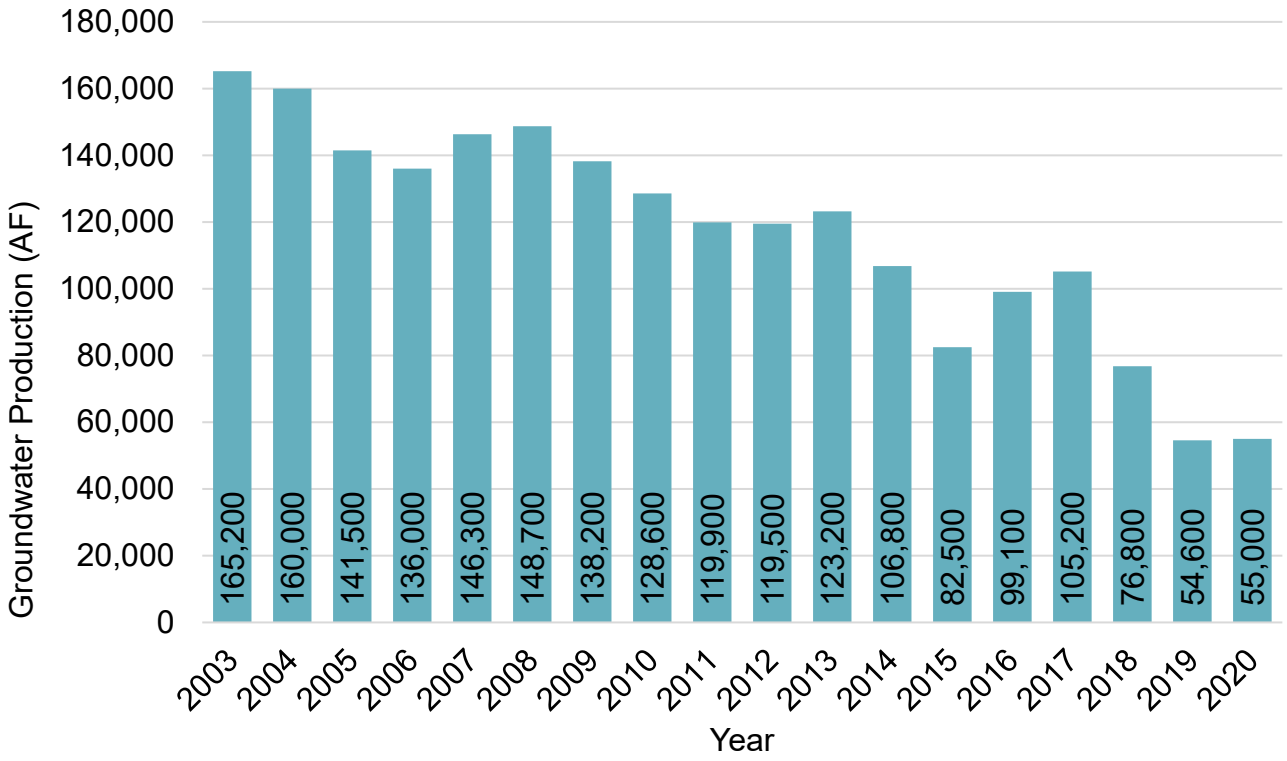
Notes:

1. Based on the Kings Basin IGSM and projected City land growth from **Figure 4-3** as discussed in **Section 3.1.1.**
2. Projected normal year intentional recharge from **Table 4-7**.

6.1.6 Historic Groundwater Pumping

The City has historically relied on groundwater as its main supply source prior to the construction of its SWTFs. With the recent investments in surface water infrastructure, the City has been able to drastically reduce its groundwater pumping. **Figure 6-7** shows the historic groundwater pumping since 2003. As shown, pumping has dropped significantly since 2003, the City's peak year for groundwater production.

Figure 6-7. Historic Groundwater Production



6.2 Surface Water

With the completion and operation of the Southeast Surface Water Treatment Facility (SESWTF), surface water is now a primary water supply used to meet potable demands within the City. The City contracts with FID for Kings River water and with the USBR for CVP water from the Friant-Kern Canal. The surface water supply is used either for potable uses through treatment and distribution or delivery to recharge basins for groundwater recharge.

The Kings River water year (WY) is October through September while USBR uses a WY of March through February. The City has historically used a calendar year (CY) for its analysis, so monthly water supply information was compiled in CY format for this report.

6.2.1 USBR Friant Division Contract Supply

The City, through an agreement originally executed in January 1961, secured a surface water supply from USBR CVP Friant Division. This agreement, for an annual water supply of 60,000 AF of Class 1 water, was last renewed in 2010 as a Section 9(d) contract that provides water from the San Joaquin River in perpetuity. A copy of the renewed contract is provided in

Appendix H of this UWMP. The USBR CVP Friant Division facilities generally include: Friant Dam (Millerton Reservoir), the Friant-Kern Canal, and the Madera Canal. The Friant-Kern Canal is maintained and operated by the Friant Water Authority. The USBR water supply is a wholesale supply.

Construction of Friant Dam was completed in 1947 and began making diversions to the Friant-Kern Canal in 1949. Full operations of the CVP Friant Division did not commence until the Madera Canal was completed in 1951. Class 1 water was intended to be a supply that would be dependable in practically every year, regardless of the type of hydrologic WY. Class 2 water is essentially excess water available as determined by USBR and less reliable than Class 1 water.

Class 1 water has historically been very reliable until the 2006 San Joaquin River Restoration Settlement Agreement between the Department of the Interior and Commerce, the Natural Resources Defense Council, and the Friant Water Users Authority (which is now the Friant Water Authority). The City is a member of the Friant Water Authority. The Settlement ended an 18-year legal dispute over the operation of Friant Dam brought by a coalition of conservation and fishing groups. The agreement characterized Class 1 deliveries by six hydrologic year types based on a recurrence over an 82-year simulation (1922–2003): wet, normal-wet, normal-dry, dry, critical-high, critical-low. The projected surface water available for the City from USBR during each hydrologic year defined by the 2006 Settlement Agreement is summarized in **Table 6-2**. As shown in the table, the average simulated delivery is 53,680 AFY and the median simulated delivery, which is similar to normal year delivery, is 60,000 AFY. The median value is higher than the average value because 100% allocation of 60,000 AF is simulated in 50 of 82 years but the dry and critical years result in substantial reductions, which bring down the average allocation.

The Settlement Agreement estimates the reduced supply available to the City compared to historic supplies, most evident in dry years. Restrictions on exports from the Delta have hindered the USBR from making deliveries to the Exchange Contractors via the Delta-Mendota Canal. The Exchange Contractors allowed the formation of the CVP Friant Division by agreeing to not exercise their historic pre-1914 water rights to the San Joaquin and Kings Rivers if guaranteed water deliveries continued through the Delta-Mendota Canal or other facilities. If USBR is unable to deliver water to the Exchange Contractors, they have the right to receive their water from the San Joaquin River, which reduces the Class 1 water availability (History of SJRECWA Exchange Contractors, n.d.).

Reduced deliveries from the Delta to the Exchange Contractors resulted in the CVP Friant Division contractors with zero allocations of Class 1 water in USBR WY 2014 and 2015, though the City received USBR deliveries in CY 2014 (prior to the USBR WY starting in March). Annual USBR deliveries since 2007 are shown in **Figure 6-8** for CY. The availability and reliability of the City's surface water supplies through its USBR contract are discussed further in **Chapter 7**.

Table 6-2. Available USBR Simulated Allocation (1922–2003)

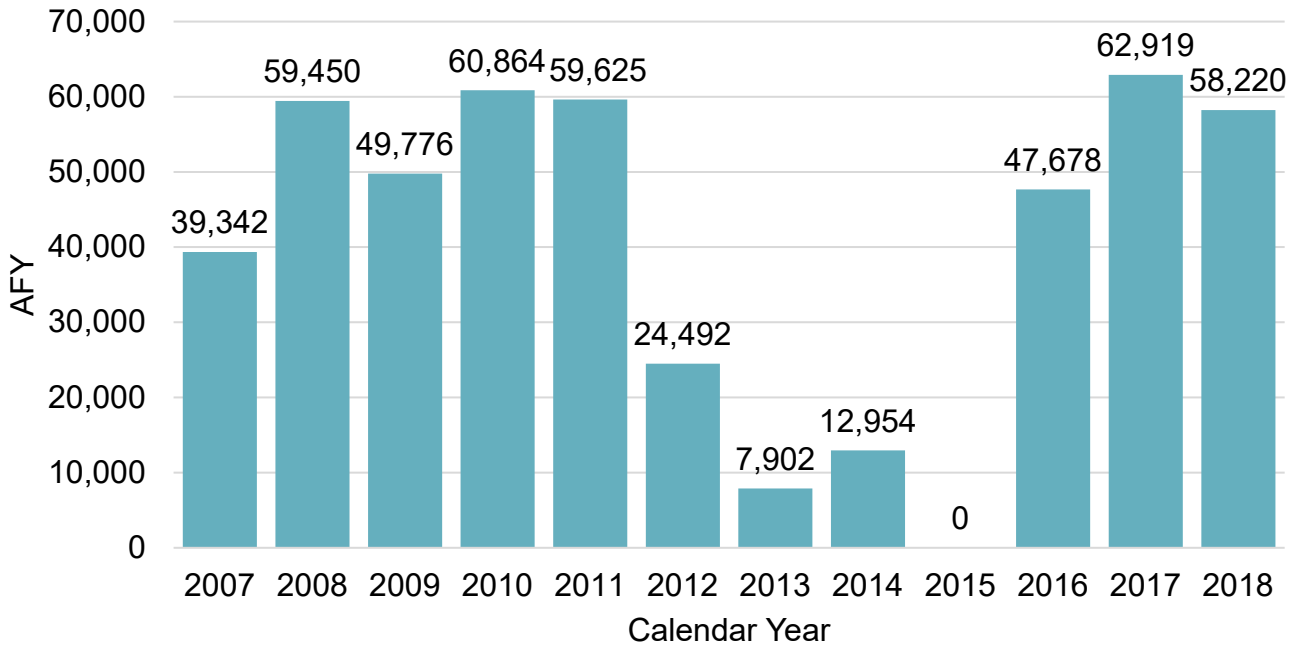
WATER YEAR TYPE	% OF YEARS OVER SIMULATION PERIOD OF DELIVERIES (1)	NUMBER OF YEARS IN THAT YEAR TYPE	RANGE OF ALLOCATION TO CITY (AF)	AVERAGE ALLOCATION TO CITY (AF)
Wet	Highest 20%	16	60,000	60,000
Normal-Wet	50% to 80%	25	60,000	60,000
Normal-Dry	20% to 50%	25	47,500 to 60,000	57,060
Dry	5% to 20%	12	28,100 to 46,800	36,575
Critical(2)	Lowest 5%	4	13,900 to 24,700	19,025
	TOTAL	**82**	**AVERAGE**	**53,680**
			MEDIAN	**60,000**

Source: 2006 Settlement Agreement

Notes:

1. As defined in 2006 Settlement Agreement
2. Includes both critical-high and critical-low, which are differentiated by the amount of unimpaired runoff. The simulation uses deliveries through 2006 and does not include the zero allocation years in 2014 and 2015.

Figure 6-8. USBR Deliveries to City Since 2007



In addition to the Class 1 water available to the City, the USBR contract also makes available water classified as: recovered water account water; Section 215 water; and unreleased restoration flows, unreleased recirculation flows, and uncontrolled season flows. The complexities of each water type are beyond the scope of this report but are mentioned here to reflect the other water acquisition opportunities afforded to the City through this contract.

The San Joaquin River water supply has excellent water quality as it originates from snowmelt from the high Sierras and has not been detrimentally impacted.

6.2.2 Fresno Irrigation District Supply

FID is one of 28 agencies that receives an entitlement of water from the Kings River through the Kings River Water Association. Water entitlements for Kings River Water Association contract members is determined based on a methodology that was initially developed in 1917–1919 to established entitlements for early claimed rights holders. The methodology was based on historic mean daily natural flow conditions at Piedra, which is approximately three miles downstream from the then yet to be built Pine Flat Dam and "at the heart of Kings River uses, regulation, and stream control and storage." (Kings River Water Association and Kings River Conservation District, June 2003)

On December 20, 2016, the Revised, Amended, and Restated Cooperative Agreement was executed between FID and the City for Water Utilization and Conveyance (2016 FID Agreement) (**Appendix I**). The 2016 FID Agreement replaces the 1976 Cooperative Agreement and ends in 2035. The Agreement identifies the City's contracted percentage of FID's Kings River water based on the City's water service area located within FID service area as a percentage of the FID land area. FID land area varies slightly every year because it is dependent on the acreage receiving water deliveries for that year rather than the total acreage within FID (roughly 200,000 acres). As the City incorporates new land area into its service area, the percentage of FID supply increases. However, the 2016 FID Agreement sets the maximum percentage as 29.0%, although the City's service area is anticipated to expand and encompass more than 29.0% of FID's service area between 2025 and 2030. In 2020, the City's percentage of overall FID Kings deliveries was 25.79%. The FID Agreement identifies that the 29.0% maximum was based on moderate growth in Growth Area 1 of the City's SOI (shown in Exhibit C in the 2016 Agreement). As such, the supply projections in this plan limit the City's FID supply with the 29.0% cap, but if the agreement were revised in the future the City's FID allocation percentage could grow beyond 29.0% as the water service area expands.

The City has historically not used all of its available allocation in any given year, although it pays a flat rate for its total allocation regardless of use. Water unused by the City is reallocated by FID to its other customers.

The City's potential supply from FID was summarized using actual Kings River deliveries for CYs 1964–2019, then categorized by the same WY types used for the USBR Friant supply. The range and average FID deliveries by WY type is shown in **Table 6-3**. The average of all 56 CY delivery totals of FID Kings River deliveries is 452,541 AF, which equates to an average potential City supply of 131,237 AF, assuming the maximum 29.0% City supply percentage. **Table 6-4** lists the historic and projected allocation of FID's Kings River water for the City in normal (average) CYs. The City percentage of FID supplies was estimated assuming the City's water service area will grow from 59,100 acres to 84,300 acres by buildout at the rate shown in **Figure 4-3**.

Table 6-3. FID Diversions by Water Year Type (1964 to 2019)

WATER YEAR TYPE	% OF YEARS[1]	NUMBER OF YEARS BETWEEN 1964 AND 2019	TOTAL FID DELIVERIES (AF)[2]		EXAMPLE AVERAGE AVAILABLE TO CITY[3]
			RANGE	AVERAGE	
Wet	Highest 20%	11	563,500 to 644,600	590,700	171,300
Normal-Wet	50% to 80%	17	452,800 to 563,300	513,700	149,000
Normal-Dry	20% to 50%	17	362,600 to 448,000	415,000	120,400
Dry	5% to 20%	8	253,700 to 362,000	315,700	91,600
Critical	Lowest 5%	3	158,100 to 253,300	210,200	61,000
		56	**AVERAGE**	**453,800**	**131,600**

Notes:

1. As defined in 2006 Settlement Agreement
2. Assigns water year type defined in defined in 2006 Settlement Agreement to FID deliveries from 1964 to 2019
3. Based on maximum 29.0% City supply percentage to provide an example City supply amount

Table 6-4. Projected FID Kings River Allocation for City, Normal Years

YEAR	PROJECTED TOTAL FID ALLOCATION, AFY	PROJECTED ALLOCATION TO CITY, AFY[1]
2025	27.55%	125,030
2030	29.00%	131,600
2035	29.00%	131,600
2040	29.00%	131,600
2045	29.00%	131,600

[1]Projected City Allocation (%) x 453,800 AFY (estimated normal year diversion by FID, per **Table 6-3**)

6.3 Stormwater

The Fresno-Clovis Metropolitan Area and surrounding rural vicinities are within the service area boundaries of the FMFCD, which has primary responsibility for managing the local stormwater flows. Most stormwater in the City drains to urban stormwater basins, where the water is retained to attenuate peak flow runoff and recharge stormwater, or is pumped to local irrigation canals for conveyance away from the municipal areas. FMFCD's operation of stormwater basins is predicated on maintaining storage capacity for rain events, which limits accessibility for recharge activities during the rainy season. FMFCD estimates the amount of stormwater that is recharged each wet season. However, recharge attained with the FMFCD basins largely occurs in May

through October when limited storage capacity is required. Dry-season recharge is accomplished by diverting surface waters, from the Kings River and Millerton Reservoir, using City-allocated surface water. It is difficult to estimate stormwater recharge volumes as there is no physical measurement of stormwater flows into the basins, and infiltration rates can vary with water elevation and degree of siltation in the basin. However, FMFCD estimates that stormwater recharge in urban basins during the winter months may range from 7,000 AF/yr to 22,200 AF/yr. Stormwater capture and infiltration are considered an integral component of natural groundwater recharge discussed in **Section 6.1.5.1**.

6.4 Wastewater and Recycled Water

6.4.1 Recycled Water Coordination

The City is currently expanding its recycled water supplies to increase offset use of potable water for landscape irrigation. In 2010, the City completed a Recycled Water Master Plan (adopted by the City Council in 2013) to evaluate and plan for increased recycled water use in the City. The City's last Metro Plan, adopted in 2014, also outlined projects to increase the use of recycled water to offset potable demands (Carollo, 2010). The City is currently updating the Metro Plan and will reevaluate recommendations and projects to increase recycled water use.

The City owns and operates two water reclamation facilities: 1) the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and 2) the North Fresno Wastewater Reclamation Facility (NFWRF), both of which can produce Title 22 recycled water for use within the City's service area. They are described further in **Section 6.4.3**.

Coordination with other water agencies and potential consumers within the planning area is inherently within the purview of the City's Department of Public Utilities (DPU) as this department provides both water and wastewater services. DPU has been on the forefront of numerous water supply preservation, enhancement, and development projects and programs for decades. The concept of multiagency coordination is fully embraced by the department as is evident with the previously discussed joint agency agreements and the commitment to construct new infrastructure to further develop new resources. The endeavor to develop recycled water as a resource was a requirement of a development in north Fresno, where the developer was conditioned to have a net zero impact on water resources. The fundamental component of this development was the construction and dedication of the NFWRF to the City.

There are only a few agencies, besides the City, that have wastewater collection and treatment facilities within and immediately adjacent to the plan area. These agencies include:

	Collection	Treatment
City of Clovis	X	X
Malaga County Water District	X	X
Pinedale County Water District	X	-
Pinedale Public Utility District	X	-

As the City is the primary responsible agency for wastewater collection and treatment for its annexed areas and certain County islands, it has taken the lead role of developing and implementing recycled water facilities to serve the same area.

6.4.1.1 City of Clovis

The RWRF was developed under a Joint Powers Authority agreement executed in 1977 among the City of Fresno, the City of Clovis, and the County of Fresno. Both of the cities contribute to the cost of operations and maintenances and capital expenditures for the RWRF based on formulas in the agreement. This facility provides service for most of Clovis' sewer flows.

The City of Clovis recently constructed its own wastewater treatment facility that produces tertiary level effluent and is distributed in a dedicated purple pipe system within portions of its service area.

6.4.1.2 County of Fresno

The County of Fresno, like the City of Clovis, is a party to the RWRF Joint Powers Authority for treatment of flows from unincorporated areas encompassed by the City's service area.

6.4.1.3 Malaga County Water District

Malaga County Water District provides water and sewer service to an unincorporated county area of about 2.25 sq mi, which covers a small portion of the City's SOI. The district provides wastewater collection and treatment for residential and non-residential customers.

6.4.1.4 Pinedale County Water District

Pinedale County Water District provides water, sewer, and solid waste service to an area of about 2 sq mi, which service area covers an unincorporated County island and a portion of the City. The district provides wastewater collection to an area of 699 acres and diverts the flow to the City's collection system for treatment at the RWRF.

6.4.1.5 Pinedale Public Utility District

Pinedale Public Utility District provides wastewater, street lighting, street sweeping, and landscape maintenance. The district services an area of 362 acres in the northern portion of the City, serving both an unincorporated County island and portions of the City. The collected wastewater is diverted to the City's collection system for treatment at the RWRF.

6.4.2 Wastewater Collection, Treatment, and Disposal

The City's wastewater collection system was originally developed in 1891 with the installation of a 24-inch outfall sewer that discharged to a 40-acre sewer farm located southwest of town. The amount of land and facilities at this location continued to be expanded as the City grew over the years. Today, the City's wastewater collection system consists of about 1,630 miles of pipes ranging in size from 4 inches in diameter to 84 inches in diameter. This collection system also utilizes 15 lift stations throughout the City, ranging in pumping capacity from 0.25 mgd to 2.2 mgd.

6.4.2.1 Wastewater Treatment and Discharge Within Service Area

The City is served by two wastewater treatment plants, briefly described below.

Fresno-Clovis Regional Wastewater Reclamation Facility

The RWRF has developed from what was once a sewer farm to what is now a state-of-the-art wastewater treatment facility. In 1966, the City of Fresno was appointed the sewering agency

for the local metropolitan region and shortly after began long-range planning and construction of new facilities to handle increasing flows and regulatory requirements. The RWRF treats flows from not only the City, but also sewered County areas (some county areas remain unsewered), the City of Clovis, Pinedale County Water District, and Pinedale Public Utility District.

Flows received at this facility peaked at 81,100 AF in 2006 and have been steadily decreasing since, with the average influent flow about 63,000 AF over the last five years. The RWRF includes preliminary, primary, secondary, and tertiary treatment units with disinfection. Secondary treatment consists of three treatment trains with an annual average capacity of 87 mgd, consisting of 30 mgd for Train A and 57 mgd for Trains B and C combined. In 2017, a 5-mgd tertiary treatment system — the Tertiary Treatment and Disinfection Facility (TTDF) — was completed. The system can be expanded to 15 mgd and ultimately to 30 mgd.

The City has three primary means of effluent disposal:

1. Undisinfected secondary effluent to on-site and off-site farmland for restricted irrigation
2. Undisinfected secondary effluent to percolation ponds
3. Disinfected tertiary effluent to the recycled water distribution system

The percolated effluent has been deemed equivalent to Title 22 tertiary treated water by the State Water Resources Control Board Department of Drinking Water (DDW). The City has been extracting this water for reuse in areas within and surrounding the RWRF, as well as to FID's canals, through an exchange agreement for delivery to FID agricultural customers.

The discharged effluent is within the City boundaries and located just southwest of the metropolitan area. The treated effluent percolation ponds are within the City's SOI and hydrologic sphere that benefit the City's overall regional water budget. See **Figure 3-1** for a depiction of the facility's location relative to the metropolitan area.

North Fresno Wastewater Reclamation Facility

The NFWRF was constructed as part of a residential, commercial, and golf course master planned development located in the northern portion of the City. As a condition of the planned community, the developer was required to construct a wastewater treatment facility that would produce tertiary level effluent for use within the development to ensure the overall project had a net zero impact on water resources. This facility is presently rated at 0.71 mgd (average monthly flow) and 1.07 mgd (maximum daily flow). However, the ultraviolet (UV) light disinfection system was only validated for 300 gpm (0.43 mgd), which is the current flow limit until the DDW approves a higher flow. This facility is expandable to 1.25 mgd (average monthly flow). The disinfected tertiary effluent from the plant is largely used to irrigate the Copper River Ranch Golf Course. Of the 325 AF of wastewater treated in 2020, 54 AF was used for irrigation of turf. Treated but unused effluent is diverted to the City's collection system to the RWRF.

6.4.3 Recycled Water System Description

The 2014 Metro Plan recommended expanding reuse by: 1) using the NFWRF effluent to irrigate Copper River Ranch Golf Course; and 2) up to 25,000 AFY of recycled water for landscape irrigation or other non-potable uses from the RWRF or new satellite WRFs. Since then, the City has irrigated the Copper River Ranch Golf Course with recycled water and has constructed much of the southwest recycled water distribution system. However, the City is currently updating the Metro Plan and reevaluating the target volume of reuse in the City beyond the southwest system

considering new conditions and regulations, including the potential for potable reuse in the future.

6.4.3.1 Fresno-Clovis Regional Wastewater Reclamation Facility

As mentioned above, the RWRF produces undisinfected secondary effluent for restricted irrigation to on-site and off-site farmlands and disinfected tertiary treated effluent for the recycled water distribution system.

The City's RWRF diverts a portion of the undisinfected secondary effluent to irrigate non-food crops grown adjacent to this facility. The practice of using the secondary effluent to irrigate non-food crops has been carried-out for decades and is expected to continue for the foreseeable future. The City owns nearly 3,300 acres of land for and around the RWRF, consisting of percolation ponds (1,750 acres) and other land available to farm non-food crops. **Table 6-5** provides the annual quantities of recycled water applied to these crops for the period from 2015–2019.

Additionally, the RWRF produces Title 22 disinfected tertiary treated effluent through the TTDF completed in 2017 and through tertiary equivalent soil aquifer treated recycled water recovered from the percolated secondary effluent. A series of 15 groundwater wells located at the RWRF are used to extract previously percolated effluent groundwater from beneath the facility. The extracted groundwater has the potential to be used for higher beneficial use if it can be demonstrated this water has attained a level of treatment satisfactory to meet disinfected tertiary levels. The City embarked on a joint project with the WateReuse Research Foundation to demonstrate to State regulatory agencies the soil aquifer treated recycled water met Title 22 levels. The culmination of this study is presented in a final report entitled "Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment," which was completed in 2013 (WateReuse Research Foundation, 2013). This study concluded that, based on the documented sampled water quality data, the extracted groundwater met requirements for classification as disinfected tertiary level recycled water. The SWRCB DDW stated that the percolated effluent water meets the tertiary treatment classification, and the City is making plans for its use as part of its recycled water production and distribution system (California Regional Water Qulaity Control Board, 2018). The combined rated production yield of the 15 wells, if run year-round, would be approximately 32,000 AFY. The City plans to blend the recycled extraction well water with the disinfected tertiary level recycled water produced from the 5 mgd TTDF to feed the southwest recycled water distribution system. As new sales grow for the recycled water, additional recycled extraction well water will be utilized to feed the City's southwest recycled water system.

The tertiary equivalent soil aquifer treated recycled water (recovered groundwater) is also used for on-site irrigation and transport to FID canals for delivery to customers during the irrigation season, as facilitated through an exchange agreement with FID. More information on the City's FID RWRF Exchange Agreement is discussed in **Section 6.6**.

Since the completion of the 2010 Recycled Water Master Plan (RWMP), the City has constructed most of the southwest recycled water system, shown in **Figure 6-9.** The southwest recycled water system consists of a 3.2 MG recycled water reservoir located at the RWRF, a 6,000 gpm (8.64 mgd) recycled water pump station located at the RWRF, a 640-gpm booster pump station (Roeding Park Booster), and 15.7 miles of 10-inch to 54-inch recycled water pipeline. Roughly 7.5 miles of pipeline remain to be constructed. The City also updated the demand and distribution system from the 2010 RWMP with the 2019 Citywide Recycled Water Demand and Southwest

Recycled Water System Analysis (Carollo, 2019) to identify potential recycled water customers. This recent analysis will be incorporated into the latest Metro Plan update.

6.4.3.2 North Fresno Water Reclamation Facility

As described earlier, the City has an existing recycled water plant in the northern portion of the City that receives and treats sewage from the residential, commercial, and golf course master planned community. The NFWRF was constructed in 2008 but was not fully operational until 2009 due to the inability to properly run at extremely low flow conditions. Subsequent modifications at the plant allowed it to run on a regular basis in 2010 and again in 2014 for UV approval. The amount of reuse has varied substantially since 2016 because the delivery system was offline in 2017 and 2018 for treated water basin slope repairs. City staff indicated that 2016 is representative of operations going forward. The disinfected tertiary effluent is conveyed in a dedicated pipeline to an adjacent golf course for irrigation purposes. The quantities used for irrigation purposes are shown in **Table 6-5** for the period of 2015–2019.

Table 6-5. Historic Recycled Water Used Within Service Area

	QUANTITY (AFY)					
RECYCLE WATER FACILITY	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**
RWRF, Secondary Effluent (Non-Food Crop Irrigation)	8,688	7,329	4,540	7,031	3,652	3,845
RWRF, Tertiary Effluent	531	485	423	867	912	858
NFWRF	62	110	0	0	19	54
TOTAL	**9,281**	**7,924**	**4,963**	**7,898**	**4,583**	**4,757**

Note: Reuse at the NFWRF was zero in 2017 and 2018 because the recycled water delivery system was offline for system repairs.

6.4.4 Potential, Current, and Projected Recycled Water Uses

The 2020 actual recycled water use, and projected recycled water use in the City's service area is included in **Table 6-6**. Secondary undisinfected reuse is projected to continue to be used to irrigate non-food crops adjacent to the RWRF in the future. The projected secondary undisinfected use going forward is based on the average use from 2015 to 2020. Additionally, the amount of tertiary recycled water from the RWRF is projected to increase to provide 6,210 AF for landscape and agricultural irrigation as the southwest recycled water system is built out. Projected tertiary recycled water from the NFWRF for golf course irrigation is projected to be 110 AF annually through 2045.

The 2015 UWMP anticipated that 21,200 AFY of recycled water would be produced and utilized in 2020. The previous projected increases in recycled water were based on recommendations from the 2010 RWMP, which included projects to increase recycled water use for landscape irrigation, agricultural irrigation, industrial use, and blending with raw surface water for groundwater recharge. Since the 2010 RWMP, the City has focused on constructing the southwest recycled water system to increase landscape and agricultural irrigation in the southwest portion of the City. The City is also currently updating the Metro Plan that is evaluating recycled water alternatives in the City and is expected to update its RWMP following the Metro Plan update to serve as a new guiding planning document for recycled water use by the City.

Customer ID	Customer Name	MDD (gpm)	PHD (gpm)	Hours of Irrigation
1	Quist Farms	1,300.0	1,300.0	24
2	Fresno Memorial Gardens	131.0	450.0	7
3	Roeding Park	267.0	640.0	10
4	Peelman Farms	650.0	650.0	24
5	Peelman Farms	650.0	650.0	24
6	St Peters Cemetery	152.7	458.2	8
7	Westside Auto	8.0	30.0	6
8-10	Multiple Cemeteries	225.8	677.2	8
11-12	Caltrans-99	100.0	300.0	8
13-16	Multiple Cemeteries	225.8	677.2	8
17	Masis Ararat Cemetery	80.0	240.0	8
18	Belmont Memorial Park	172.3	517.0	8
19	Caltrans 180/ Hughs	33.3	100.0	8
20	Caltrans 180/ Fruit	16.7	50.0	8
21	Fink-White Park	61.0	183.0	8
22	Caltrans 99/ Amador	16.7	50.0	8
23	Columbia Elem	44.3	133.0	8
24	Frank Ball Park	19.3	58.0	8
25	Kearney Triangle	18.3	55.0	8
26	Eaton Plaza	21.0	63.0	8

Customer ID	Customer Name	MDD (gpm)	PHD (gpm)	Hours of Irrigation
27	Veteran's Memorial	27.7	83.0	8
28	City Hall	27.7	83.0	8
29	AmeriPride	67.3	202.0	8
30	Courthouse Park	116.7	350.0	8
31	Community Regional	173.0	519.0	8
32	Chukchansi Park	59.3	178.0	8
33	Caltrans 41/H	16.7	50.0	8
34	McKinley Elem	66.7	200.0	8
35	El Capitan Middle	83.3	250.0	8
36	Polk Elem	74.7	224.0	8
37	Madison Elem	56.1	168.3	8
38	King Elem	44.3	101.6	8
39	Gaston Middle	87.5	350.0	8
40	Computech Middle	63.0	245.5	8
41	Edison High	43.7	166.0	8
42	Fresno City College	639.4	871.9	24
43	Hinton Park	19.3	58.0	8
44	Oasis Residential Development	210.5	631.5	8
	Total	**6,070.0**	**12,013.4**	**---**

Legend

Existing Facilities

- Wastewater Reclamation Facility
- Existing Recycled Water Pipeline
- Recycled Water Reservoir

Recycled Water Pump Station

- Existing
- Future

Future/ Proposed Recycled Water Pipelines

- Oasis Development
- SW1D
- South Pipeline

Recycled Water Customer

- Existing Recycled Water Customer
- Agriculture
- Cemetery
- Central Unified School District
- College
- Fresno Unified School District
- Park
- Private/Commercial
- Residential
- Freeway

City Features

- Fresno Sphere of Influence
- Fresno City Limits
- Streets

Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/ CA-180
California Ave
Jensen Ave
Brawley Ave
Marks Ave
West Ave
Walnut Ave
Elm Ave
SWPS1
Roeding Park PS
RWRF PS
Fresno-Clovis Regional WRF
3.2 MG Recycled Water Reservoir

Prepared by: WSC

N

1:44,248
0 0.28 0.55 1.1 Mi
0 1,000 2,000 4,000 US Feet

References:

1. Coordinate System: NAD 1983 StatePlane California IV FIPS 0404 Feet
Projection: Lambert Conformal Conic
Datum: North American 1983
2. Figure recreated from Figure 7 Potential Southwest Recycled Water Users from the 2019 City Wide Recycled Water Demand and Southwest Recycled Water System Analysis prepared by Carollo Engineers, Inc.

Notes:

Prepared for: City of Fresno Department of Public Utilities

City of Fresno
2020 Urban Water Management Plan

Figure 6-9. Southwest Recycled Water System

W:\GIS\FresnoMetro Plan\2020 UWMP\Fresno_UWMP.aprx

Table 6-6. Recycled Water within Service Area in 2020 (DWR 6-4R)

The supplier will complete the table.

Name of Supplier Producing (Treating) the Recycled Water:	City of Fresno
Name of Supplier Operating the Recycled Water Distribution System:	City of Fresno
Supplemental Volume of Water Added in 2020:	0%
Source of 2020 Supplemental Water:	N/A

BENEFICIAL USE TYPE	POTENTIAL BENEFICIAL USES OF RECYCLED WATER	AMOUNT OF POTENTIAL USES OF RECYCLED WATER	GENERAL DESCRIPTION OF 2020 USES	LEVEL OF TREATMENT	2020	2025	2030	2035	2040	2045
Agricultural Irrigation[1]	Non-foodcrop irrigation	7,900	Irrigate non-food crops	Secondary, Undisinfected	3,845	7,900	7,900	7,900	7,900	7,900
Landscape Irrigation (excludes golf courses)	Landscape Irrigation	5,800	Landscape irrigation, distributed through the southwest recycled water distribution system	Tertiary	858	5,800	5,800	5,800	5,800	5,800
Agricultural Irrigation[1]	Food crop irrigation	410	Irrigate limited food crops, distributed through the southwest recycled water distribution system	Tertiary	-	410	410	410	410	410
Golf Course Irrigation	Landscape Irrigation	110	Copper River Golf Course	Tertiary	54	110	110	110	110	110
-				Total:	4,757	14,220	14,220	14,220	14,220	14,220

Note:

1. Recycled water for agricultural irrigation does not offset the City's potable water demands, and as such, is excluded from projected recycled water in subsequent tables.

6.4.5 Actions to Encourage and Optimize Future Recycled Water Use

The 2010 RWMP identified the need for the City to adopt an ordinance to establish a recycled water policy and criteria for its use within the City's SOI. On July 14, 2014, the Recycled Water Ordinance was adopted by the City Council, laying the foundation for the expanded use of recycled water within the City.

The focus of the ordinance includes the following:

- Establish an Administrative Authority.
- Establish approved uses of recycled water.
- Define areas of potential eligibility for recycled water service.
- Specify voluntary uses of recycled water, depending on user classifications.
- Require installation of a transmission and distribution infrastructure.
- Encourage the use of voluntary retrofits for existing users that may not be addressed in the ordinance.
- Require the City of Fresno to prepare Rules and Regulations.
- Provide enforcement and severability clauses.
- Establishing a means for the City to provide recycled water at a negotiated price.

Efforts to further the use of recycled water include the requirement that new developments within planned major recycled water distribution mains must install purple pipe. Then, as the City's capital projects construct a distribution infrastructure, these segments will be in place to facilitate connections to new customers, reduce program costs by avoiding digging up new street improvements and reduce disruption to vehicular traffic.

Most of the southwest recycled water distribution system from the RWRF is completed or planned for construction in 2021. The City has identified potential customers to connect to the recycled water system once it is completed to offset potable demand and increase recycled water use in the City.

6.5 Desalinated Water Opportunities

The City is located in the central San Joaquin Valley; therefore, seawater desalination is not applicable to the City. Additionally, the groundwater that exists within the immediate area of the City is not brackish in nature and does not require desalination treatment.

6.6 Water Exchanges and Transfers

6.6.1 Exchanges and Transfer Opportunities

6.6.1.1 USBR Supply

The Central Valley Project Improvement Act (CVPIA) of 1992 authorized the transfer of all or a portion of a CVP contractor's water supply to any other California water users or water agencies. The CVPIA allows water transfers as long as they are consistent with federal and state water laws. The primary component of the CVPIA that specifies water transfer provisions for federal

water supplies is Section 3405(a), which includes provisions regarding maximum annual water transfer, beneficial use, and approvals.

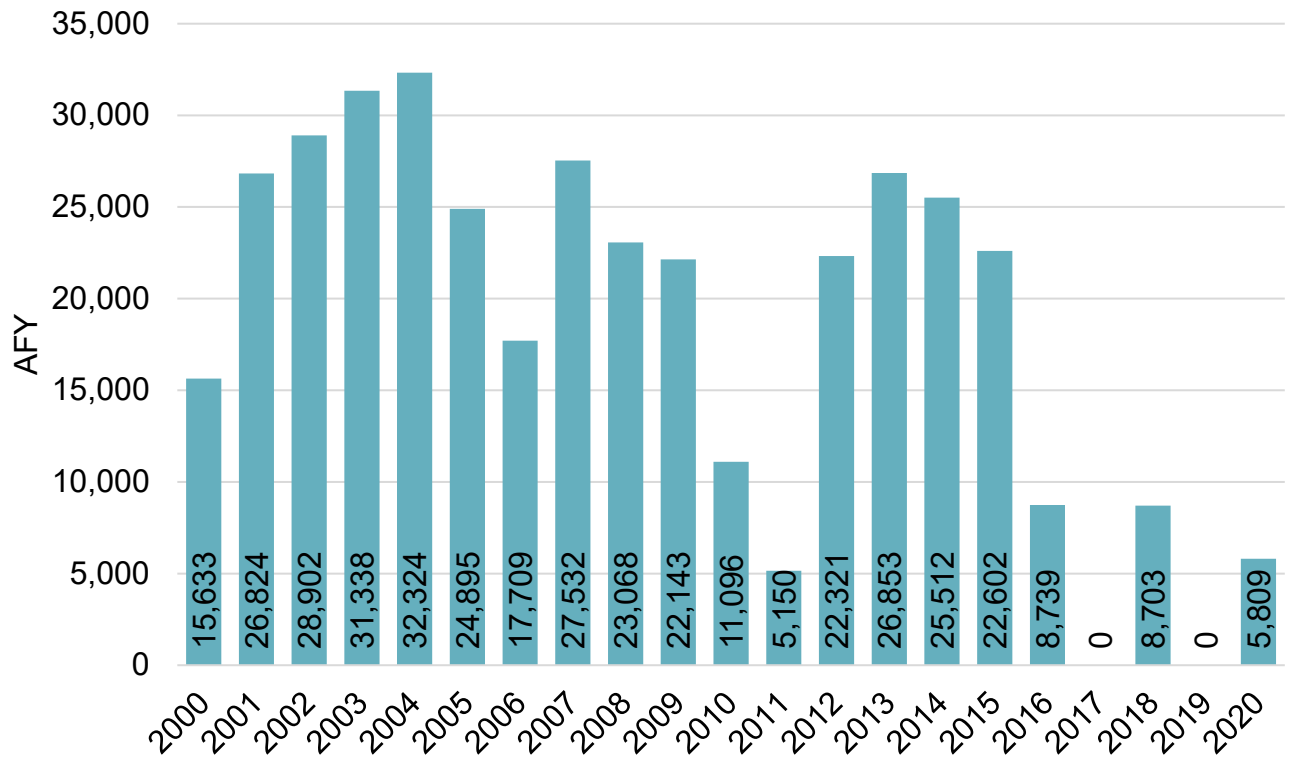
As part of the City's current Metro Plan update, the City is evaluating potential future water transfers and exchanges of its periodically available USBR water. Currently, the City does not have any plans to transfer its USBR water to other California water users.

6.6.1.2 FID / RWRF Groundwater Exchange Supply

Since 1974, the City has had an agreement with FID to exchange recycled water for the delivery of surface water east of the City (**Appendix I**). The Agreement between FID and the City for Exchange of Recycled Water allows for water pumped from beneath the RWRF to be conveyed to FID's Dry Creek and Houghton Canals for delivery to growers west of the City. In exchange for the water delivered to FID by the City, FID agreed to deliver 46% of the total from either its Kings River entitlement or USBR Class II supply to growers or basins in the eastern portion of FID "insofar as is feasible and practical." The water is to be considered additional to the water that would have been delivered to the eastern portion of FID, such that the additional delivered water used by growers is assumed to offset groundwater pumping in the area and, therefore, provide a groundwater basin benefit. This is an indirect benefit to the City.

The agreement includes a minimum of 100,000 AF delivered over a 10-year period and no more than 30,000 AF in any given year. As shown in **Figure 6-10**, the City exceeded the maximum yearly delivery in 2003 and 2004 and has maintained more than 100,000 AF of deliveries over a 10-year period. However, since 2016, the City has reduced RWRF groundwater exchange deliveries. The City is currently discussing an update to the agreement with FID, while the 2020 Metro Plan will identify and recommend other beneficial uses for the City's percolated effluent.

Figure 6-10. Historical RWRF Groundwater Exchange Deliveries



6.6.2 Emergency Interties

In 2007, the Cities of Fresno and Clovis executed an agreement for interconnection of their potable water systems to provide service during emergencies and other times of hardship in either community. The agreement covers interconnections, including apportionment of capital costs, at two locations: Leonard Avenue at the Gould Canal alignment and Behymer Avenue at Willow Avenue.

The agreement provided for temporary deliveries from Clovis to southeast Fresno through the Leonard connection through 2013. The Leonard interconnection was constructed and remains in place for emergency uses through manual operation.

The agreement also provided for temporary deliveries from Fresno to northern Clovis through the Behymer connection through 2015. However, the Behymer interconnection has yet to be constructed and, if constructed in the future, would serve only for emergency use.

6.7 Future Water Projects

The City is currently updating its Metro Plan, which will recommend programs and projects to improve the City's water supply portfolio and continue providing a safe, reliable, and sustainable water supply. While the outcomes of the Metro Plan update are currently being developed, the City's ongoing and future projects to improve its supply portfolio include:

- Expansion of recycled water distribution system
- Expansion of groundwater recharge program
- Expansion of surface water treatment capacity
- Beneficial transfers and exchanges

6.7.1 Expand Recycled Water Distribution System

As mentioned in **Section 6.4.5**, the City has made significant improvements to their recycled water system over the last five years and is currently expanding their recycled water distribution system. The City expects to implement construction on the final portion of the Southwest recycled water distribution system this year. The completed distribution system will allow an additional 5,000 AF of recycled water use in the City to offset potable demands that can be used in all hydrological year types. The expansion is projected to be completed by 2025.

6.7.2 Expand Groundwater Recharge Capacity

With the acknowledgement that the groundwater aquifer is and will remain an integral resource, the City is currently evaluating an expanded recharge program as part of the Metro Plan update. Expanding intentional recharge may include the development of new dedicated intentional recharge facilities and/or joint projects for basins with FMFCD and potentially FID. The target for recharge expansion is to maximize storage within the groundwater basin and optimize use of available surface water supplies in normal years. The stored water will be used more in the single-dry year and consecutive dry years when surface water supplies are less available.

The timing for groundwater recharge capacity expansion will be examined as part of the Metro Plan update and, for the UWMP, is assumed to increase to allow for an additional 540 AFY of recharge to occur on average each year.

6.7.3 Expand Surface Water Treatment Capacity

A key component to the success of the City's ability to reverse the long-time overreliance on groundwater is the construction of its surface water treatment facilities. These have allowed the City to optimize the use of available surface water supplies. The City's NESWTF currently has a 30 mgd capacity and the capability to expand up to 60 mgd. The SESWTF is currently permitted to produce up to 54 mgd but, with the subsequent rerating of the media filters, will be capable of operating at a rated capacity of 80 mgd.

The timing for the SWTF expansion will be examined as part of the Metro Plan update and determined based on need as the City grows and demands increase.

6.7.4 Beneficial Transfers and Exchanges

As mentioned in **Section 6.6.1**, the City is evaluating future beneficial transfers and exchanges of the City's USBR water in normal water years when available water supplies exceeds demands.

6.8 Summary of Existing and Planned Sources of Water

Summaries of the above discussed existing and planned sources of water are provided in **Table 6-7** and **Table 6-8** below.

6.8.1 Supply Management

The City currently balances its surface water supplies and groundwater based on minimum production for operation of the SWTFs and minimum groundwater pumping to manage and control contamination plumes and prevent their spread. The minimum operation conditions typically occur in the low-demand winter months, and the City can increase surface water production during peak demand months when surface water is available. In normal and wet years, the City intends to rely on more surface water supply and recharge raw surface water to replenish the groundwater basin and build storage for dry years. In dry years, when surface water is less available, the City will ramp up well production to meet demands. The City is expected to continue this supply management strategy in the future.

Table 6-7. Actual Water Supplies (DWR 6-8R)

	2020	
WATER SUPPLY	**ACTUAL VOLUME**	**WATER QUALITY**
Groundwater	55,028	Drinking Water
USBR CVP	37,447	Drinking Water
FID Kings River	71,292	Drinking Water
Recycled Water, RWRF	858	Recycled Water
Recycled Water, NFWRF	54	Recycled Water
TOTAL:	**164,679**	

Table 6-8. Projected Water Supplies (DWR 6-9R)

	REASONABLY AVAILABLE VOLUME, AFY				
WATER SUPPLY	**2025**	**2030**	**2035**	**2040**	**2045**
Groundwater	138,090	143,630	149,100	154,490	159,820
USBR CVP	60,000	60,000	60,000	60,000	60,000
FID Kings River	125,030	131,600	131,600	131,600	131,600
Recycled Water, RWRF	5,800	5,800	5,800	5,800	5,800
Recycled Water, NFWRF	110	110	110	110	110
TOTAL:	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**

6.8.2 Special Conditions

This section details climate change and future regulatory conditions that impact the City's supply sources.

6.8.2.1 Climate Change Effects

Climate models disagree on average annual precipitation projections but agree on other hydrologic metrics relevant to water resources management, including:

- Snowpack declines
- Increased fraction of precipitation on extreme rainfall days
- Shorter, sharper rainy season
- Increased evapotranspiration
- Higher frequency of extremely wet and extremely dry years
- Higher incidence of extreme dry year followed by an extreme wet year or vice versa (Persad, 2020) (Partida, 2020)

As discussed in **Section 4.4**, climate change impacts were evaluated in the North Kings GSP using DWR climate change datasets, which were developed for the California Water Commission's Water Storage Investment Program (WSIP). The North Kings GSP analyzed WSIP water supply projections and found climate change will have no significant impact on the FID Kings River diversions. The North Kings GSP estimates the timing of the inflows to water reservoir and surface water supplies is anticipated to shift significantly due to warmer temperatures causing precipitation to arrive as rainfall instead of snowmelt. The warmer temperatures are also predicted to cause the snowmelt to turn to runoff earlier each spring. These climate impacts are estimated in the North Kings GSP to slightly increase inflows to the Kings River (0.6% in 2040 and 0.3% in 2070); however, it is not expected to impact the Kings River diversions significantly and the timing will have a greater impact on water management, including a possible greater need for additional storage. The North Kings GSP also estimated climate impacts to the San Joaquin River supplies available to the CVP Friant Division Contractors, including the City's USBR Class I supplies, and found the WSIP dataset estimates a slight reduction in future water supplies (Provost & Pritchard, November 2019). This plan

considers water supply during an extreme dry year or multi-dry year scenario, which may occur more often due to climate change, further in **Chapter 7**.

6.8.2.2 Regulatory Conditions

The City has existing contracts for its surface water supplies that are not facing any reduction due to forthcoming regulation. The City's groundwater supply is from an unadjudicated basin and is also considered reliable. The GSA is currently working toward determining a safe yield for the Kings Subbasin, which is the amount of water than can be pumped from the basin over a long-term period without producing undesirable results. The City is an active member of the GSA, working collaboratively to bring the basin to balance while protecting the City's groundwater supply.

Additionally, forthcoming California regulations for per- and polyfluoroalkyl substances (PFAS) may impact certain wells within the City. The City is currently monitoring and treating some groundwater wells for PFAS. These regulations are not expected to impact the City's ability to use its full groundwater supply.

6.9 Energy Intensity

Pursuant to CWC Section 10631.2(a), readily available information regarding energy intensity shall be reported in the 2020 UWMP. For the City, this includes the total energy usage at each production facility, including each well site and the three SWTFs. The electrical usage includes the energy to produce, treat, and pump the water into the distribution system. Because the City's distribution system includes over 200 groundwater wells, **Table 6-9** presents the total energy usage, water produced, and average energy intensity for all groundwater wells and for each SWTF following the methodology presented in Appendix O of the DWR 2020 UWMP Guidebook. The energy intensity varies significantly between groundwater wells depending on the depth to the groundwater table, if the well includes treatment beyond disinfection, and other local conditions. The total energy intensity for all production and treatment in the City's distribution system in 2020 was 384 kWh/ AF.

Table 6-9. Water System Energy Intensity in 2020

	WELLS	NESWTF	SESWTF	T-3 SWTF	TOTAL
Electricity (kWh)	27,667,366	5,848,314	13,416,000	454,470	47,386,150
Treated Water Deliveries (AF)	56,445	20,724	45,367	875	123,411
Energy Intensity (kWh/AF)	490	282	296	520	384

7

CITY OF FRESNO

Water Service Reliability and Drought Risk Assessment

This Section discusses the long-term reliability of surface and groundwater supplies for the City.

A comparison is made of anticipated supplies and demands through 2045 for a normal year, single dry year, and five-year drought. Shorter-term reliability planning that may require immediate action, such as drought or catastrophic supply interruption, is addressed in **Chapter 8**.

IN THIS SECTION

- Water Service Reliability Assessment
- Drought Risk Assessment

7.1 Water Service Reliability Assessment

This section describes the existing constraints on the City's supply sources and reliability in different hydrologic year types.

7.1.1 Constraints on Water Sources

7.1.1.1 Groundwater

Groundwater has long been the primary water supply source for the City. Before the City's investments to increase its use of surface water with the construction of its NESWTF, T-3 SWTF, and SESWTF, groundwater levels were declining, and the falling levels were a potential constraint. Groundwater levels in some areas of the City have actually been increasing over the last five years as a result of the City's using less groundwater and are expected to continue to increase as the City pumps less in the future.

The North Kings GSP is setting sustainability indicators for groundwater levels and groundwater storage. The current GSP does define a measurable objective and minimum threshold for the basin to allow the North Kings GSA to evaluate its progress for the subject indicator, as defined by SGMA, and determine whether conditions are improving, remaining stable, or degrading.

Another constraint to the use of groundwater stems from the negative impacts from contamination (see **Section 6.1.4**). To ensure the continued beneficial use of the groundwater supply, the City has set minimum pumping requirements for specific wells to prevent the spread of existing groundwater plumes to other areas in the City and to protect the basin. The City will remain proactive in pursuing responsible parties so the proper remediation is conducted to preserve the groundwater system as a viable and sustainable resource in perpetuity. Largely, the City has been able to rely on the relatively good quality of this resource.

7.1.1.2 USBR

The City has a contract for 60,000 AFY of Class 1 water with the USBR. Analysis supporting the 2006 San Joaquin River Settlement is the basis for USBR supply projections. The settlement is based on ensuring flows downstream of Millerton Dam for varying hydrologic conditions, which can constrain surface water supplies available to the CVP Friant Division contractors, such as the City.

Another constraint that affects the consistency of this supply are the restrictions that have been imposed on water diversions from the Delta (see **Section 6.2.1**). The resulting impacts associated with the restrictions from the Delta has been more detrimental to water supplies for the CVP Friant Division contractors than the above-discussed settlement, as the latter has resulted in two years of zero allocations for the CVP Friant Division contractors.

The construction of a raw water pipeline in 2018 to convey USBR water from the Friant-Kern Canal to the NESWTF, referred to as the Friant-Kern Canal Pipeline, has improved the reliability and water quality of deliveries to the NESWTF. The NESWTF is now capable of year-round operation, and the original connection from FID's Enterprise Canal still exists as a backup delivery system if needed.

Every three years, the Friant-Kern Canal is taken down for maintenance, and during these shutdowns the City has the flexibility to deliver its Kings River supply to the NESWTF to allow for its continued use.

7.1.1.3 FID

The City has an agreement with FID providing the City an allocation of approximately 115,000 AFY of Kings River water in normal-year conditions. Water supplied from the FID contract is most susceptible to annual hydrologic conditions. The City's annual FID supply allocation is dependent on annual precipitation, Sierra Nevada mountain snowpack, and natural river flow conditions. The annual variability of these sources results in variable allocations to the City. Based on the foregoing data, FID receives an annually adjusted entitlement, the delivery of which will fluctuate throughout the irrigation delivery season. The City in turn receives its pro rata allocation based on the foregoing entitlement determination.

Another factor that may constrain the availability of Kings River water supply is scheduled maintenance of FID's vast canal network. FID typically terminates water deliveries to the City's water treatment facilities in the months of November and/or December so they can perform necessary infrastructure repairs and maintenance. However, the City constructed a dedicated 13-mile, 72-inch-diameter raw water pipeline to deliver Kings River water to the SESWTF to allow for year-round operations and prevent shutdowns due to FID maintenance. Deliveries to intentional recharge facilities will continue to be supplied through the FID canal system.

7.1.1.4 Recycled Water

At present, the largest constraint for recycled water use is the lack of infrastructure to distribute the water to end users. The City has recently increased recycled water production capabilities and constructed much of the southwest recycled water system, as described in **Section 6.4**. The City plans to complete construction of the southwest recycled water distribution system in the near term and expand its recycled water delivery in the City.

7.1.2 Description of Management Tools and Options

The City currently manages its surface water and groundwater supply by maximizing surface water for potable use and intentional recharge during wet and normal years, while relying on groundwater during dry years. The City is currently updating its Metro Plan, which will recommend projects and programs to optimize the use of its supply portfolio and further improve supply resilience. Supply management tools are an expected outcome of the Metro Plan update; however, the City's ongoing supply management is intended to maximize local supplies and improve the groundwater basin storage. Current actions include enhanced groundwater management and intentional recharge, increased recycled water use, and continued conservation through the implementation of demand management measures.

7.1.3 Year Type Characterization

Normal-water-year, single-dry-water-year, and five-consecutive-year-drought-period supply projections were made based on historic water allocations for surface water supplies, historic municipal water well pumping for groundwater, and projected utilization for recycled water, as described below.

Kings River water supply data was obtained from the Kings River Water Association and FID. USBR CVP Friant Division data was obtained from the USBR website, the City of Fresno, and FID. Groundwater and recycled water supply data was obtained from the City of Fresno.

7.1.3.1 Normal Year

Data for the total water supply for the normal-year condition is provided in **Table 7-1** based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**.
- **USBR:** long-term average allocation from **Table 6-2**.
- **FID:** long-term average allocation from **Table 6-3**.
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

7.1.3.2 Single Dry Year

The single-dry-year supply availability is based on 2015, during the 2012-2017 drought, because the City had the lowest surface water supply available in 2015. Data for total water supply for the single-dry-year condition is provided in **Table 7-2** based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** actual allocation in 2015 (0 AF).
- **FID:** actual total FID allocation in 2015 (42,935 AF) but with the projected City percentage of FID supply for the future years considered (per **Table 6-3**).
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

7.1.3.3 Multiple Dry Years

Data for total water supply for the five-year drought condition is provided in

Table 7-3 based on:

- **Groundwater:** estimated sustainable yield from **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** actual allocations in 2012 to 2016, which ranged from 0 to 45,000 AF.
- **FID:** actual total FID allocations in 2012 to 2016, which ranged from 42,935 to 110,824 but with the projected City percentage of FID supply for the future years considered (per **Table 6-3**).
- **Recycled Water:** projected supply from **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand**.**

Despite severe reductions of surface water supplies during dry years, sufficient good-quality water was available to permit the SWTFs to operate. As mentioned in the previous section, there is some seasonal vulnerability with surface water availability in dry years, which needs to be closely coordinated with surface water suppliers to minimize impacts to the City's SWTF operations. Groundwater supplies, with intentional recharge augmentation, remain reliable in all hydrologic conditions.

7.1.4 Water Service Reliability

This section compares projected supplies and demands for a normal year, single dry year, and five-year consecutive drought. As shown in **Table 7-1**, the City is projected to have greater than 100,000 AF of available supply after meeting demands in normal years. As shown in **Table 7-2**, the City's surface water supplies are reduced in a single dry year, but all potable demands are met and groundwater recharge of raw surface water is reduced. As shown in **Table 7-3**, the City is projected to meet all demands during a five-year drought with its existing supplies. Potable demands are unrestricted, and non-potable water used for groundwater recharge is reduced in years three and four of a five-year drought.

Table 7-1. Normal Year Supply and Demand Comparison (DWR 7-2R)

	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
Surface Water – USBR	60,000	60,000	60,000	60,000	60,000
Surface Water – FID	125,030	131,600	131,600	131,600	131,600
Recycled Water	5,910	5,910	5,910	5,910	5,910
SUPPLY TOTALS	**329,030**	**341,140**	**346,610**	**352,000**	**357,330**
Potable Demand	136,504	147,356	154,210	161,076	167,947
Non-Potable (Groundwater Recharge) Demand	62,700	65,400	68,100	70,800	73,500
DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
DIFFERENCE:	**129,826**	**128,384**	**124,300**	**120,124**	**115,883**

Table 7-2. Single Dry Year Supply and Demand Comparison (DWR 7-3R)

	2025	2030	2035	2040	2045
Groundwater	138,090	143,630	149,100	154,490	159,820
Surface Water – USBR	0	0	0	0	0
Surface Water – FID	45,852	45,852	45,852	45,852	45,852
Recycled Water	5,910	5,910	5,910	5,910	5,910
SUPPLY TOTALS	**189,852**	**195,392**	**200,862**	**206,252**	**211,582**
Potable Demand	136,504	147,356	154,210	161,076	167,947
Non-Potable (Groundwater Recharge) Demand	27,588	28,776	29,964	31,152	32,340
DEMAND TOTALS	**164,092**	**176,132**	**184,174**	**192,228**	**200,287**
DIFFERENCE:	**25,760**	**19,260**	**16,688**	**14,024**	**11,295**

Table 7-3. Multiple Dry Years Supply and Demand Comparison (DWR 7-4R)

		2025	2030	2035	2040	2045
FIRST YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	30,000	30,000	30,000	30,000	30,000
	Surface Water – FID	99,725	99,725	99,725	99,725	99,725
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**273,725**	**279,265**	**284,735**	**290,125**	**295,455**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**74,521**	**66,509**	**62,425**	**58,249**	**54,008**
SECOND YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	37,200	37,200	37,200	37,200	37,200
	Surface Water – FID	93,426	93,426	93,426	93,426	93,426
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**274,626**	**280,166**	**285,636**	**291,026**	**296,356**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**75,422**	**67,410**	**63,326**	**59,150**	**54,909**
THIRD YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	0	0	0	0	0
	Surface Water – FID	73,568	73,568	73,568	73,568	73,568
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**217,568**	**223,108**	**228,578**	**233,968**	**239,298**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	53,763	46,281	43,526	40,677	37,761
	DEMAND TOTALS	**190,267**	**193,637**	**197,736**	**201,753**	**205,708**
	DIFFERENCE:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**

		2025	2030	2035	2040	2045
FOURTH YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	0	0	0	0	0
	Surface Water – FID	45,852	45,852	45,852	45,852	45,852
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**189,852**	**195,392**	**200,862**	**206,252**	**211,582**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	26,047	18,564	15,810	12,960	10,045
	DEMAND TOTALS	**162,551**	**165,920**	**170,020**	**174,036**	**177,992**
	DIFFERENCE:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
FIFTH YEAR	Groundwater	138,090	143,630	149,100	154,490	159,820
	Surface Water – USBR	45,000	45,000	45,000	45,000	45,000
	Surface Water – FID	125,840	125,840	125,840	125,840	125,840
	Recycled Water	5,910	5,910	5,910	5,910	5,910
	SUPPLY TOTALS	**314,840**	**320,380**	**325,850**	**331,240**	**336,570**
	Potable Demand	136,504	147,356	154,210	161,076	167,947
	Non-Potable Demand	62,700	65,400	68,100	70,800	73,500
	DEMAND TOTALS	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**
	DIFFERENCE:	**115,636**	**107,624**	**103,540**	**99,364**	**95,123**

7.2 Drought Risk Assessment

A new provision of the Water Code directs Suppliers to prepare a DRA. The DRA considers a drought period lasting five consecutive years, starting from the year following the year when the assessment is conducted. For this plan, the DRA considers five consecutive dry years from 2021 through 2025. The City may conduct an interim update or updates to this DRA within the five-year cycle of its UWMP update. The DRA analysis allows the City to examine the management of its supplies during stressed hydrologic conditions and an opportunity to evaluate whether the City may need to enact its Water Shortage Contingency Plan (WSCP) during the next actual drought period lasting at least five years. The projected gross water use for the five-year DRA is based on unrestricted potable demand, a reduction in raw-water demand for intentional recharge in years three and four of the five-year drought, and unrestricted recycled water demand.

The reliability of supplies over a five-consecutive-year drought is described in **Section 7.1.4** and summarized below for 2021 through 2025:

- **Groundwater:** based on interpolating between the 2020 and 2025 values in **Table 6-1**. If necessary, the City would pump beyond its estimated sustainable yield during dry periods and balance out the pumping with recharge in normal or wet periods.
- **USBR:** based on the actual supply allocations from these sources during the driest consecutive five-year drought (2012–2016).

- **FID:** based on the actual supply allocations from these sources during the driest consecutive five-year drought (2012–2016). For this DRA, the City's percentage of FID supplies are conservatively assumed to remain at the existing 25.79%.
- **Recycled Water:** based on interpolating between the 2020 and 2025 values in **Table 6-6**, excluding agricultural irrigation demand that does not offset the City's potable demand.

Table 7-4 compares the total projected supply and demand for the five-year DRA for 2021 through 2025. As shown, the City does not expect to enact its WSCP for a five-consecutive-year drought based on the unrestricted potable demand projections and the current supply portfolio and reliability.

Table 7-4. Five-Year Drought Risk Assessment

WATER USE TYPE	2021	2022	2023	2024	2025
Groundwater	133,602	134,724	135,846	136,968	138,090
Surface Water – USBR	30,000	37,200	0	0	45,000
Surface Water – FID	93,354	83,085	65,425	40,776	111,911
Recycled Water	1,912	2,911	3,911	4,910	5,910
TOTAL SUPPLY	**258,868**	**257,920**	**205,181**	**182,655**	**300,911**
Potable Demand	124,910	127,827	130,745	133,662	136,504
Non-Potable Demand	60,000	60,000	48,287	22,260	60,000
TOTAL DEMAND	**184,910**	**187,827**	**179,032**	**155,922**	**196,504**
AVAILABLE SUPPLIES	**73,958**	**70,093**	**26,149**	**26,732**	**104,407**

8

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Water Shortage Contingency Plan

This WSCP is a detailed plan for how the City intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time.

The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

IN THIS SECTION

- WSCP Overview

The WSCP describes the following:

1. **Water Supply Reliability Analysis:** summarizes the City's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition
2. **Annual Water Supply and Demand Assessment Procedures:** describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions
3. **Six Standard Shortage Stages:** establishes water shortage levels to clearly identify and prepare for shortages
4. **Shortage Response Actions:** describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand as well as minimize social and economic impacts to the community
5. **Communication Protocols:** describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements
6. **Compliance and Enforcement:** defines compliance and enforcement actions available to administer demand reductions
7. **Legal Authority:** lists the legal documents that grant the City the authority to declare a water shortage and implement and enforce response actions
8. **Financial Consequences of WSCP Implementation:** describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens
9. **Monitoring and Reporting:** summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation, with results used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced
10. **WSCP Refinement Procedures:** describes the factors that may trigger updates to the WSCP and outlines how to complete an update
11. **Special Water Features Distinctions:** identifies exemptions for ponds, lakes, fountains, pools, and spas, etc.
12. **Plan Adoption, Submittal, and Availability:** describes the process for the WSCP adoption, submittal, and availability after each revision

The 2020 WSCP is a standalone document that can be modified as needed and is included as **Appendix J**.

CITY OF FRESNO

9 Demand Management Measures

This chapter discusses the City's demand management measures including its water waste prevention ordinances, metering program, public outreach, and water loss reduction measures.

The City employs several water conservation programs, in excess of State-mandated restrictions, to promote conservation and reduce the water supply demand. These measures help reduce overdraft of the groundwater aquifer that the City uses and have aided in the City's attainment of the urban water use reduction targets discussed in **Chapter 5**. The following sections provide a description of the Demand Management Measures (DMMs), including the nature and extent of each.

IN THIS SECTION

- Water Waste Prevention
- Metering
- Conservation Pricing
- Public Education and Outreach
- Water Loss Reduction Measures

9.1 Demand Management Measures for Retail

9.1.1 Water Waste Prevention Ordinances

The City prohibits water waste through implementation of the Urban Water Conservation and Excessive Water Use ordinance (see Section 6-520 of the Fresno Municipal Code). The ordinance includes such prohibitions as not washing hardscapes, using a nozzle-controlled hose, and using irrigation practices. The WSCP, included in **Appendix J**, Section 1.5, contains a more in-depth discussion of these prohibitions and consequences associated with them.

The City has a water waste hotline and a reporting form on the City website and keeps records of water waste violations. The City also employs fifteen staff persons year-round to manage and monitor the water conservation programs in place. Communication to the City's diverse customer base is always taken into consideration, so two of the positions require Spanish and Hmong languages. All Water Conservation Representatives use advanced metering infrastructure (AMI) to monitor and confirm excessive or negligent water waste incidents.

The Water Conservation staff can be reached at (559) 621-5300, (559) 621-5480, or (559) 621-CITY for after-hours emergencies. Online forms are also available to the public. Their office is located at 1910 E. University Avenue, Fresno, CA 93703. The Water Conservation Supervisor is Conrad Braganza.

9.1.2 Metering

In 2008, the City embarked on an aggressive project to install meters on all single-family residential service connections throughout its service area. The water meter project was completed at the end of 2012. The City already had water meters on all existing multifamily residential, commercial, industrial, landscape irrigation, and fire services.

With completion of the metering project, the City can now monitor water use more closely and provide its customers an understanding of water use (and its fiscal impacts), which has led to reducing water consumption by approximately 13% since 2013. The City will continue to monitor water use through the metering data and use the data to analyze demand trends and plan for future water shortages.

As part of the analysis of the meter data and through customer complaints or comments, the City is able to identify meters that are not working properly. Once identified, the City can have a maintenance crew visit the property and evaluate whether to repair or replace the meter.

The City also routinely tests and calibrates meters to ensure accuracy in reading and billing. Typically, meters are tested in place in the field or at a test bench in the meter shop. Field testing involves using calibrated flow meters to monitor the flow through a test port on or attached to the meter and comparing the measured flow to the meter reading. The majority of large meters, three inches and above, have a bypass valve that will be turned on during the meter test as not to disrupt water use to the property. In the case where a bypass valve is not in place, the customer is notified at least 48 hours before the test date. The City's service area has a total of approximately 135,000 meters, of which approximately 1,100 are three inches or larger. In 2018, of 157 of these large meters were tested, 10 were repaired, and 15 were replaced.

With the majority of meters being two inches or smaller, testing every single one is not logistically or economically feasible; therefore, a statistical sampling of each size is tested each year based on the following criteria:

- Meters six inches and above are tested annually.
- Meters three inches to four inches are tested at least once every two years.
- Meters three-fourths of an inch to two inches are sample tested as needed.

The City performs more frequent testing on larger meters on the basis that an error in their registration has a greater effect on customer equity and revenue issues. Meters registering larger volumes are given priority regardless of when they were last tested.

The City also shares meter data with the customers through its EyeOnWater tool available on its website or on a mobile app. This allows customers to monitor and better understand their hourly, daily, weekly, and monthly water usage, trends, and how they compare to average users.

9.1.3 Conservation Pricing

The City's customers are subject to the water rate structure adopted by the City Council through the Proposition 218 process. The approved rate structure has a base price designated by meter size and a volumetric rate for water usage. **Table 9-1** shows the rate structure.

The City will investigate the use of alternative rate structures in the future, which could have specific charges for usage to provide a fiscal incentive for customers to conserve water. This approach would permit customers to directly see the impact of water use reduction each month.

Table 9-1. Current Water Rate Structure

	BASE RATE		USAGE CHARGES	
METER SIZE	DOMESTIC	IRRIGATION	100 CUBIC FEET (HCF)	1,000 GALLONS
¾" or smaller	$13.50	$10.70	$1.74 (per each HCF)	$2.33 (per each 1,000 gallons)
1"	$17.90	$13.40		
1.5"	$20.80	$15.20		
2"	$35.30	$24.10		
3"	$52.80	$34.90		
4"	$79.00	$51.00		
6"	$152.00	$96.00		
8"	$705.00	$436.00		
10"	$1,113.00	$687.00		
12"	$1,462.00	$901.00		

9.1.4 Public Education and Outreach

The City has worked diligently to connect with and educate the community it serves. Those efforts include an emphasis on water conservation techniques and the importance of reducing overall water demand, both specifically to the resident (in terms of fiscal impacts) and to the overall water supply.

The City's varied programs to incentivize water savings are frequently discussed, including the following items:

- Water-wise landscape consultation
- EyeOnWater tool
- Irrigation efficiency audit
- Assistance with setting irrigation controllers
- Interior/exterior water leak surveys
- Water meter use information
- Water use rebates, coupons, and permits
- Lawn-to-garden rebates
- Water conservation hotlines

9.1.4.1 Education and Outreach

The City's water conservation public information program is managed in-house with the assistance of JP Marketing. The firm's services include strategic planning, creative concepts, public relations, marketing, promotion, research, advertising, media design, copywriting, event creation, and online services.

The City's public information program has many components, including multimedia campaigns (paid and public service advertising), customer billing inserts, literature, public outreach activities, a speaker's bureau, and inter-agency partnerships. Many of the City's water conservation materials are provided in three languages: English, Hmong, and Spanish.

The City is a member of the Central Valley Water Awareness Committee (CVWAC), which is composed of several cities, water utilities, irrigation districts, and other groups in the Central Valley. The CVWAC was created to increase the public's understanding of how water is treated, managed, and delivered to customers. The City participates in Water Awareness Month activities through its affiliation with the CVWAC.

The City conducted outreach to the community through approximately 50 events between 2015 and 2020, including:

- Setting up outreach booths providing water-saving info and rebate information at local festivals, parades, plant sales, home and garden shows, and fairs
- Participating in Annual Water Wise Plant Exchanges, a large community event to share water-wise plants and information and participate in hands-on activities
- Hosting Kids Water Camp, a large one-day event with hands-on activities for kids in third grade in all elementary schools in the service area
- Hosting workshops and speaker events about water-wise plants, gardening, and landscaping

A full list of specific education and outreach events over the past five years is included in **Appendix K**. The City also maintains a water conservation page on its website with links to many of the flyers and rebates mentioned above.

9.1.4.2 Water Surveys

The City conducted over 24,000 interior and exterior water leak surveys between 2015 and 2020. **Table 9-2** quantifies the number and types of surveys conducted.

Table 9-2. Interior and Exterior Surveys

DESCRIPTION/YEAR	2015	2016	2017	2018	2019	2020	TOTAL
EXTERIOR SURVEYS							
Exterior Audit	942	1,289	1,359	835	2,189	427	7,041
Landscape Consultation	605	382	193	139	149	48	1,516
Large Turf Survey	1	5	1	0	0	0	7
Timer Tutorial	1,644	1,967	1,873	2,170	1,346	518	9,518
INTERIOR SURVEYS							
Interior Audit	835	1,135	1,222	748	2,137	412	6,489
TOTALS	**4,027**	**4,778**	**4,648**	**3,892**	**5,821**	**1,405**	**24,571**

9.1.4.3 Rebate Programs

The City operates 14 rebate programs. Some of those that were active and used during the 2015–2020 reporting period are summarized in **Table 9-3**.

Table 9-3. Rebate Program Results (2015–2020)

	LAWN TO GARDEN		WASHING MACHINE		HIGH EFFIC. TOILET	
YEAR	NO.	REBATE	NO.	REBATE	NO.	REBATE
2015	122	$4,044	358	$46,144	301	$35,344
2016	160	$71,372	247	$27,600	233	$21,124
2017	103	$37,157	255	$19,682	495	$18,937
2018	43	$19,238	57	$5,502	145	$75,721
2019	42	$19,456	84	$8,000	115	$19,091
2020	25	$14,521	121	$6,950	106	$18,033
TOTALS	**495**	**$165,791**	**1,122**	**$113,880**	**1,395**	**$188,253**

9.1.5 Programs to Assess and Manage Distribution System Real Loss

As discussed in **Chapter 4**, the calculated loss was determined to be 8%, illustrating the City's conservative approach in the past. With completed system metering, the City is able to track losses more closely and understand where possible losses are occurring and correct them as necessary.

The AWWA Water Audit Tool suggested the areas the City could improve to reduce system losses, including calibration of source meters, unauthorized consumption, and data handling errors.

The following measures are in place or are being developed to improve the system losses:

- The City installed the remaining source meters on the few unmetered wells within the system in 2017, and now currently all wells and production facilities are fully metered.
- The City has a source meter calibration plan in place.
- The City has implemented meter testing frequency based on service size. This is discussed in more detail in **Section 9.1.2**.
- The City has an online tool as well as a telephone hotline available for the public to report water leaks, either on their property or within the public rights-of-way. This helps reduce detection time and limits the water loss from leaks.
- The City conducted a leak survey on 100 miles of the water system in January 2016. Eight total leaks were pinpointed, one on the main, two on hydrants, two on water service lines, and one at a water meter.
- The City uses meter data to identify any meters not functioning correctly or any leaks in the system so that they can be replaced or repaired. This helps reduce unaccounted for water consumption.

Unauthorized consumption can be determined, at times, through the meter data also. If a meter shows no usage, the City can note the address and schedule a site visit to determine any possible issues.

9.1.6 Other Demand Management Measures

In addition to the water conservation programs, the City has also enacted watering schedules for the community that specify days and times that customers are allowed to water, based on odd or even street addresses. The City has also created an automated courtesy notice program that informs customers when they exceed the excessive water use threshold during days and times when outdoor watering is not allowed.

9.2 Implementation to Achieve Water Use Targets

As discussed in **Chapter 5**, the City has met and exceeded its 2020 water use target. However, the City also realizes a portion of the observed conservation is due to the strict water use restrictions imposed during the drought. If those restrictions are lifted, the City will be diligent in continuing use of the above described DMMs.

The extensive metering program, replacement of turf, and replacement of over 10,000 high-water-use appliances (toilets and washing machines) over the last several years has helped the City maintain overall lower water consumption.

9.3 Water Use Objectives (Future Requirements)

As discussed in **Section 4.2.4.4**, the City is tracking the recommended water use efficiency standards and water use objectives developed due to Senate Bill 606 and Assembly Bill 1668. Currently no water use objectives have been adopted by the State, and are not anticipated to be adopted until 2022, but an indoor residential water use standard has been recommended by DWR, and additional standards are expected to be released in late 2021. The City is aware of the legislation and tracking the forthcoming water use objectives as they are available. The City is currently having ongoing discussions with DWR on clarifying the GIS-based approach for developing the overall water objective for residential customers. Alternatively, the City is also interested in using actual water use data (from the AMI system) to develop these objectives, following discussions and approval from DWR and SWRCB.

10 CITY OF FRESNO Plan Adoption, Submittal, and Implementation

This section provides guidance in the adoption, submittal, and implementation of the 2020 UWMP and WSCP, as well as processes for amending the adopted plans if needed.

This UWMP update has been prepared on a calendar-year basis and includes all water use and planning data for the 2020 calendar year. Additional details are provided in the preceding chapters.

IN THIS SECTION

- Public Hearing Notices
- Plan Adoption and Submittal

10.1 Notice of Public Hearing

The City has notified the County of Fresno, the only city or county in which the City provides water, of its intent to review the UWMP and consider changes to the plan. The City also notified the City of Clovis of plan preparation. Both of these governmental entities as well as a host of local water purveyors and agencies (**Table 2-1**) were notified of the preparation of the UWMP and public hearing and were encouraged to participate in the development of this plan update. Copies of the notification letters are included in **Appendix L**.

Consistent with the legislative requirements for public noticing, the City published two notices in the Fresno Bee, at least five days apart over a two-week period, providing the date and time of the public hearing. The notices were published on July 1, 2021, and July 8, 2021.

10.2 Public Hearing and Adoption

The City held a public hearing and adopted the 2020 UWMP on July 15, 2021. A copy of the adopting resolution is included in **Appendix M**. Before the public hearing, notices were published notifying the public of the date and time of the hearing.

10.3 Plan Submittal

Once the 2020 UWMP and WSCP have been adopted, a copy of the 2020 UWMP and WSCP and any subsequent amendments will be submitted to DWR, the State Library, and the County of Fresno.

10.4 Public Availability

Once the plan has been adopted, a hard copy will be made available for public reference at the City of Fresno Department of Public Utilities office at City Hall (located at 2600 Fresno Street) and the Water Division office (located at 1910 E. University Avenue). Additionally, an electronic copy will be uploaded to the City of Fresno website and made available for public reference.

11 CITY OF FRESNO References

Applied Development Economics, Inc. and Mintier Harnish Associates. (2017). *Fresno County 2050 Growth.*

California Department of Finance. (2020, May). *E-4 Population Estimates for Cities, Counties, and the State.* Retrieved from State of California Department of Finance: http://www.dof.ca.gov/Forecasting/Demographics/Estimates/e-4/2010-20/

California Department of Water Resources. (Feb 2016). *Methodologies for Calculating Baseline and Compliance Urban Per Capita Water Use.*

California Department of Water Resources. (January 2006). *Bulletin 118 - San Joaquiv Valley Groundwater Basin, Kings Subbasin.*

California Department of Water Resources, State Water Resources Control Board. (November 2018). *Making Water Conservation a California Way of Life.*

California Regional Water Qulaity Control Board. (2018). Order R5-2018-0080 Waste Discharge Requirements for Cities of Fresno and Clovis Regional Wastewater Reclamation Facility .

Carollo. (2010). Recycled Water Master Plan. City of Fresno.

Carollo. (2019). Citywide Recycled Water Demand and Southwest Recycled Water System Analysis . City of Fresno.

CH2MHill. (1992). *City of Fresno Metropolitan Water Resources Management Plan, Phase 1 Report, Volume II or II, Appendix B Hydrogeologic Conditions in the FCMA.*

City of Fresno Development and Resource Management Department. (2014). *Fresno General Plan .*

City of Fresno Development and Resource Management Department. (2017). *Fresno General Plan 2015 - 2023 Housing Element.*

City of Fresno Planning and Development Department. (2020). *2019 Housing Element Annual Progress Report.*

Department of Water Resources. (2018). *Guidance for Climate Change Data Use during Groundwater Sustainability Plan.*

First Carbon Solutions. (2014). *Master Environmental Impact Report General Plan and Development Code Update City of Fresno, Fresno County, California.*

Fresno City Water, Engineering Department. (1940). Average of Groundwater Depth for City of Wells Log.

History of SJRECWA Exchange Contractors. (n.d.). Retrieved 03 18, 2021, from San Joaquin River Exchange Contractrs Water Authority: http://www.sjrecwa.net/about/history/

John Carollo Engineers. (1969). *Report on Water Resources City of Fresno.*

Kings River Water Association and Kings River Conservation District. (June 2003). *The Kings River Handbook, pg. 7.*

LSA. (2020). *Fresno General Plan Public Review Draft Program Environmental Impact Report.*

Partida, C. K. (2020, November 15). Planning for a shorter rainy season and more frequent extreme storms in California. *California WaterBlog*. Retrieved from https://californiawaterblog.com/2020/11/15/planning-for-a-shorter-rainy-season-and-more-frequent-extreme-storms-in-california/

Persad, G. G. (2020, October). Inter-model agreement on projected shifts in California hydroclimate characteristics critical to water management. *Climatic Change*. Retrieved from https://doi.org/10.1007/s10584-020-02882-4

Provost & Pritchard. (November 2019). *North Kings Groundwater Sustainability Plan.* North Kings Groundwater Sustainability Agency.

WateReuse Research Foundation. (2013). *Demonstration of Filtration and Disinfection Compliance Through Soil-Aquifer Treatment.*

West Yost Associates. (January 2014). *City of Fresno Metropolitan Water Resources Management Plan Update Addendum.*

WRIME. (2007). The Integrated Groundwater and Surface Water Model prepared for the Kings Basin Integrated Regional Water Management Authority.

A

2020 UWMP Checklist

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Chapter 1	10615	A plan shall describe and evaluate sources of supply, reasonable and practical efficient uses, reclamation and demand management activities.	Introduction and Overview	Chapter 1
x	x	Chapter 1	10630.5	Each plan shall include a simple description of the supplier's plan including water availability, future requirements, a strategy for meeting needs, and other pertinent information. Additionally, a supplier may also choose to include a simple description at the beginning of each chapter.	Summary	Executive Summary
x	x	Section 2.2	10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Chapter 2, Section 10.2
x	x	Section 2.6	10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.1
x	x	Section 2.6.2	10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan and contingency plan.	Plan Preparation	Section 2.1, Section 10.1
x		Section 2.6, Section 6.1	10631(h)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) - if any - with water use projections from that source.	System Supplies	N/A
	x	Section 2.6	10631(h)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	N/A
x	x	Section 3.1	10631(a)	Describe the water supplier service area.	System Description	Section 3.1 and 3.2
x	x	Section 3.3	10631(a)	Describe the climate of the service area of the supplier.	System Description	Table 3-2 Section 3.3
x	x	Section 3.4	10631(a)	Provide population projections for 2025, 2030, 2035, 2040 and optionally 2045.	System Description	Table 3-3 Section 3.4.1
x	x	Section 3.4.2	10631(a)	Describe other social, economic, and demographic factors affecting the supplier's water management planning.	System Description	Section 3.3.1
x	x	Sections 3.4 and 5.4	10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Table 3-3 Section 3.4.1
x	x	Section 3.5	10631(a)	Describe the land uses within the service area.	System Description	Table 3-1 Section 3.1.1, Section 4.2.4.1, Table 4-3, Figure 4-3,
x	x	Section 4.2	10631(d)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2
x	x	Section 4.2.4	10631(d)(3)(C)	Retail suppliers shall provide data to show the distribution loss standards were met.	System Water Use	Losses included Section 4.2.2, City has not adopted loss standards

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 4.2.6	10631(d)(4)(A)	In projected water use, include estimates of water savings from adopted codes, plans and other policies or laws.	System Water Use	Table 4-5 Section 4.2.4.2
x	x	Section 4.2.6	10631(d)(4)(B)	Provide citations of codes, standards, ordinances, or plans used to make water use projections.	System Water Use	Section 4.2.5.2
x	optional	Section 4.3.2.4	10631(d)(3)(A)	Report the distribution system water loss for each of the 5 years preceding the plan update.	System Water Use	Table 4-1 Section 4.2.2
x	optional	Section 4.4	10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Table 4-9 Section 4.3
x	x	Section 4.5	10635(b)	Demands under climate change considerations must be included as part of the drought risk assessment.	System Water Use	Section 4.4
x		Chapter 5	10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Table 5-1 Section 5.4 Appendix C
x		Chapter 5	10608.24(a)	Retail suppliers shall meet their water use target by December 31, 2020.	Baselines and Targets	Section 5.5 Appendix C
	x	Section 5.1	10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	N/A
x		Section 5.2	10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	N/A
x		Section 5.5	10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	N/A
x		Section 5.5 and Appendix E	10608.4	Retail suppliers shall report on their compliance in meeting their water use targets. The data shall be reported using a standardized form in the SBX7-7 2020 Compliance Form.	Baselines and Targets	Appendix C
x	x	Sections 6.1 and 6.2	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought.	System Supplies	Section 6.1-6.4 Section 7.1.3
x	x	Sections 6.1	10631(b)(1)	Provide a discussion of anticipated supply availability under a normal, single dry year, and a drought lasting five years, as well as more frequent and severe periods of drought, *including changes in supply due to climate change*.	System Supplies	Section 6.8.2.1
x	x	Section 6.1	10631(b)(2)	When multiple sources of water supply are identified, describe the management of each supply in relationship to other identified supplies.	System Supplies	Section 6.8
x	x	Section 6.1.1	10631(b)(3)	Describe measures taken to acquire and develop planned sources of water.	System Supplies	Section 6.7
x	x	Section 6.2.8	10631(b)	Identify and quantify the existing and planned sources of water available for 2020, 2025, 2030, 2035, 2040 and optionally 2045.	System Supplies	Table 6-7 and Table 6-8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.2	10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.1
x	x	Section 6.2.2	10631(b)(4)(A)	Indicate whether a groundwater sustainability plan or groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.1 Appendix G
x	x	Section 6.2.2	10631(b)(4)(B)	Describe the groundwater basin.	System Supplies	Section 6.1.1
x	x	Section 6.2.2	10631(b)(4)(B)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	N/A
x	x	Section 6.2.2.1	10631(b)(4)(B)	For unadjudicated basins, indicate whether or not the department has identified the basin as a high or medium priority. Describe efforts by the supplier to coordinate with sustainability or groundwater agencies to achieve sustainable groundwater conditions.	System Supplies	Section 6.1.2
x	x	Section 6.2.2.4	10631(b)(4)(C)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.1.6 Figure 6-6
x	x	Section 6.2.2	10631(b)(4)(D)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Section 6.1.5 Table 6-1
x	x	Section 6.2.7	10631(c)	Describe the opportunities for exchanges or transfers of water on a short-term or long- term basis.	System Supplies	Section 6-6
x	x	Section 6.2.5	10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.4.2, Appendix B Table 6-3R
x	x	Section 6.2.5	10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.4.4 Table 6-5
x	x	Section 6.2.5	10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.4.4
x	x	Section 6.2.5	10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.4.4 Table 6-6
x	x	Section 6.2.5	10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.4.5
x	x	Section 6.2.5	10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.4.5
x	x	Section 6.2.6	10631(g)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.5
x	x	Section 6.2.5	10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area with quantified amount of collection and treatment and the disposal methods.	System Supplies (Recycled Water)	Section 6.4.2, Appendix B Table 6-3R

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 6.2.8, Section 6.3.7	10631(f)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and for a period of drought lasting 5 consecutive water years.	System Supplies	Section 6.7
x	x	Section 6.4 and Appendix O	10631.2(a)	The UWMP must include energy information, as stated in the code, that a supplier can readily obtain.	System Suppliers, Energy Intensity	Section 6.9
x	x	Section 7.2	10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1.1
x	x	Section 7.2.4	10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.1.2
x	x	Section 7.3	10635(a)	Service Reliability Assessment: Assess the water supply reliability during normal, dry, and a drought lasting five consecutive water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.1.4
x	x	Section 7.3	10635(b)	Provide a drought risk assessment as part of information considered in developing the demand management measures and water supply projects.	Water Supply Reliability Assessment	Section 7.2
x	x	Section 7.3	10635(b)(1)	Include a description of the data, methodology, and basis for one or more supply shortage conditions that are necessary to conduct a drought risk assessment for a drought period that lasts 5 consecutive years.	Water Supply Reliability Assessment	Section 7.1.3.3
x	x	Section 7.3	10635(b)(2)	Include a determination of the reliability of each source of supply under a variety of water shortage conditions.	Water Supply Reliability Assessment	Section 7.1.3
x	x	Section 7.3	10635(b)(3)	Include a comparison of the total water supply sources available to the water supplier with the total projected water use for the drought period.	Water Supply Reliability Assessment	Section 7.1.4 Table 7-1, Table 7-2, and Table 7-3
x	x	Section 7.3	10635(b)(4)	Include considerations of the historical drought hydrology, plausible changes on projected supplies and demands under climate change conditions, anticipated regulatory changes, and other locally applicable criteria.	Water Supply Reliability Assessment	Section 7.1.3 and 7.1.4
x	x	Chapter 8	10632(a)	Provide a water shortage contingency plan (WSCP) with specified elements below.	Water Shortage Contingency Planning	Appendix J
x	x	Chapter 8	10632(a)(1)	Provide the analysis of water supply reliability (from Chapter 7 of Guidebook) in the WSCP	Water Shortage Contingency Planning	Appendix J - Section 1.2
x	x	Section 8.10	10632(a)(10)	Describe reevaluation and improvement procedures for monitoring and evaluation the water shortage contingency plan to ensure risk tolerance is adequate and appropriate water shortage mitigation strategies are implemented.	Water Shortage Contingency Planning	Appendix J - Section 1.10

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.2	10632(a)(2)(A)	Provide the written decision-making process and other methods that the supplier will use each year to determine its water reliability.	Water Shortage Contingency Planning	Appendix J - Section 1.3
x	x	Section 8.2	10632(a)(2)(B)	Provide data and methodology to evaluate the supplier's water reliability for the current year and one dry year pursuant to factors in the code.	Water Shortage Contingency Planning	Appendix J - Section 1.3
x	x	Section 8.3	10632(a)(3)(A)	Define six standard water shortage levels of 10, 20, 30, 40, 50 percent shortage and greater than 50 percent shortage. These levels shall be based on supply conditions, including percent reductions in supply, changes in groundwater levels, changes in surface elevation, or other conditions. The shortage levels shall also apply to a catastrophic interruption of supply.	Water Shortage Contingency Planning	Appendix J - Section 1.4 Table 2
x	x	Section 8.3	10632(a)(3)(B)	Suppliers with an existing water shortage contingency plan that uses different water shortage levels must cross reference their categories with the six standard categories.	Water Shortage Contingency Planning	Appendix J - Section 1.4 Figure 2
x	x	Section 8.4	10632(a)(4)(A)	Suppliers with water shortage contingency plans that align with the defined shortage levels must specify locally appropriate supply augmentation actions.	Water Shortage Contingency Planning	Appendix J - Section 1.5.3 Table 4
x	x	Section 8.4	10632(a)(4)(B)	Specify locally appropriate demand reduction actions to adequately respond to shortages.	Water Shortage Contingency Planning	Appendix J - Section 1.5.2 Table 3
x	x	Section 8.4	10632(a)(4)(C)	Specify locally appropriate operational changes.	Water Shortage Contingency Planning	Appendix J - Section 1.5.4
x	x	Section 8.4	10632(a)(4)(D)	Specify additional mandatory prohibitions against specific water use practices that are in addition to state-mandated prohibitions are appropriate to local conditions.	Water Shortage Contingency Planning	Appendix J - Section 1.5.1
x	x	Section 8.4	10632(a)(4)(E)	Estimate the extent to which the gap between supplies and demand will be reduced by implementation of the action.	Water Shortage Contingency Planning	Appendix J - Section 1.5.2 Table 3
x	x	Section 8.4.6	10632.5	The plan shall include a seismic risk assessment and mitigation plan.	Water Shortage Contingency Plan	Appendix J - Section 1.5.6
x	x	Section 8.5	10632(a)(5)(A)	Suppliers must describe that they will inform customers, the public and others regarding any current or predicted water shortages.	Water Shortage Contingency Planning	Appendix J - Section 1.6
x	x	Section 8.5 and 8.6	10632(a)(5)(B) 10632(a)(5)(C)	Suppliers must describe that they will inform customers, the public and others regarding any shortage response actions triggered or anticipated to be triggered and other relevant communications.	Water Shortage Contingency Planning	Appendix J - Section 1.6
x		Section 8.6	10632(a)(6)	Retail supplier must describe how it will ensure compliance with and enforce provisions of the WSCP.	Water Shortage Contingency Planning	Appendix J - Section 1.7
x		Section 8.7	10632(a)(7)(A)	Describe the legal authority that empowers the supplier to enforce shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.8

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 8.7	10632(a)(7)(B)	Provide a statement that the supplier will declare a water shortage emergency Water Code Chapter 3.	Water Shortage Contingency Planning	Appendix J - Section 1.8
x	x	Section 8.7	10632(a)(7)(C)	Provide a statement that the supplier will coordinate with any city or county within which it provides water for the possible proclamation of a local emergency.	Water Shortage Contingency Planning	Appendix J - Section 1.8
x	x	Section 8.8	10632(a)(8)(A)	Describe the potential revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.9
x	x	Section 8.8	10632(a)(8)(B)	Provide a description of mitigation actions needed to address revenue reductions and expense increases associated with activated shortage response actions.	Water Shortage Contingency Planning	Appendix J - Section 1.9
x		Section 8.8	10632(a)(8)(C)	Retail suppliers must describe the cost of compliance with Water Code Chapter 3.3: Excessive Residential Water Use During Drought	Water Shortage Contingency Planning	Appendix J - Section 1.9
x		Section 8.9	10632(a)(9)	Retail suppliers must describe the monitoring and reporting requirements and procedures that ensure appropriate data is collected, tracked, and analyzed for purposes of monitoring customer compliance.	Water Shortage Contingency Planning	Appendix J - Section 1.10
x		Section 8.11	10632(b)	Analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas.	Water Shortage Contingency Planning	Appendix J - Section 1.12
x	x	Sections 8.12 and 10.4	10635(c)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 30 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Appendix J - Section 1.13
x	x	Section 8.14	10632(c)	Make available the Water Shortage Contingency Plan to customers and any city or county where it provides water within 30 after adopted the plan.	Water Shortage Contingency Planning	Appendix J - Section 1.13
	x	Sections 9.1 and 9.3	10631(e)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	N/A
x		Sections 9.2 and 9.3	10631(e)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Section 9.1
x		Chapter 10	10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets (recommended to discuss compliance).	Plan Adoption, Submittal, and Implementation	Section 10.2
x	x	Section 10.2.1	10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan. Reported in Table 10-1.	Plan Adoption, Submittal, and Implementation	Section 10.1, Table 2-1, Appendix L

Retail	Wholesale	2020 Guidebook Location	Water Code Section	Summary as Applies to UWMP	Subject	2020 UWMP Location (Optional Column for Agency Review Use)
x	x	Section 10.4	10621(f)	Each urban water supplier shall update and submit its 2020 plan to the department by July 1, 2021.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Sections 10.2.2, 10.3, and 10.5	10642	Provide supporting documentation that the urban water supplier made the plan and contingency plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan and contingency plan.	Plan Adoption, Submittal, and Implementation	Appendix L
x	x	Section 10.2.2	10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Appendix L
x	x	Section 10.3.2	10642	Provide supporting documentation that the plan and contingency plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Appendix M
x	x	Section 10.4	10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.4	10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Sections 10.4.1 and 10.4.2	10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be submitted electronically.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.5	10645(a)	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.5	10645(b)	Provide supporting documentation that, not later than 30 days after filing a copy of its water shortage contingency plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	TBD
x	x	Section 10.6	10621(c)	If supplier is regulated by the Public Utilities Commission, include its plan and contingency plan as part of its general rate case filings.	Plan Adoption, Submittal, and Implementation	N/A
x	x	Section 10.7.2	10644(b)	If revised, submit a copy of the water shortage contingency plan to DWR within 30 days of adoption.	Plan Adoption, Submittal, and Implementation	TBD

B

DWR Standardized Tables

2-1R | Public Water Systems

Public Water System Number	Public Water System Name	Number of Municipal Connections 2020	Volume of Water Supplied 2020
CA1010007	CITY OF FRESNO	139,523	121,994
	Total:	**139,523**	**121,994**
Note: Data provided by City of Fresno Water Division			

2-2 | Public Water Systems

Type of Plan	Member of RUWMP	Member of Regional Alliance	Name of RUWMP or Regional Alliance
Individual UWMP	No	No	N/A

2-3 | Agency Identification

Type of Supplier	Year Type	First Day of Year		Unit Type
		DD	MM	
Retailer	Calendar Years			Acre Feet (AF)

Conversion to Gallons: *325851*
Conversion to Gallons per Day: *892.7425*

2-4R | Water Supplier Information Exchange

Wholesale Water Supplier Name
United States Bureau of Reclamation
Fresno Irrigation District

3-1R | Current & Projected Population

Population Served	2020	2025	2030	2035	2040	2045
Total	550,217	609,433	674,677	719,327	765,278	812,529

4-1R | Actual Demands for Water

Use Type	Additional Description	Level of Treatment When Delivered	2020 Volume
Single Family		Drinking Water	60,065
Multi-Family		Drinking Water	18,842
Commercial		Drinking Water	16,971
Industrial		Drinking Water	5,729
Institutional/Governmental	See Note 1	Drinking Water	---
Landscape		Drinking Water	10,478
Other	Travel Meters	Drinking Water	340
Losses		Drinking Water	9,568
Groundwater Recharge		Raw Water	42,686
		Total:	**164,679**

Notes:
1. Institutional and Governmental water usage is included in the Commercial use type.

4-2R | Projected Demands for Water

Use Type	Additional Description	Projected Water Use				
		2025	2030	2035	2040	2045
Single Family		76,255	80,429	82,934	85,437	87,936
Multi-Family		19,000	20,654	21,737	22,831	23,935
Commercial		19,052	21,135	22,587	24,041	25,496
Industrial		7,410	9,003	9,922	10,841	11,758
Institutional/Governmental	See Note 1					
Landscape		4,490	5,035	5,422	5,809	6,196
Other	Travel Meters	200	200	200	200	200
Losses		10,097	10,900	11,408	11,917	12,426
Groundwater Recharge	Raw Water	62,700	65,400	68,100	70,800	73,500
Total:		**199,204**	**212,756**	**222,310**	**231,876**	**241,447**

Notes:
1. Institutional and Governmental water usage is included in the Commercial use type.

4-3R | Total Gross Water Use

	2020	2025	2030	2035	2040	2045
Potable and Raw Water From Table 4-1R and 4-2R	164,679	199,204	212,756	222,310	231,876	241,447
Recycled Water Demand From Table 6-4R	4,757					
Total Water Use:	**169,436**	**199,204**	**212,756**	**222,310**	**231,876**	**241,447**

Note: Recycled water supply is a potable water offset, thus the recycled water demand in years 2025-2045 is included in the potable and raw water demand total.

4-4R | 12 Month Water Loss Audit Reporting

Report Period Start Date		Volume of Water Loss*
MM	YYYY	
1	2016	9,036
1	2017	10,235
1	2018	9,028
1	2019	9,059
1	2020	9,568

*For years 2016, through 2019, volume of water loss is taken from the field "Water Losses" (a combination of apparent losses and real losses) from the AWWA worksheet. For 2020 the volume of water loss is estimates as the difference in metered water produced and entered into the distribution system and metered consumption.

4-5R | Inclusion in Water Use Projections

Are Future Water Savings Included in Projections? Refer to Appendix K of UWMP Guidebook.	Yes
Section or page number where the citations utilized in the demand projects can it be found:	Section 4.2.4.2
Are Lower Income Residential Demands Included in Projections?	Yes

5-1R | Baselines & Targets Summary

Baseline Period	Start Year	End Year	Average Baseline GPCD*	Confirmed 2020 Target *
10-15 Year	1999	2008	309	247
5 Year	2003	2007	304	N/A

*All values are in Gallons per Capita per Day (GPCD)

5-2R | 2020 Compliance

Actual 2020 GPCD*	Optional Adjustments to 2020 GPCD					2020 GPCD* (Adjusted if applicable)	Supplier Achieved Targeted Reduction in 2020
	Extraordinary Events*	Economic Adjustment*	Weather Normalization*	Total Adjustments*	Adjusted 2020 GPCD*		
198	0	0	0	0	0	0	Yes

*All values are in Gallons per Capita per Day (GPCD)

6-1R | Groundwater Volume Pumped

Groundwater Type	Location or Basin Name	2016	2017	2018	2019	2020
Alluvial Basin	San Joaquin Groundwater Basin: Kings Subbasin	99,107	105,211	76,796	54,609	55,028
	Total:	**99,107**	**105,211**	**76,796**	**54,609**	**55,028**

6-2R | Wastewater Collected within Service Area in 2020

The supplier will complete the table.						
			Percentage of 2020 service area covered by wastewater collection system (optional):			
			Percentage of 2020 service area population covered by wastewater collection system (optional):			
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	**Wastewater Volume Metered or Estimated**	**Wastewater Volume Collected from UWMP Service Area in 2020**	**Name of Wastewater Agency Receiving Collected Wastewater**	**Wastewater Treatment Plant Name**	**Wastewater Treatment Plant Located within UWMP Area**	**WWTP Operation Contracted to a Third Party**
City of Fresno	Metered	63,652	**City of Fresno**	RWRF	Yes	No
City of Fresno	Metered	325	**City of Fresno**	NFWRF	Yes	No
	Total:	**63,977**				
Note: Wastewater Volume in units of AF						

6-3R | Wastewater Treatment & Discharge Within Service Area in 2020

The supplier will complete the table.											
Wastewater Treatment Plant Name	**Discharge Location Name or Identifier**	**Discharge Location Description**	**Wastewater Discharge ID Number**	**Method of Disposal**	**Plant Treats Wastewater Generated Outside the Service Area**	**Treatment Level**	**2020 Volumes**				
							Wastewater Treated	**Discharged Treated Wastewater**	**Recycled Within Service Area**	**Recycled Outside of Service Area**	**Instream Flow Permit Requirement**
RWRF	Treatment Site	Onsite Percolation Ponds	WDR Order R5-2018-0080	Percolation ponds	Yes	Secondary, Undisinfected	63,652	58,949	-	3,845	-
RWRF	Treatment Site	Onsite Percolation Ponds	WDR Order R5-2018-0080	Percolation ponds	Yes	Tertiary			858	-	-
NFWRF	Treatment Site	Onsite Pond	WDR Order R5-2014-0162	Percolation ponds	No	Tertiary	325	271	54	-	-
						Total:	**63,977**	**59,220**	**912**	**3,845**	**-**

6-4R | Recycled Water Direct Beneficial Uses Within Service Area

The supplier will complete the table.										
Name of Supplier Producing (Treating) the Recycled Water:			City of Fresno							
Name of Supplier Operating the Recycled Water Distribution System:			City of Fresno							
Supplemental Volume of Water Added in 2020:										0%
Source of 2020 Supplemental Water:			N/A							
Beneficial Use Type	**Potential Beneficial Uses of Recycled Water**	**Amount of Potential Uses of Recycled Water**	**General Description of 2020 Uses**	**Level of Treatment**	**2020**	**2025**	**2030**	**2035**	**2040**	**2045**
Agricultural Irrigation	Non-food crop irrigation	7,900	Irrigate non-food crops	Secondary, Undisinfected	3,845	7,900	7,900	7,900	7,900	7,900
Landscape Irrigation (excludes golf courses)	Landscape Irrigation	5,800	Landscape irrigation, distribtued through the southwest recycled water distribution system	Tertiary	858	5,800	5,800	5,800	5,800	5,800
Agricultural Irrigation	Food crop irrigation	410	Irrigate limited food crops, distribtued through the southwest recycled water distribution system	Tertiary	-	410	410	410	410	410
Golf Course Irrigation	Landscape Irrigation	110	Copper River Golf Course	Tertiary	54	110	110	110	110	110
				Total:	**4,757**	**14,220**	**14,220**	**14,220**	**14,220**	**14,220**
Internal Reuse (Not included in Statewide Recycled Water Volume).					11	30	30	30	30	30

6-5R | 2015 Recycled Water Use Projection Compared to 2020 Actual

The supplier will complete the table.

Use Type	2015 Projection for 2020	2020 Actual Use
Agricultural Irrigation	14,200	3,845
Landscape Irrigation (excludes golf courses)	4,300	858
Golf Course Irrigation		54
Commercial Use		
Industrial Use	1,400	
Geothermal and Other Energy Production		
Seawater Intrusion Barrier		
Recreational Impoundment		
Wetlands or Wildlife Habitat		
Groundwater Recharge (IPR)*	1,300	
Surface Water Augmentation (IPR)*		
Direct Potable Reuse		
Total:	**21,200**	**4,757**

6-6R | Methods to Expand Future Recycled Water Use

The supplier will complete the table below.			
Name of Action	**Description**	**Planned Implementation Year**	**Expected Increase of Recycled Water Use**
Build Infrastructure	Recycled Water Distribution System Expansion	2021	5,000
		Total:	**5,000**

6-7R | Expected Future Water Supply Projects or Programs

Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.						
Page Location for Narrative in UWMP:			Section 6.7			
Name of Future Projects or Programs	**Joint Project with Other Suppliers**	**Agency Name**	**Description**	**Planned Implementation Year**	**Planned for Use in Year Type**	**Expected Increase in Water Supply to Supplier**
Expansion of Tertiary Recycled Water Treatment	No		See Section 6.7		All Year Types	
Expansion of Surface Water Treatment Capacity	No		See Section 6.7		All Year Types	
Expansion of Groundwater Recharge Program	No		See Section 6.7		All Year Types	

6-8R | Actual Water Supplies

Water Supply	Additional Detail on Water Supply	2020		
		Actual Volume	Water Quality	Total Right or Safe Yield
Groundwater (not desalinated)		55,028	Drinking Water	
Surface water (not desalinated)	USBR CVP	37,447	Drinking Water	
Surface water (not desalinated)	FID Contract	71,292	Drinking Water	
Recycled Water	RWRF	858	Recycled Water	
Recycled Water	NFWRF	54	Recycled Water	
	Total:	**164,679**		**-**

6-8DS | Source Water Desalination

Neither groundwater nor surface water are reduced in salinity prior to distribution. The supplier will not complete the table.

6-9R | Projected Water Supplies

Water Supply	Additional Detail on Water Supply	Projected Water Supply									
		2025		2030		2035		2040		2045	
		Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield	Reasonably Available Volume	Total Right or Safe Yield
Groundwater (not desalinated)	Kings Subbasin	138,090		143,630		149,100		154,490		159,820	
Surface water (not desalinated)	USBR CVP	60,000		60,000		60,000		60,000		60,000	
Surface water (not desalinated)	FID Contract	125,030		131,600		131,600		131,600		131,600	
Recycled Water	NFWRF Tertiary Disinfected	5,800		5,800		5,800		5,800		5,800	
Recycled Water	RWRF Tertiary Disinfected	110		110		110		110		110	
Total:		**329,030**	**-**	**341,140**	**-**	**346,610**	**-**	**352,000**	**-**	**357,330**	**-**

7-1R | Basis of Water Year Data (Reliability Assessment)

Quantification of available supplies is not compatible with this table and is provided elsewhere in the UWMP.	
Page Location for Narrative in UWMP:	See Section 7.1.3 in the UWMP

7-2R | Normal Year Supply and Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals From Table 6-9R	329,030	341,140	346,610	352,000	357,330
Demand Totals From Table 4-3R	199,204	212,756	222,310	231,876	241,447
Difference:	**129,826**	**128,384**	**124,300**	**120,124**	**115,883**

7-3R | Single Dry Year Supply & Demand Comparison

	2025	2030	2035	2040	2045
Supply Totals	189,852	195,392	200,862	206,252	211,582
Demand Totals	164,092	176,132	184,174	192,228	200,287
Difference:	**25,760**	**19,260**	**16,688**	**14,024**	**11,295**

7-4R | Multiple Dry Years Supply & Demand Comparison

		2025	2030	2035	2040	2045
First Year	**Supply Totals**	273,725	279,265	284,735	290,125	295,455
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**74,521**	**66,509**	**62,425**	**58,249**	**54,008**
Second Year	**Supply Totals**	274,626	280,166	285,636	291,026	296,356
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**75,422**	**67,410**	**63,326**	**59,150**	**54,909**
Third Year	**Supply Totals**	217,568	223,108	228,578	233,968	239,298
	Demand Totals	190,267	193,637	197,736	201,753	205,708
	Difference:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
Fourth Year	**Supply Totals**	189,852	195,392	200,862	206,252	211,582
	Demand Totals	162,551	165,920	170,020	174,036	177,992
	Difference:	**27,301**	**29,471**	**30,842**	**32,215**	**33,589**
Fifth Year	**Supply Totals**	314,840	320,380	325,850	331,240	336,570
	Demand Totals	199,204	212,756	222,310	231,876	241,447
	Difference:	**115,636**	**107,624**	**103,540**	**99,364**	**95,123**

7-5 | Five-Year Drought Risk Assessment Tables to Address Water Code Section 10635(b)

2021	**Gross Water Use**	184,910
	Total Supplies	240,905
	Surplus/Shortfall without WSCP Action	**55,995**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**55,995**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2022	**Gross Water Use**	187,827
	Total Supplies	244,448
	Surplus/Shortfall without WSCP Action	**56,621**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**56,621**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2023	**Gross Water Use**	170,051
	Total Supplies	196,200
	Surplus/Shortfall without WSCP Action	**26,149**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**26,149**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2024	**Gross Water Use**	151,432
	Total Supplies	178,164
	Surplus/Shortfall without WSCP Action	**26,732**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**26,732**
	Resulting Percent Use Reduction from WSCP Action	**0%**
2025	**Gross Water Use**	196,504
	Total Supplies	300,911
	Surplus/Shortfall without WSCP Action	**104,407**
	Planned WSCP Actions (Use Reduction and Supply Augmentation)	
	WSCP (Supply Augmentation Benefit)	0
	WSCP (Use Reduction Savings Benefit)	0
	Revised Surplus/Shortfall	**104,407**
	Resulting Percent Use Reduction from WSCP Action	**0%**

8-1 | Water Shortage Contingency Plan Levels

Shortage Level	Percent Shortage[1]	Water Shortage Condition
0		No water shortage condition. Corresponds with year-round water use measures listed in Section 1.5.1 and demand reduction measures listed for "All" stages in Table 3.
1	0-10%	Stage 1 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 100% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 2 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10-25%	Stage 2 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 90% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 3 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
3	25-35%	Stage 3 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 75% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 4 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
4	35-50%	Stage 4 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 65% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or •After having been in a Stage 5 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[2] or higher; or •After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
5	>50%	Stage 5 may be triggered by any of the following conditions: •The available water supplies for the next year are projected to be less than 50% of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment.

[1]Shortage levels indicate the gap between supply and demand compared to normal-year conditions. The Annual Assessment incorporates a 10% buffer on top of projected demands for conservative planning.
[2]Water year types were defined 2006 San Joaquin River Restoration Settlement Agreement for USBR allocations and characterized in Section 6.2 of the City's 2020 UWMP.

8-2 | Demand Reduction Actions

Shortage Level	Demand Reduction Actions	How much is this going to reduce the shortage gap?[1]	Additional Explanation or Reference	Penalty, Charge, or Other Enforcement[2]
All	Expand Public Information Campaign	Not Applicable	Community outreach includes classroom presentations, outreach educational information, and water tours. Increase communication as drought stages increase.	Not Applicable
All	Improve Customer Billing	Not Applicable	Water bills show customer usage vs. average usage for the customer category. Increase customer notifications of high water use based on advanced metering infrastructure (AMI) data as drought stages increase.	Not Applicable
All	Offer Water Use Surveys	Not Applicable	Use water leak surveys with all community members.	Not Applicable
All	Provide Rebates for Landscape Irrigation Efficiency	Not Applicable	The City offers rebates for micro-irrigation conversions, soil moisture sensors, smart irrigation controller, and rain sensors to improve efficiencies.	Not Applicable
All	Provide Rebates for Turf Replacement	Not Applicable	The City provides rebates for community members who wish to replace their turf with a drought-resistant garden.	Not Applicable
All	Provide Rebates on Plumbing Fixtures and Devices	Not Applicable	The City offers rebates on a variety of high-efficiency plumbing fixtures, such as washers, toilets, and urinals.	Not Applicable
All	Decrease Line Flushing	Not Applicable	The City uses NO-DES for regular pipe flushing to eliminate discharging water.	Not Applicable
All	Reduce System Water Loss	Not Applicable	The City has a comprehensive system water loss reduction program in place. Increase efforts to correct water system losses as drought stages increase.	Not Applicable
1	Decrease Line Flushing	0 to 100% of shortage gap	For dead-end flushing where the NO-DES truck cannot be used, reduce normal flushing time.	Not Applicable
1	Increase Water Waste Patrols	0 to 100% of shortage gap	Increase monitoring of AMI reporting and communication with customers; Conduct patrols based on public input.	Not Applicable
1	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Voluntary limits: Summer: three days/week Winter: one day/week	No
2	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: three days/week Winter: one day/week	Yes
3	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: two days/week Winter: one day/week	Yes
4	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: one day/week Winter: one day/week	Yes
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	The City provides rebates for community members who wish to replace their turf with a drought resistant garden	No
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, and building washdowns where non-potable or recycled water is sufficient.	Yes
4	Other — Prohibit vehicle washing except at facilities using recycled or recirculating water	0 to 100% of shortage gap	Prohibit washing cars, boats, trailers, aircraft, or other vehicles, except at commercial or fleet vehicle-washing facilities using water recycling equipment.	Yes
4	Pools and Spas - Require covers for pools and spas	0 to 100% of shortage gap	Require covers for swimming pools when not in use.	No
4	Other	0 to 100% of shortage gap	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City manager.	Not Applicable
4	Other	0 to 100% of shortage gap	Prohibit use of outdoor misters.	No
5	Landscape — Prohibit all landscape irrigation	0 to 100% of shortage gap	Prohibit outdoor irrigation year-round.	Yes
5	Moratorium or Net Zero Demand Increase on New Connections	0 to 100% of shortage gap	The City will temporarily limit or ban new water service connections within the service area.	Not Applicable

[1]Reduction in the shortage gap is estimated and can vary significantly.
[2]Refer to WSCP Section 1.7 for Penalties for Water Wastage.

8-3R | Supply Augmentation & Other Actions

Shortage Level	Supply Augmentation Methods and Other Actions by Water Supplier	How much is this going to reduce the shortage gap?	Additional Explanation or Reference
1 to 5	Transfers	As Needed	Purchase or exchange available USBR or FID surface water
1 to 5	Other Purchases	As Needed	Interconnection with City of Clovis for use in emergencies

10-1R | Notification to Cities & Counties

City	60 Day Notice	Notice of Public Hearing	Other
City of Clovis	Yes	Yes	
County	**60 Day Notice**	**Notice of Public Hearing**	**Other**
County of Fresno	Yes	Yes	
Other	**60 Day Notice**	**Notice of Public Hearing**	**Other**
Bakman Water Company	Yes	Yes	
Fresno Irrigation District	Yes	Yes	
Fresno Metropolitan Flood Control District	Yes	Yes	
Friant Water Authority	Yes	Yes	
Garfield Water District	Yes	Yes	
Malaga County Water District	Yes	Yes	
North Kings Groundwater Sustainabilty Agency	Yes	Yes	
Pinedale County Water District	Yes	Yes	
United Stated Bureau of Reclamation South-Central California Area Office	Yes	Yes	

C

SBx7-7 Tables and Verification Form

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	2020 Target GPCD
309	247
NOTES:	

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target*	Calculated 2020 Target *Fm Appropriate Target Table*	Confirmed 2020 Target
304	288	247	247
** Maximum 2020 Target is 95% of the 5 Year Baseline GPCD*			
NOTES:			

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)*					2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015?
		Extraordinary Events	Weather Normalization	Economic Adjustment	TOTAL Adjustments	Adjusted 2015 GPCD		
190	278	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	0	189.745674	189.745674	YES
NOTES:								

SB X7-7 Table 0: Units of Measure Used in 2020 UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent throughout the UWMP, as reported in Submittal Table 2-3.*
NOTES:

SB X7-7 Table 2: Method for 2020 Population Estimate	
Method Used to Determine 2020 Population (may check more than one)	
☐	**1. Department of Finance** (DOF) or **American Community Survey** (ACS)
☐	**2. Persons-per-Connection Method**
☑	**3. DWR Population Tool**
☐	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: 2020 Service Area Population	
2020 Compliance Year Population	
2020	550,217
NOTES:	

SB X7-7 Table 4: 2020 Gross Water Use

Compliance Year 2020	2020 Volume Into Distribution System *This column will remain blank until SB X7-7 Table 4-A is completed.*	2020 Deductions					2020 Gross Water Use
		Exported Water *	Change in Dist. System Storage* (+/-)	Indirect Recycled Water *This column will remain blank until SB X7-7 Table 4-B is completed.*	Water Delivered for Agricultural Use*	Process Water *This column will remain blank until SB X7-7 Table 4-D is completed.*	
	121,994	-	-	-	-	-	**121,994**

*** Units of measure (AF, MG , or CCF)** must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Groundwater
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	55,028	-	55,028

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s) Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- NESWTF
This water source is *(check one)* **:**	
☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	20,724		20,724

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- SESWTF
This water source is *(check one)* **:**	

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	45,367		45,367

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Surface Water- T-3 SWTF

This water source is *(check one)* **:**

☑	The supplier's own water source
☐	A purchased or imported source

Compliance Year 2020	Volume Entering Distribution System [1]	Meter Error Adjustment [2] *Optional (+/-)*	Corrected Volume Entering Distribution System
	875		875

[1] ***Units of measure (AF, MG , or CCF)*** *must remain consistent throughout the UWMP, as reported in SB X7-7 Table 0 and Submittal Table 2-3.* [2] ***Meter Error Adjustment*** *- See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES:

SB X7-7 Table 4-A: 2020 Volume Entering the Distribution System(s), Meter Error Adjustment

Complete one table for each source.

Name of Source	Enter Name of Source 5

This water source is *(check one)* **:**

☐	The supplier's own water source
☐	A purchased or imported source

SB X7-7 Table 5: 2020 Gallons Per Capita Per Day (GPCD)		
2020 Gross Water *Fm SB X7-7 Table 4*	**2020 Population** *Fm SB X7-7 Table 3*	**2020 GPCD**
121,994	550,217	**198**
NOTES:		

SB X7-7 Table 9: 2020 Compliance							
Actual 2020 GPCD[1]	Optional Adjustments to 2020 GPCD Enter "0" if Adjustment Not Used Extraordinary Events[1]	Weather Normalization[1]	Economic Adjustment[1]	TOTAL Adjustments[1]	Adjusted 2020 GPCD [1] *(Adjusted if applicable)*	2020 Confirmed Target GPCD [1, 2]	**Did Supplier Achieve Targeted Reduction for 2020?**
198	-	-	-	-	198	247	**YES**

[1] *All values are reported in GPCD*

[2] ***2020 Confirmed Target GPCD*** *is taken from the Supplier's SB X7-7 Verification Form Table SB X7-7, 7-F.*

NOTES:

D

City of Fresno's Reduce Delta Reliance Reporting

Appendix D - Delta Reliance

1. Background

Under the Sacramento-San Joaquin Delta Reform Act of 2009, state and local public agencies proposing a covered action (e.g., a proposed project) in the Sacramento-San Joaquin Delta (Delta), prior to initiating the implementation of that action, must prepare a written certification of consistency with detailed findings as to whether the covered action is consistent with applicable Delta Plan policies and submit that certification to the Delta Stewardship Council.

Anyone may appeal a certification of consistency. If the Delta Stewardship Council grants the appeal, the covered action may not be implemented until the agency proposing the covered action submits a revised certification of consistency. The covered action may be implemented if either: 1) no appeal is filed; or 2) the Delta Stewardship Council denies the appeal to the revised certification of consistency.

The City of Fresno (City) contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 af of Class 1 water through an agreement originally executed in January 1961. Although the Friant Division of the CVP does not pull water from the Delta, the project was developed through an exchange agreement reached in 1939 with the Delta-Mendota supply that provides water to the Exchange Contractors[1] with historic pre-1914 San Joaquin River water rights. As restrictions on Delta exports have hindered USBR from making deliveries to the Delta-Mendota Canal, the Exchange Contractors can call on their historic rights, which reduces the Friant Division Class 1 allocations. As such, the City is required to demonstrate consistency with the Delta Plan's policy to reduce reliance on the Delta.

An urban water supplier that anticipates participating in or receiving water from a proposed covered action such as a multi-year water transfer, conveyance facility, or new diversion that involves transferring water through, exporting water from, or using water in the Delta should provide information in their 2015 and 2020 Urban Water Management Plans (UWMPs) that can then be used in the covered action process to demonstrate consistency with Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (WR P1).

WR P1 details what is needed for a covered action to demonstrate consistency with reduced reliance on the Delta and improved regional self-reliance. WR P1 subsection (a) states that:

[1] The Exchange Contractors are the benefactors of the historic pre-1914 water rights established by Miller and Lux. These contracts include: Central California Irrigation District; San Luis Canal Company; Firebaugh Canal Water District; and Columbia Canal Company, per http://www.sjrecwa.net/history.html (accessed March 10, 2021).

(a) Water shall not be exported from, transferred through, or used in the Delta if all of the following apply:

(1) One or more water suppliers that would receive water as a result of the export, transfer, or use have failed to adequately contribute to reduced reliance on the Delta and improved regional self-reliance consistent with all of the requirements listed in paragraph (1) of subsection (c);

(2) That failure has significantly caused the need for the export, transfer, or use; and

(3) The export, transfer, or use would have a significant adverse environmental impact in the Delta.

WR P1 subsection (c)(1) further defines what adequately contributing to reduced reliance on the Delta means in terms of (a)(1) above.

(c)(1) Water suppliers that have done all the following are contributing to reduced reliance on the Delta and improved regional self-reliance and are therefore consistent with this policy:

(A) Completed a current Urban or Agricultural Water Management Plan (Plan) which has been reviewed by the California Department of Water Resources for compliance with the applicable requirements of Water Code Division 6, Parts 2.55, 2.6, and 2.8;

(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta; and

(C) Included in the Plan, commencing in 2015, the expected outcome for measurable reduction in Delta reliance and improvement in regional self-reliance. The expected outcome for measurable reduction in Delta reliance and improvement in regional self- reliance shall be reported in the Plan as the reduction in the amount of water used, or in the percentage of water used, from the Delta watershed. For the purposes of reporting, water efficiency is considered a new source of water supply, consistent with Water Code section 1011(a).

The analysis and documentation provided below include all the elements described in WR P1(c)(1) that need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action.

2. Methodology

As stated in WR P1(c)(1)(C), the policy requires that, commencing in 2015, UWMPs include expected outcomes for improved regional self-reliance and measurable reduction in Delta reliance. WR P1 further states that those outcomes shall be reported in the UWMP as the reduction in the amount of water used, or in the percentage of water used, from the Delta. The expected outcomes for the City's regional self-reliance and reduced Delta reliance were developed using the approach and guidance described in Appendix C of DWR's Urban Water Management Plan Guidebook 2020 issued in March 2020 (Guidebook Appendix C), including the use of narrative justifications for the accounting of supplies and the documentation of specific data sources.

All data were obtained from planning documents adopted by the City Council, including the current and previous UWMPs and Metropolitan Water Resource Management Plan (Metro Plan) and represent average or normal water year conditions. Using normal water year demands serves as a proxy for the amount of supplies that would be used in a normal water year, which helps alleviate issues associated with how supply capability is presented to fulfill requirements of the UWMP Act versus how supplies might be accounted for to demonstrate consistency with WR P1.

To calculate the expected outcomes for improved regional self-reliance and reduced Delta reliance, a baseline is needed to compare against. This analysis uses a normal water year representation of 2010 as the baseline, which is consistent with the approach described in the Guidebook Appendix C. Data for the 2010 baseline were taken from the City's 2008 UWMP. Consistent with the 2010 baseline data approach, the expected outcomes for improved regional self-reliance and reduced Delta reliance for 2015 and 2020 were taken from the City's 2010 and 2015 UWMPs, respectively. Expected outcomes for 2025-2045 are from the current 2020 UWMP. Documentation of the specific data sources and assumptions are included in the discussions below.

3. Demonstration of Regional Self-Reliance

3.1 Service Area Demands without Water Use Efficiency

Because WR P1 considers water use efficiency savings a source of water supply, water suppliers such as the City that do not explicitly quantify water use efficiency savings in their UWMPs can calculate their embedded water use efficiency savings based on changes in forecasted per capita water use since the baseline.

Agencies that explicitly calculate and report water use efficiency savings in their UWMP will need to make an adjustment to properly reflect normal water year demands in the calculation of reduced reliance. As explained in the Guidebook Appendix C, water use efficiency savings must be added back to the normal year demands to represent demands without water use efficiency savings accounted for; otherwise the effect of water use efficiency savings on regional self-reliance would be overestimated. **Table 1** (included at the end of this appendix) shows the results of this adjustment for the City. Supporting narratives and documentation for all the data shown in Table 1 are provided below.

Service Area Demands with Water Use Efficiency

The service area demands shown in Table 1 represent the total water demands for the City's service area. The demand data shown in Table 1 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 6-5
- 2015: Fresno 2010 UWMP, Table 7-2
- 2020: Fresno 2015 UWMP, Table 4-4
- 2025-2045: Fresno 2020 UWMP, Table 4-6

Non-Potable Water Demands

The non-potable water demands shown in Table 1 represent recycled water use that offsets potable water use in the City's service area. The demand data shown in Table 1 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 10-7
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14
- 2025-2045: Fresno 2020 UWMP, Table 4-7

Potable Service Area Demands with Water Use Efficiency

Subtract "Non-Potable Water Demands" from "Service Area Demands with Water Use Efficiency."

Service Area Population

The population data shown in Table 1 were collected from the following sources:

- Baseline (2010) and 2015: Fresno 2015 UWMP, Table 5-1
- 2020-2045: Fresno 2020 UWMP, Table 3-3

Estimated Water Use Efficiency Since Baseline

The "Per Capita Water Use" calculated using "Potable Service Area Demands with Water Use Efficiency" divided by "Service Area Population". The "Change in Per Capita Water Use from Baseline" was then calculated by comparing with 2010 Per Capita Water Use. Finally, the "Estimated Water Use Efficiency Since Baseline" was calculated by multiplying the "Change in Per Capita Water Use from Baseline" by the population for one (1) year.

Service Area Water Demands without Water Use Efficiency

Add "Service Area Demands with Water Use Efficiency" to "Estimated Water Use Efficiency Since Baseline."

3.2 Supplies Contributing to Regional Self-Reliance

For a covered action to demonstrate consistency with the Delta Plan, WR P1 subsection (c)(1)(C) states that water suppliers must report the expected outcomes for measurable improvement in regional self-reliance. Table 2 shows expected outcomes for supplies contributing to regional self-reliance both in amount and as a percentage. The numbers shown in **Table 2** (included at the end of this appendix) represent efforts to improve regional self-reliance for the City's entire service area and include the total contributions of the City and its customers. Supporting narratives and documentation for all of the data shown in Table 2 are provided below.

Estimated Water Use Efficiency Since Baseline

The water use efficiency information shown in Table 2 is taken directly from Table 1.

Water Recycling

The water recycling information shown in Table 2 is taken from the Non-Potable Water Demands row in Table 1.

Local and Regional Water Supply and Storage Programs

The values shown in Table 2 represent groundwater supplies considering both natural recharge and intentional recharge. The supply data shown in Table 2 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-9
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14

- 2025-2045: Fresno 2020 UWMP, Table 6-8

Other Programs and Projects the Contribute to Regional Self-Reliance

The values shown in Table 2 represent Kings River supplies considering both contracted supplies and recycled water exchange supplies. The supply data shown in Table 2 were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-11
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-5
- 2025-2045: Fresno 2020 UWMP, Table 6-8

Water Supplies Contributing to Regional Self Reliance

Sum of:

- Estimated Water Use Efficiency Since Baseline
- Water Recycling
- Local and Regional Water Supply and Storage Programs
- Other Programs and Projects the Contribute to Regional Self-Reliance

Percent of Water Supplies Contributing to Regional Self-Reliance

"Water Supplies Contributing to Regional Self Reliance" divided by "Service Area Water Demands without Water Use Efficiency" (from Section 3.1).

3.3 Conclusions

The results shown in Table 2 demonstrate that the City's service area is measurably improving its regional self-reliance. The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City's regional self-reliance:

- Near-term (2025): The expected outcome for normal water year regional self-reliance is expected to increase by 129,700 AFY from the 2010 baseline; this represents an increase of about 31 percent of 2025 normal water year demands (Table 2).
- Long-term (2045): The expected outcome for normal water year regional self-reliance is expected to increase by more than 191,600 AFY from the 2010 baseline, this represents an increase of about 14 percent of 2045 normal water year retail demands (Table 2).

The results show that the City is measurably improving regional self-reliance, both as an amount of water used and as a percentage of water used.

4. Demonstration of Reduced Reliance on the Delta

The City's service area reduces reliance on the Delta through investments in non-Delta water supplies, local water supplies, and regional and local demand management measures.

4.1 Calculation of Reliance on Water Supplies from the Delta Watershed

The calculation of reliance on water supplies from the Delta watershed, shown in **Table 3** (included at the end of this appendix), is based on the following assumptions.

CVP/SWP Contract Supplies

The City water supplies with a connection to the Delta watershed are CVP/SWP Contract Supplies. The supply data shown in Table 3 is for anticipated average yield from the City's USBR contract and were collected from the following sources:

- Baseline (2010): Fresno 2008 UWMP, Table 4-6
- 2015: Fresno 2010 UWMP, Table 7-1
- 2020: Fresno 2015 UWMP, Table 6-14
- 2025-2045: Fresno 2020 UWMP, Table 6-2

Water Supplies from the Delta Watershed

Equal to "CVP/SWP Contract Supplies."

Percent Change in Supplies from the Delta Watershed

Divides "Water Supplies from the Delta Watershed" by "Service Area Demands without Water Use Efficiency" (from Section 3.1) and calculates changes from the 2010 baseline.

4.2 Conclusions

The following provides a summary of the near-term (2025) and long-term (2045) expected outcomes for the City's Delta reliance on supplies from the Delta watershed:

- Near-term (2025): The expected outcome for normal water year reliance on supplies from the Delta watershed is expected to decrease by 4,520 AF from the 2010 baseline. With Delta water representing 25.5% of service area water demand without water use efficiency, this represents a decrease from the 2010 baseline of 10.1% (Table 3).
- Long-term (2045): The expected outcome for normal water year reliance on supplies from the Delta watershed is expected to decrease by 4,520 AF from the 2010 baseline. With Delta water representing 19.5% of service area water demand without water use efficiency, this represents a decrease from the 2010 baseline of 16.2% (Table 3).

The results shown in Table 3 demonstrate that City is measurably reducing reliance on the Delta, both as an amount of water used and as a percentage of water used.

5. UWMP Implementation

In addition to the analysis and documentation described above, WR P1 subsection (c)(1)(B) requires that all programs and projects included in the UWMP that are locally cost-effective and technically feasible, which reduce reliance on the Delta, are identified, evaluated, and implemented consistent with the implementation schedule. WR P1 (c)(1)(B) states that:

> *(B) Identified, evaluated, and commenced implementation, consistent with the implementation schedule set forth in the Plan, of all programs and projects included in the Plan that are locally cost effective and technically feasible which reduce reliance on the Delta[.]*

In accordance with Water Code Section 10631(f), water suppliers must already include in their UWMP a detailed description of expected future projects and programs that they may implement to increase the amount of water supply available to them in normal and single-dry water years and for a period of drought lasting five consecutive years. The UWMP description must also identify specific projects, include a description of the increase in water supply that is expected to be available from each project, and include an estimate regarding the implementation timeline for each project or program.

Chapter 6 of the City's 2020 UWMP summarizes the implementation of future water projects and continued progress in developing a diversified water portfolio to meet the City's water needs.

6. 2015 UWMP Appendix L

The information contained in this appendix is also intended to be a new Appendix L attached to the City's 2015 UWMP consistent with WR P1 subsection (c)(1)(C) (Cal. Code Regs. tit. 23, § 5003). The City provided notice of the availability of the draft 2020 UWMP, 2020 WSCP, and a new Appendix L to the 2015 UWMP and the public hearing to consider adoption of the documents in accordance with CWC Sections 10621(b) and 10642, and Government Code Section 6066, and Chapter 17.5 (starting with Section 7290) of Division 7 of Title 1 of the Government Code. The public review drafts of the 2020 UWMP, Appendix L to the 2015 UWMP, and the 2020 WSCP were posted on the City's website, fresno.gov, on June 28, 2021, more than 14 days in advance of the public hearing on July 15, 2021. The notice of availability of the documents was sent to the City's customers, as well as cities and counties in the City's service area. Copies of the notification letter sent to the customers and cities and counties in the City's service area are included in the 2020 UWMP Appendix L. Thus, this Appendix D to the City's 2020 UWMP, which was adopted with the City's 2020 UWMP, will also be recognized and treated as Appendix L to the City's 2015 UWMP.

The City held the public hearing for the draft 2020 UWMP, draft Appendix L to the 2015 UWMP, and draft 2020 WSCP on July 15, 2021, at a regular City Council meeting, held online due to COVID-19 concerns. At the meeting, the City Council determined that the 2020 UWMP and the 2020 WSCP accurately represent the water resources plan for the City's service area. In addition, the City Council determined that Appendix L to the 2015 UWMP and Appendix D to the 2020 UWMP includes all of the elements described in Delta Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self-Reliance (Cal. Code Regs. tit. 23, § 5003), which need to be included in a water supplier's UWMP to support a certification of consistency for a future covered action. As stated in Resolutions 2021-196, 2021-197, and 2021-198, the City Council adopted the 2020 UWMP, the 2020 WSCP, and Appendix L to the 2015 UWMP and authorized their submittal to the State of California. Copies of the resolutions are included in the 2020 UWMP Appendix M.

Table 1. Calculation of Service Area Water Demands without Water Use Efficiency (UWMP Table C-1 and Table C-2)

Table C-1: Optional Calculation of Water Use Efficiency -To be completed if Water Supplier does not specifically estimate Water Use Efficiency as a supply

Service Area Water Use Efficiency Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	163,300	172,900	168,200	136,579	147,505	154,434	161,372	168,318
Non-Potable Water Demands	750	1,000	9,500	14,220	14,220	14,220	14,220	14,220
Potable Service Area Demands with Water Use Efficiency Accounted For	162,550	171,900	158,700	122,359	133,285	140,214	147,152	154,098

Total Service Area Population	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Population	505,315	525,575	550,217	609,433	674,677	719,327	765,278	812,529

Water Use Efficiency Since Baseline (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Per Capita Water Use (GPCD)	287	292	257	179	176	174	172	169
Change in Per Capita Water Use from Baseline (GPCD)		5	(30)	(108)	(111)	(113)	(116)	(118)
Estimated Water Use Efficiency Since Baseline		(2,833)	18,294	73,684	83,745	91,180	99,023	107,277

Table C-2: Calculation of Service Area Water Demands Without Water Use Efficiency

Total Service Area Water Demands (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands with Water Use Efficiency Accounted For	163,300	172,900	168,200	136,579	147,505	154,434	161,372	168,318
Reported Water Use Efficiency or Estimated Water Use Efficiency Since Baseline	-	(2,833)	18,294	73,684	83,745	91,180	99,023	107,277
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Table 2. Calculation of Supplies Contributing to Regional Self-Reliance (UWMP Table C-3)

Table C-3: Calculation of Supplies Contributing to Regional Self-Reliance

Water Supplies Contributing to Regional Self-Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Estimated Water Use Efficiency since Baseline	-	(2,833)	18,294	73,684	83,745	91,180	99,023	107,277
Water Recycling	750	1,000	9,500	14,220	14,220	14,220	14,220	14,220
Stormwater Capture and Use								
Advanced Water Technologies								
Conjunctive Use Projects								
Local and Regional Water Supply and Storage Projects	88,800	76,100	132,480	138,090	143,630	149,100	154,490	159,820
Other Programs and Projects the Contribute to Regional Self-Reliance	131,750	117,400	116,000	125,030	131,600	131,600	131,600	131,600
Water Supplies Contributing to Regional Self-Reliance	221,300	191,667	276,274	351,024	373,195	386,100	399,333	412,917

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Change in Regional Self Reliance (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies Contributing to Regional Self-Reliance	221,300	191,667	276,274	351,024	373,195	386,100	399,333	412,917
Change in Water Supplies Contributing to Regional Self-Reliance		(29,633)	54,974	129,724	151,895	164,800	178,033	191,617

Percent Change in Regional Self Reliance (As Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies Contributing to Regional Self-Reliance	135.5%	112.7%	148.1%	166.9%	161.4%	157.2%	153.4%	149.8%
Change in Percent of Water Supplies Contributing to Regional Self-Reliance		-22.8%	12.6%	31.4%	25.9%	21.7%	17.8%	14.3%

Table 3. Reliance on Water Supplies from the Delta Watershed (UWMP Table C-4)

Table C-4: Calculation of Reliance on Water Supplies from the Delta Watershed

Water Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
CVP/SWP Contract Supplies	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680
Delta/Delta Tributary Diversions								
Transfers and Exchanges of Supplies from the Delta Watershed								
Other Water Supplies from the Delta Watershed								
Total Water Supplies from the Delta Watershed	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680

Service Area Water Demands without Water Use Efficiency (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Service Area Water Demands without Water Use Efficiency Accounted For	163,300	170,067	186,494	210,263	231,250	245,614	260,395	275,595

Change in Supplies from the Delta Watershed (Acre-Feet)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Water Supplies from the Delta Watershed	58,200	58,200	52,600	53,680	53,680	53,680	53,680	53,680
Change in Water Supplies from the Delta Watershed		-	(5,600)	(4,520)	(4,520)	(4,520)	(4,520)	(4,520)

Percent Change in Supplies from the Delta Watershed (As a Percent of Demand w/out WUE)	Baseline (2010)	2015	2020	2025	2030	2035	2040	2045 (Optional)
Percent of Water Supplies from the Delta Watershed	35.6%	34.2%	28.2%	25.5%	23.2%	21.9%	20.6%	19.5%
Change in Percent of Water Supplies from the Delta Watershed		-1.4%	-7.4%	-10.1%	-12.4%	-13.8%	-15.0%	-16.2%

E

AWWA Water Audits

AWWA Free Water Audit Software: Reporting Worksheet

WAS v5.0

American Water Works Association

? Click to access definition

+ Click to add a comment

Water Audit Report for: City of Fresno (1010007)

Reporting Year: 2016 1/2016 - 12/2016

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	112,398.020	acre-ft/yr	3			acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration

Enter positive % or value for over-registration

WATER SUPPLIED: 112,398.020 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option

				Pcnt:	Value:	
Billed metered:	9	103,038.468	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	42.876	acre-ft/yr			
Unbilled unmetered:	5	280.995	acre-ft/yr		280.995	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 103,362.339 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 9,035.681 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:	280.995	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,041.226	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		257.596	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,579.817 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 7,455.864 acre-ft/yr

WATER LOSSES: 9,035.681 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 9,359.552 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,810.39	miles
Number of active AND inactive service connections:	9	143,916	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 3 50.0 psi

COST DATA

Total annual cost of operating water system:	10	$71,848,500	$/Year	
Customer retail unit cost (applied to Apparent Losses):	9	$1.86	$/1000 gallons (US)	
Variable production cost (applied to Real Losses):	5	$152.10	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources

2: Customer metering inaccuracies

3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

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+ Click to add a comment

Water Audit Report for: City of Fresno
Reporting Year: 2017 (1/2017 - 12/2017)

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	121,079.641	acre-ft/yr	5			acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 121,079.641 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	9	110,520.840	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	10	48.124	acre-ft/yr			
Unbilled unmetered:	5	276.052	acre-ft/yr		276.052	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 110,845.016 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption)

10,234.625 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		302.699	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,116.858	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		276.302	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,695.859 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 8,538.766 acre-ft/yr

WATER LOSSES: 10,234.625 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 10,558.801 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,854.4	miles
Number of active AND inactive service connections:	9	146,212	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure: 4 — 50.0 psi

COST DATA

Total annual cost of operating water system:	10	$76,015,350	$/Year
Customer retail unit cost (applied to Apparent Losses):	9	$2.01	$/1000 gallons (US)
Variable production cost (applied to Real Losses):	5	$175.42	$/acre-ft

☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

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? Click to access definition
+ Click to add a comment

Water Audit Report for: City of Fresno
Reporting Year: 2018 1/2018 - 12/2018

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

Master Meter and Supply Error Adjustments

WATER SUPPLIED

<---------- Enter grading in column 'E' and 'J' ---------->

					Pcnt:	Value:	
Volume from own sources:	5	120,065.780	acre-ft/yr	8			acre-ft/yr
Water imported:	n/a		acre-ft/yr				acre-ft/yr
Water exported:	n/a		acre-ft/yr				acre-ft/yr

Enter negative % or value for under-registration
Enter positive % or value for over-registration

WATER SUPPLIED: 120,065.780 acre-ft/yr

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

			Pcnt:	Value:	
Billed metered:	9	110,710.560	acre-ft/yr			
Billed unmetered:	n/a	0.000	acre-ft/yr			
Unbilled metered:	8	27.129	acre-ft/yr			
Unbilled unmetered:	5	300.164	acre-ft/yr		300.164	acre-ft/yr

Use buttons to select percentage of water supplied **OR** value

AUTHORIZED CONSUMPTION: 111,037.853 acre-ft/yr

WATER LOSSES (Water Supplied - Authorized Consumption) 9,027.927 acre-ft/yr

Apparent Losses

			Pcnt:	Value:	
Unauthorized consumption:		300.164	acre-ft/yr	0.25%		acre-ft/yr

Default option selected for unauthorized consumption - a grading of 5 is applied but not displayed

Customer metering inaccuracies:	5	1,118.563	acre-ft/yr	1.00%	acre-ft/yr
Systematic data handling errors:		276.776	acre-ft/yr	0.25%	acre-ft/yr

Default option selected for Systematic data handling errors - a grading of 5 is applied but not displayed

Apparent Losses: 1,695.503 acre-ft/yr

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: 7,332.423 acre-ft/yr

WATER LOSSES: 9,027.927 acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: 9,355.220 acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	9	1,854.7	miles
Number of active AND inactive service connections:	9	146,608	
Service connection density:		79	conn./mile main

Are customer meters typically located at the curbstop or property line? Yes

Average length of customer service line: (length of service line, beyond the property boundary, that is the responsibility of the utility)

Average length of customer service line has been set to zero and a data grading score of 10 has been applied

Average operating pressure:	10	53.3	psi

COST DATA

Total annual cost of operating water system:	10	$82,960,821	$/Year	
Customer retail unit cost (applied to Apparent Losses):	10	$2.33	$/1000 litres	
Variable production cost (applied to Real Losses):	5	$178.06	$/acre-ft	☐ Use Customer Retail Unit Cost to value real losses

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 66 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer metering inaccuracies
3: Variable production cost (applied to Real Losses)

AWWA Free Water Audit Software: Worksheet

FWAS v6.0

American Water Works Association.

Water Audit Report for: City of Fresno

Audit Year: 2019 | Jan 01 2019 - Dec 31 2019 | Calendar

Click 'n' to add notes

Click 'g' to determine data validity grade

To edit water system info: go to start page

To access definitions, click the input name

All volumes to be entered as: ACRE-FEET PER YEAR

Water Supplied Error Adjustments

WATER SUPPLIED

choose entry option:

VOS	Volume from Own Sources:	n	g	115,544.090	Acre-ft/Yr	n	g	5.00%	percent	under-registration	VOSEA
WI	Water Imported:	n	g	0.000	Acre-ft/Yr						WIEA
WE	Water Exported:	n	g	0.000	Acre-ft/Yr						WEEA
	WATER SUPPLIED:			121,625.358	Acre-ft/Yr						

AUTHORIZED CONSUMPTION

choose entry option:

BMAC	Billed Metered:	n	g		106,485.360	Acre-ft/Yr		
BUAC	Billed Unmetered:	n	g		0.000	Acre-ft/Yr		
UMAC	Unbilled Metered:	n	g		52.635	Acre-ft/Yr		
UUAC	Unbilled Unmetered:	n	g	3	266.213	Acre-ft/Yr	0.25%	default
	AUTHORIZED CONSUMPTION:				106,804.208	Acre-ft/Yr		

Default option selected for Unbilled Unmetered, with automatic data grading of 3

WATER LOSSES

14,821.149 Acre-ft/Yr

Apparent Losses

choose entry option:

SDHE	Systematic Data Handling Errors:	n	g	3	266.213	Acre-ft/Yr	0.25%	default	
CMI	Customer Metering Inaccuracies:	n	g		1,076.141	Acre-ft/Yr	1.00%	percent	under-registration
UC	Unauthorized Consumption:	n	g	3	266.213	Acre-ft/Yr	0.25%	default	
	Apparent Losses:				1,608.568	Acre-ft/Yr			

Default option selected for Systematic Data Handling Errors, with automatic data grading of 3

Default option selected for Unauthorized Consumption, with automatic data grading of 3

Real Losses

	Real Losses:				13,212.581	Acre-ft/Yr
	WATER LOSSES:				14,821.149	Acre-ft/Yr

NON-REVENUE WATER

	NON-REVENUE WATER:				15,139.998	Acre-ft/Yr

SYSTEM DATA

Lm	Length of mains:	n	g		1,862.2	miles (including fire hydrant lead lengths)
Nc	Number of service connections:	n	g		147,633	(active *and* inactive)
	Service connection density:				79	conn./mile main

	Are customer meters typically located at the curbstop/property line?				Yes
Lp		n	g	10	

Average length of customer service line has been set to zero and a data grading of 10 has been applied

AOP	Average Operating Pressure:	n	g		50.0	psi

COST DATA

CRUC	Customer Retail Unit Charge:	n	g	$2.33	$/1000 gallons (US)	Total Annual Operating Cost		
VPC	Variable Production Cost:	n	g	$230.95	$/acre-ft	$106,528,917	$/yr (optional input)	

WATER AUDIT DATA VALIDITY TIER:

Click 'g' for 10 parameter(s), then complete all visible data grading questions to enable the Data Validity Score to calculate

go to dashboard

PRIORITY AREAS FOR ATTENTION TO IMPROVE DATA VALIDITY:

Based on the information provided, audit reliability can be most improved by addressing the following components:

KEY PERFORMANCE INDICATOR TARGETS:

OPTIONAL: If targets exist for the operational performance indicators, they can be input below:

Unit Total Losses:		gal/conn/day
Unit Apparent Losses:		gal/conn/day
Unit Real Losses[^]:		gal/conn/day
Unit Real Losses[=]:		gal/mile/day

If entered above by user, targets will display on KPI gauges (see Dashboard)

F

DWR Population Tool Output

WUEdata - Fresno City Of

Sign Out

Please print this page to a PDF and include as part of your UWMP submittal.

Confirmation Information

Generated By	Water Supplier Name	Confirmation #	Generated On
Heather Freed	Fresno City Of	8103177726	3/17/2021 12:16:56 PM

Boundary Information

Census Year	Boundary Filename	Internal Boundary ID
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515
1990	fresno_1990_processed.kml	517
2000	fresno_2000_processed.kml	516
2010	fresno_2010_processed.kml	515

Baseline Period Ranges

10 to 15-year baseline period

Number of years in baseline period: 10

Year beginning baseline period range: 1996

Year ending baseline period range[1]: 2005

5-year baseline period

Year beginning baseline period range: 2003

Year ending baseline period range[2]: 2007

[1] The ending year must be between December 31, 2004 and December 31, 2010.

[2] The ending year must be between December 31, 2007 and December 31, 2010.

Persons per Connection

Year	Census Block Level Total Population	Number of Connections *	Persons per Connection
1990	**364,084**		**4.23**
1991	-	-	4.23
1992	-	-	4.24
1993	-	-	4.24
1994	-	-	4.25
1995	-	-	4.26
1996	-	-	4.26
1997	-	-	4.27
1998	-	-	4.27
1999	-	-	4.28
2000	**439,062**	**102476**	**4.28**
2001	-	-	4.29
2002	-	-	4.29
2003	-	-	4.30
2004	-	-	4.30
2005	-	-	4.31
2006	-	-	4.32
2007	-	-	4.32
2008	-	-	4.33
2009	-	-	4.33
2010	**505,315**	**116373**	**4.34**
2011	-	-	4.28
2012	-	-	4.28
2013	-	-	4.28
2014	-	-	4.28
2015	-	-	4.28
2020	**-**	**-**	**4.41 ****

Population Using Persons-Per-Connection

Year		Number of Connections *	Persons per Connection	Total Population
10 to 15 Year Baseline Population Calculations				
Year 1	1996		4.26	
Year 2	1997		4.27	
Year 3	1998		4.27	
Year 4	1999		4.28	
Year 5	2000	102476	4.28	**439,062**
Year 6	2001		4.29	
Year 7	2002		4.29	
Year 8	2003		4.30	
Year 9	2004		4.30	
Year 10	2005		4.31	
5 Year Baseline Population Calculations				
Year 1	2003		4.30	
Year 2	2004		4.30	
Year 3	2005		4.31	
Year 4	2006		4.32	
Year 5	2007		4.32	
2020 Compliance Year Population Calculations				
2020		124862	4.41 **	**550,217**

Hide Print Confirmation

QUESTIONS / ISSUES? CONTACT THE WUEDATA HELP DESK
MWELO QUESTIONS / ISSUES? CONTACT THE MWELO HELP DESK

G

North Kings Subbasin Groundwater Sustainability Plan

Reference the North Kings Subbasin Groundwater Sustainability Plan online: https://www.northkingsgsa.org/groundwater-sustainability-plan/

H

City of Fresno's Central Valley Project Contract

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

LONG-TERM RENEWAL CONTRACT BETWEEN THE UNITED STATES
AND
CITY OF FRESNO
PROVIDING FOR PROJECT WATER SERVICE
FROM FRIANT DIVISION

THIS CONTRACT, made this 18 day of August, 2005, in pursuance generally of the Act of June 17, 1902 (32 Stat. 388), and acts amendatory or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between the UNITED STATES OF AMERICA, hereinafter referred to as the United States, and the CITY OF FRESNO, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States has constructed and is operating the Central Valley Project (Project), California, for diversion, storage, carriage, distribution and beneficial use, for flood control, irrigation, municipal, domestic, industrial, fish and wildlife mitigation, protection and restoration, generation and distribution of electric energy, salinity control, navigation and other beneficial uses, of waters of the Sacramento River, the American River, the Trinity River, and the San Joaquin River and their tributaries; and

[2nd] WHEREAS, the United States constructed Friant Dam (thereby creating Millerton Lake) and the Friant-Kern and Madera Canals, hereinafter collectively referred to as the Friant Division facilities, which will be used in part for the furnishing of water to the Contractor pursuant to the terms of this Contract; and

[3rd] WHEREAS, pursuant to Section 8 of the Act of June 17, 1902 (32 Stat. 388), the United States has acquired water rights and other rights to the flows of the San Joaquin River, including without limitation the permits issued as the result of Decision 935 by the California State Water Resources Control Board and the contracts described in subdivision (n) of Article 3 of this Contract, pursuant to which the Contracting Officer develops, diverts, stores and delivers Project Water stored or flowing through Millerton Lake in accordance with State and Federal law for the benefit of Project Contractors in the Friant Division; and

[3.1] WHEREAS, the water supplied to the Contractor pursuant to this Contract is Project Water developed through the exercise of the rights described in the third Explanatory Recital of this Contract; and

[4th] WHEREAS, the Contractor and the United States entered into Contract No. 14-06-200-8901, which established terms for the delivery to the Contractor of Project Water from the Friant Division from March 1, 1966, to February 28, 2006, hereinafter referred to as the Existing Contract; and

[5th] WHEREAS, the Contractor and the United States have, pursuant to Subsection 3404(c)(3) of the Central Valley Project Improvement Act (CVPIA), subsequently entered into a Binding Agreement identified as Binding Agreement No. 14-06-200-8901-BA, which sets out the terms pursuant to which the Contractor agreed to renew the Existing Contract before its expiration date after completion of the programmatic environmental impact statement and other appropriate environmental documentation and negotiation of a renewal contract, and which also sets out the consequences of a subsequent decision not to renew; and

[6th] WHEREAS, Section 3404(c) of the CVPIA provides for long-term renewal of the Existing Contract following completion of appropriate environmental documentation, including a programmatic environmental impact statement (PEIS) pursuant to the National Environmental Policy Act (NEPA) analyzing the direct and indirect impacts and benefits of implementing the CVPIA and the potential renewal of all existing contracts for Project Water; and

[7th] WHEREAS, the United States has completed the PEIS and all other appropriate environmental review necessary to provide for long-term renewal of the Existing Contract; and

[8th] WHEREAS, the Contractor has requested the long-term renewal of the Existing Contract, pursuant to the terms of the Existing Contract, Federal Reclamation law, and the laws of the State of California, for water service from the Project; and

[9th] WHEREAS, the United States has determined that the Contractor has fulfilled all of its obligations under the Existing Contract; and

[10th] WHEREAS, the Contractor has demonstrated to the satisfaction of the Contracting Officer that the Contractor has utilized the Project Water supplies available to it for reasonable and beneficial use and/or has demonstrated projected future demand for water use such that the Contractor has the capability and expects to utilize fully for reasonable and beneficial use the quantity of Project Water to be made available to it pursuant to this Contract; and

[11th] WHEREAS, water obtained from the Project has been relied upon by urban and agricultural areas within California for more than 50 years, and is considered by the Contractor as an essential portion of its water supply; and

[12th] WHEREAS, the economies of regions within the Project, including the Contractor's, depend upon the continued availability of water, including water service from the Project; and

[13th] WHEREAS, the Secretary intends through coordination, cooperation, and partnerships to pursue measures to improve water supply, water quality, and reliability of the Project for all Project purposes; and

[14th] WHEREAS, the mutual goals of the United States and the Contractor include: to provide for reliable Project Water supplies; to control costs of those supplies; to achieve repayment of the Project as required by law; to guard reasonably against Project Water shortages; to achieve a reasonable balance among competing demands for use of Project Water; and to comply with all applicable environmental statutes, all consistent with the legal obligations of the United States relative to the Project; and

[15th] WHEREAS, the parties intend by this Contract to develop a more cooperative relationship in order to achieve their mutual goals; and

[15.1] WHEREAS, during uncontrolled seasons, Friant Division Project Contractors utilize undependable Class 2 Water in their service areas to, among other things, assist in the management and alleviation of groundwater overdraft in the Friant Division service area, provide opportunities for environmental enhancement, including restoration of the San Joaquin River below Friant Dam, minimize flooding along the San Joaquin River, encourage optimal water management, and maximize the reasonable and beneficial use of the water; and

[15.2] WHEREAS, the parties desire and intend that this Contract not provide a disincentive to the Friant Division Project Contractors continuing to carry out the beneficial activities set out in the Explanatory Recital immediately above; and

[16th] WHEREAS, the United States and the Contractor are willing to enter into this Contract pursuant to Federal Reclamation law on the terms and conditions set forth below;

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby mutually agreed by the parties hereto as follows:

DEFINITIONS

1. When used herein unless otherwise distinctly expressed, or manifestly incompatible with the intent of the parties as expressed in this Contract, the term:

(a) "Calendar Year" shall mean the period January 1 through December 31, both dates inclusive;

(b) "Charges" shall mean the payments required by Federal Reclamation law in addition to the Rates and Tiered Pricing Component specified in this Contract as determined annually by the Contracting Officer pursuant to this Contract;

(b2) "Class 1 Water" shall mean that supply of water stored in or flowing through Millerton Lake which, subject to the contingencies hereinafter described in Articles 3, 11, and 12 of this Contract, will be available for delivery from Millerton Lake and the Friant-Kern and Madera Canals as a dependable water supply during each Year;

(b3) "Class 2 Water" shall mean that supply of water which can be made available subject to the contingencies hereinafter described in Articles 3, 11, and 12 of this Contract for delivery from Millerton Lake and the Friant-Kern and Madera Canals in addition to the supply of Class 1 Water. Because of its uncertainty as to availability and time of occurrence, such water will be undependable in character and will be furnished only if, as, and when it can be made available as determined by the Contracting Officer;

(c) "Condition of Shortage" shall mean a condition respecting the Project during any Year such that the Contracting Officer is unable to deliver sufficient water to meet the Contract Total;

(d) "Contracting Officer" shall mean the Secretary of the Interior's duly authorized representative acting pursuant to this Contract or applicable Federal Reclamation law or regulation;

(e) "Contract Total" shall mean the maximum amount of Class 1 Water, plus the maximum amount of Class 2 Water to which the Contractor is entitled under subdivision (a) of Article 3 of this Contract;

(f) "Contractor's Service Area" shall mean the area to which the Contractor is permitted to provide Project Water under this Contract as described in Exhibit "A" attached hereto, which may be modified from time to time in accordance with Article 35 of this Contract without amendment of this Contract;

(g) "CVPIA" shall mean the Central Valley Project Improvement Act, Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706);

(h-i) Omitted;

(j) "Full Cost Rate" shall mean an annual rate as determined by the Contracting Officer that shall amortize the expenditures for construction properly allocable to the Project irrigation or M&I functions, as appropriate, of facilities in service including all O&M deficits funded, less payments, over such periods as may be required under Federal Reclamation law or applicable contract provisions. Interest will accrue on both the construction expenditures and funded O&M deficits from October 12, 1982, on costs outstanding at that date, or from the date incurred in the case of costs arising subsequent to October 12, 1982, and shall be calculated in accordance with subsections 202(3)(B) and (3)(C) of the RRA. The Full Cost Rate includes actual operation, maintenance, and replacement costs consistent with Section 426.2 of the Rules and Regulations for the RRA;

(k-l) Omitted;

(m) "Irrigation Water" shall mean water made available from the Project that is used primarily in the production of agricultural crops or livestock, including domestic use incidental thereto, and watering of livestock;

(n) Omitted;

(n2) "Long Term Historic Average" shall mean the average of the final forecast of Water Made Available to the Contractor pursuant to this Contract and the contract referenced in the fourth Explanatory Recital of this Contract;

(o) "Municipal and Industrial (M&I) Water" shall mean Project Water, other than Irrigation Water, made available to the Contractor. M&I Water shall include water used for human use and purposes such as the watering of landscaping or pasture for animals (e.g., horses) which are kept for personal enjoyment or water delivered to land holdings operated in units of less than five acres unless the Contractor establishes to the satisfaction of the Contracting Officer that the use of water delivered to any such landholding is a use described in subdivision (m) of this Article;

(p) "M&I Full Cost Water Rate" shall mean the Full Cost Rate applicable to the delivery of M&I Water;

(q) "Operation and Maintenance" or "O&M" shall mean normal and reasonable care, control, operation, repair, replacement (other than capital replacement), and maintenance of Project facilities;

(r) "Operating Non-Federal Entity" shall mean the Friant Water Authority, its successors or assigns, a non-Federal entity which has the obligation to operate and maintain all or a portion of the Friant Division facilities pursuant to an agreement with the United States, and which may have funding obligations with respect thereto;

(s) "Project" shall mean the Central Valley Project owned by the United States and managed by the Department of the Interior, Bureau of Reclamation;

(t) "Project Contractors" shall mean all parties who have water service contracts for Project Water from the Project with the United States pursuant to Federal Reclamation law;

(u) "Project Water" shall mean all water that is developed, diverted, stored, or delivered by the Secretary in accordance with the statutes authorizing the Project and in accordance with the terms and conditions of water rights acquired pursuant to California law;

(v) "Rates" shall mean the payments determined annually by the Contracting Officer in accordance with the then-current applicable water ratesetting policies for the Project, as described in subdivision (a) of Article 7 of this Contract;

(w) Omitted;

(x) "Secretary" shall mean the Secretary of the Interior, a duly appointed successor, or an authorized representative acting pursuant to any authority of the Secretary and through any agency of the Department of the Interior;

(y) "Tiered Pricing Component" shall be the incremental amount to be paid for each acre-foot of Water Delivered as described in subdivision (j) of Article 7 of this Contract;

(z) "Water Delivered" or "Delivered Water" shall mean Project Water diverted for use by the Contractor at the point(s) of delivery approved by the Contracting Officer;

(aa) "Water Made Available" shall mean the estimated amount of Project Water that can be delivered to the Contractor for the upcoming Year as declared by the Contracting Officer, pursuant to subdivision (a) of Article 4 of this Contract;

(bb) "Water Scheduled" shall mean Project Water made available to the Contractor for which times and quantities for delivery have been established by the Contractor and Contracting Officer, pursuant to subdivision (b) of Article 4 of this Contract; and

(cc) "Year" shall mean the period from and including March 1 of each Calendar Year through the last day of February of the following Calendar Year.

TERM OF CONTRACT

2. (a) This Contract supersedes the Existing Contract and shall be effective on the date first hereinabove written through February 28, 2045. In the event the Contractor wishes to renew this Contract beyond February 28, 2045, the Contractor shall submit a request for renewal in writing to the Contracting Officer no later than two years prior to the date this Contract expires.

(b) Omitted.

(c) Provided the Contractor is complying with all terms and conditions of this Contract and all legal obligations of the Contractor, if any, set forth in an enforceable court order, final judgment and/or settlement relating to restoration of the San Joaquin River, this Contract shall be renewed for successive periods of up to 40 years each, which periods shall be consistent with the then-existing Reclamation-wide policy, under terms and conditions mutually agreeable to the parties and consistent with Federal and State law. The Contractor shall be afforded the opportunity to comment to the Contracting Officer on the proposed adoption and application of any revised policy applicable to the delivery of M&I Water that would limit the term of any subsequent renewal contract with the Contractor for the furnishing of M&I Water to less than 40 years.

(d) The Contracting Officer shall make a determination ten years after the date of execution of this Contract, and every five years thereafter during the term of this Contract, of whether a conversion to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939 can be accomplished. The Contracting Officer anticipates that during the term of this Contract, all authorized Project construction expected to occur will have occurred, and on that basis the Contracting Officer agrees upon such completion to allocate all costs that are properly assignable to the Contractor, and agrees further that, at any time after such allocation is made, and subject to satisfaction of the conditions set out in this subdivision, this Contract shall, at the request of the Contractor, be converted to a contract under subsection 9(c)(1) of the Reclamation Project Act of 1939, subject to applicable Federal law and under stated terms and conditions mutually agreeable to the Contractor and the Contracting Officer. A condition for such conversion to occur shall be a determination by the Contracting Officer that, account being taken of the amount credited to return by the Contractor as provided for under Federal Reclamation law, the remaining amount of construction costs assignable for ultimate return by the Contractor can probably be repaid to the United States within the term of a contract under subsection 9(c)(1). If the remaining amount of costs that are properly assignable to the Contractor cannot be determined during the term of this Contract, the Contracting Officer shall notify the Contractor, and provide the reason(s) why such a determination could not be made. Further, the Contracting Officer shall make such a determination as soon thereafter as possible so as to permit, upon request of the Contractor and satisfaction of the conditions set out above, conversion to a contract under subsection 9(c)(1). In the event such determination of costs has not been made at a time which allows conversion of this Contract during the term of this

Contract or the Contractor has not requested conversion of this Contract within such term, the parties shall incorporate in any subsequent renewal contract as described in subdivision (c) of this Article a provision that carries forth in substantially identical terms the provisions of this subdivision.

WATER TO BE MADE AVAILABLE AND DELIVERED TO THE CONTRACTOR

3. (a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 60,000 acre-feet of Class 1 Water for M&I purposes. Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract.

(b) Omitted.

(c) The Contractor shall utilize the Project Water in accordance with all applicable legal requirements.

(d) The Contractor shall make reasonable and beneficial use of all water furnished pursuant to this Contract. Groundwater recharge programs (direct, indirect, or in lieu), groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted within the Contractor's Service Area which are consistent with applicable State law and result in use consistent with Federal Reclamation law will be allowed: Provided, That any direct recharge program(s) is (are) described in the Contractor's water conservation plan submitted pursuant to Article 26 of this Contract: Provided further, That such water conservation plan demonstrates sufficient lawful uses exist in the

Contractor's Service Area so that using a long-term average, the quantity of Delivered Water is demonstrated to be reasonable for such uses and in compliance with Federal Reclamation law. Groundwater recharge programs, groundwater banking programs, surface water storage programs, and other similar programs utilizing Project Water or other water furnished pursuant to this Contract conducted outside the Contractor's Service Area may be permitted upon written approval of the Contracting Officer, which approval will be based upon environmental documentation, Project Water rights, and Project operational concerns. The Contracting Officer will address such concerns in regulations, policies, or guidelines.

(e) The Contractor shall comply with requirements applicable to the Contractor in biological opinion(s) prepared as a result of a consultation regarding the execution of this Contract undertaken pursuant to Section 7 of the Endangered Species Act of 1973 (ESA), as amended, that are within the Contractor's legal authority to implement. The Existing Contract, which evidences in excess of 39 years of diversions for M&I purposes of the quantities of water provided in subdivision (a) of Article 3 of this Contract, will be considered in developing an appropriate baseline for the biological assessment(s) prepared pursuant to the ESA, and any other needed environmental review. Nothing herein shall be construed to prevent the Contractor from challenging or seeking judicial relief in a court of competent jurisdiction with respect to any biological opinion or other environmental documentation referred to in this Article.

(f) Subject to subdivisions (l) and (n) of Article 3 of this Contract, following the declaration of Water Made Available under Article 4 of this Contract, the Contracting Officer will make a determination whether Project Water, or other water available to the Project, can be made

available to the Contractor in addition to the Contract Total under Article 3 of this Contract during the Year without adversely impacting other Project Contractors. At the request of the Contractor, the Contracting Officer will consult with the Contractor prior to making such a determination. Subject to subdivisions (l) and (n) of Article 3 of this Contract, if the Contracting Officer determines that Project Water, or other water available to the Project, can be made available to the Contractor, the Contracting Officer will announce the availability of such water and shall so notify the Contractor as soon as practicable. The Contracting Officer will thereafter meet with the Contractor and other Project Contractors capable of taking such water to determine the most equitable and efficient allocation of such water. If the Contractor requests the delivery of any quantity of such water, the Contracting Officer shall make such water available to the Contractor in accordance with applicable statutes, regulations, guidelines, and policies.

(g) The Contractor may request permission to reschedule for use during the subsequent Year some or all of the Water Made Available to the Contractor during the current Year referred to as "carryover." The Contractor may request permission to use during the current Year a quantity of Project Water which may be made available by the United States to the Contractor during the subsequent Year referred to as "preuse." The Contracting Officer's written approval may permit such uses in accordance with applicable statutes, regulations, guidelines, and policies.

(h) The Contractor's right pursuant to Federal Reclamation law and applicable State law to the reasonable and beneficial use of Water Delivered pursuant to this Contract during the term thereof and any subsequent renewal contracts, as described in Article 2 of this Contract, during the terms thereof shall not be disturbed so long as the Contractor shall fulfill all of its obligations

under this Contract and any renewals thereof. Nothing in the preceding sentence shall affect the Contracting Officer's ability to impose shortages under Article 11 or subdivision (b) of Article 12 of this Contract or applicable provisions of any subsequent renewal contracts.

(i) Project Water furnished to the Contractor pursuant to this Contract may be delivered for other than M&I purposes upon written approval by the Contracting Officer in accordance with the terms and conditions of such approval.

(j) The Contracting Officer shall make reasonable efforts to protect the water rights and other rights described in the third Explanatory Recital of this Contract necessary for the Project and to provide the water available under this Contract. The Contracting Officer shall not object to participation by the Contractor, in the capacity and to the extent permitted by law, in administrative proceedings related to the water rights and other rights described in the third Explanatory Recital of this Contract: Provided, That the Contracting Officer retains the right to object to the substance of the Contractor's position in such a proceeding: Provided further, That in such proceedings the Contracting Officer shall recognize the Contractor has a legal right under the terms of this Contract to use Project Water.

(k) Project Water furnished to the Contractor during any month designated in a schedule or revised schedule submitted by the Contractor and approved by the Contracting Officer shall be deemed to have been accepted by the Contractor as Class 1 Water to the extent that Class 1 Water is called for in such schedule for such month and shall be deemed to have been accepted as Class 2 Water to the extent Class 2 Water is called for in such schedule for such month. If in any month the Contractor diverts a quantity of water in addition to the total amount of Class 1 Water and

Class 2 Water set forth in the Contractor's approved schedule or revised schedule for such month, such additional diversions shall be charged first against the Contractor's remaining Class 2 Water supply available in the current Year. To the extent the Contractor's remaining Class 2 Water supply available in the current Year is not sufficient to account for such additional diversions, such additional diversions shall be charged against the Contractor's remaining Class 1 Water supply available in the current Year. To the extent the Contractor's remaining Class 1 Water and Class 2 Water supplies available in the current Year are not sufficient to account for such additional diversions, such additional diversions shall be charged first against the Contractor's available Class 2 Water supply and then against the Contractor's available Class 1 Water supply, both for the following Year. Payment for all additional diversions of water shall be made in accordance with Article 7 of this Contract.

(l) If the Contracting Officer determines there is a Project Water supply available at Friant Dam as the result of an unusually large water supply not otherwise storable for Project purposes or infrequent and otherwise unmanaged flood flows of short duration, such water will be made available to the Contractor and others under Section 215 of the RRA pursuant to the priorities specified below if the Contractor enters into a temporary contract with the United States not to exceed one year for the delivery of such water or, as otherwise provided for in Federal Reclamation law and associated regulations. Such water may be identified by the Contractor either (i) as additional water to supplement the supply of Class 1 Water and/or Class 2 Water made available to it pursuant to this Contract or, (ii) upon written notification to the Contracting Officer, as water to be credited against the Contractor's Class 2 Water supply available pursuant to this Contract. The Contracting Officer

shall make water determined to be available pursuant to this subsection according to the following priorities: first, to long-term contractors for Class 1 Water and/or Class 2 Water within the Friant Division; second, to long-term contractors in the Cross Valley Division of the Project. The Contracting Officer will consider and seek to accommodate requests from other parties for Section 215 Water for use within the area identified as the Friant Division service area in the environmental assessment developed in connection with the execution of this Contract.

(m) Nothing in this Contract, nor any action or inaction of the Contractor or Contracting Officer in connection with the implementation of this Contract, is intended to override, modify, supersede, or otherwise interfere with any term or condition of the water rights and other rights referred in the third Explanatory Recital of this Contract.

(n) The rights of the Contractor under this Contract are subject to the terms of the contract for exchange waters, dated July 27, 1939, between the United States and the San Joaquin and Kings River Canal and Irrigation Company, Incorporated, et al., (hereinafter referred to as the Exchange Contractors), Contract No. I1r-1144, as amended. The United States agrees that it will not deliver to the Exchange Contractors thereunder waters of the San Joaquin River unless and until required by the terms of said contract, and the United States further agrees that it will not voluntarily and knowingly determine itself unable to deliver to the Exchange Contractors entitled thereto from water that is available or that may become available to it from the Sacramento River and its tributaries or the Sacramento-San Joaquin Delta those quantities required to satisfy the obligations of the United States under said Exchange Contract and under Schedule 2 of the Contract for Purchase of Miller and Lux Water Rights (Contract No. I1r-1145, dated July 27, 1939).

TIME FOR DELIVERY OF WATER

4. (a) On or about February 20 of each Calendar Year, the Contracting Officer shall announce the Contracting Officer's expected declaration of the Water Made Available. Such declaration will be expressed in terms of both Water Made Available and the Long Term Historic Average and will be updated monthly, and more frequently if necessary, based on then-current operational and hydrologic conditions and a new declaration with changes, if any, to the Water Made Available will be made. The Contracting Officer shall provide forecasts of Project operations and the basis of the estimate, with relevant supporting information, upon the written request of the Contractor. Concurrently with the declaration of the Water Made Available, the Contracting Officer shall provide the Contractor with the updated Long-Term Historic Average.

(b) On or before each March 1 and at such other times as necessary, the Contractor shall submit to the Contracting Officer a written schedule, satisfactory to the Contracting Officer, showing the monthly quantities of Project Water to be delivered by the United States to the Contractor pursuant to this Contract for the Year commencing on such March 1. The Contracting Officer shall use all reasonable means to deliver Project Water according to the approved schedule for the Year commencing on such March 1.

(c) The Contractor shall not schedule Project Water in excess of the quantity of Project Water the Contractor intends to put to reasonable and beneficial use within the Contractor's Service Area or to sell, transfer, or exchange pursuant to Article 9 of this Contract during any Year.

(d) Subject to the conditions set forth in subdivision (a) of Article 3 of this Contract, the United States shall deliver Project Water to the Contractor in accordance with the initial

schedule submitted by the Contractor pursuant to subdivision (b) of this Article, or any written revision(s), satisfactory to the Contracting Officer, thereto submitted within a reasonable time prior to the date(s) on which the requested change(s) is/are to be implemented: Provided, That the total amount of water requested in that schedule or revision does not exceed the quantities announced by the Contracting Officer pursuant to the provisions of subdivision (a) of Article 3, and the Contracting Officer determines that there will be sufficient capacity available in the appropriate Friant Division facilities to deliver the water in accordance with that schedule: Provided further, That the Contractor shall not schedule the delivery of any water during any period as to which the Contractor is notified by the Contracting Officer or Operating Non-Federal Entity that Project facilities required to make deliveries to the Contractor will not be in operation because of scheduled O&M.

(e) The Contractor may, during the period from and including November 1 of each Year through and including the last day of February of that Year, request delivery of any amount of the Class 1 Water estimated by the Contracting Officer to be made available to it during the following Year. The Contractor may, during the period from and including January 1 of each Year (or such earlier date as may be determined by the Contracting Officer) through and including the last day of February of that Year, request delivery of any amount of Class 2 Water estimated by the Contracting Officer to be made available to it during the following Year. Such water shall hereinafter be referred to as preuse water. Such request must be submitted in writing by the Contractor for a specified quantity of preuse water and shall be subject to the approval of the Contracting Officer. Payment for preuse water so requested shall be at the appropriate rate(s) for the following Year in accordance with Article 7 of this Contract and shall be made in advance of delivery of any preuse water. The

Contracting Officer shall deliver such preuse water in accordance with a schedule or any revision thereof submitted by the Contractor and approved by the Contracting Officer, to the extent such water is available and to the extent such deliveries will not interfere with the delivery of Project Water entitlements to other Friant Division contractors or the physical maintenance of the Project facilities. The quantities of preuse water delivered pursuant to this subdivision shall be deducted from the quantities of water that the Contracting Officer would otherwise be obligated to make available to the Contractor during the following Year: Provided, That the quantity of preuse water to be deducted from the quantities of either Class 1 Water or Class 2 Water to be made available to the Contractor in the following Year shall be specified by the Contractor at the time the preuse water is requested or as revised in its first schedule for the following Year submitted in accordance with subdivision (b) of this Article, based on the availability of the following Year water supplies as determined by the Contracting Officer.

POINT OF DIVERSION AND RESPONSIBILITY FOR DISTRIBUTION OF WATER

5. (a) Project Water scheduled pursuant to subdivision (b) of Article 4 of this Contract shall be delivered to the Contractor at a point or points of delivery either on Project facilities or another location or locations mutually agreed to in writing by the Contracting Officer and the Contractor.

(b) The Contracting Officer, either directly or through its written agreement(s) with the Operating Non-Federal Entity, shall make all reasonable efforts to maintain sufficient flows and levels of water in the Friant-Kern Canal to deliver Project Water to the Contractor at specific turnouts established pursuant to subdivision (a) of this Article.

(c) The Contractor shall not deliver Project Water to land outside the Contractor's Service Area unless approved in advance by the Contracting Officer.

(d) All Water Delivered to the Contractor pursuant to this Contract shall be measured and recorded with equipment furnished, installed, operated, and maintained by the United States or the Operating Non-Federal Entity at the point or points of delivery established pursuant to subdivision (a) of this Article. Upon the request of either party to this Contract, the Contracting Officer shall investigate, or cause to be investigated by the appropriate Operating Non-Federal Entity, the accuracy of such measurements and shall take any necessary steps to adjust any errors appearing therein. For any period of time when accurate measurements have not been made, the Contracting Officer shall consult with the Contractor and the responsible Operating Non-Federal Entity prior to making a final determination of the quantity delivered for that period of time.

(e) Neither the Contracting Officer nor any Operating Non-Federal Entity shall be responsible for the control, carriage, handling, use, disposal, or distribution of Water Delivered to the Contractor pursuant to this Contract beyond the delivery points specified in subdivision (a) of this Article. The Contractor shall indemnify the United States, its officers, employees, agents, and assigns on account of damage or claim of damage of any nature whatsoever for which there is legal responsibility, including property damage, personal injury, or death arising out of or connected with the control, carriage, handling, use, disposal, or distribution of such Project Water Delivered beyond such delivery points, except for any damage or claim arising out of: (i) acts or omissions of the Contracting Officer or any of its officers, employees, agents, or assigns, including the Operating Non-Federal Entity, with the intent of creating the situation resulting in any damage or claim;

(ii) willful misconduct of the Contracting Officer or any of its officers, employees, agents, or assigns, including the Operating Non-Federal Entity; (iii) negligence of the Contracting Officer or any of its officers, employees, agents, or assigns including the Operating Non-Federal Entity; or (iv) damage or claims resulting from a malfunction of facilities owned and/or operated by the United States or responsible Operating Non-Federal Entity.

MEASUREMENT OF WATER WITHIN THE CONTRACTOR'S SERVICE AREA

6. (a) Within five years of the date of Contract execution, the Contractor will have an established measuring program satisfactory to the Contracting Officer. The Contractor shall ensure that all surface water delivered for M&I purposes is measured at each M&I service connection. The water measuring devices or water measuring methods of comparable effectiveness must be acceptable to the Contracting Officer. The Contractor shall be responsible for installing, operating, and maintaining and repairing all such measuring devices and implementing all such water measuring methods at no cost to the United States. The Contracting Officer acknowledges that the Contractor has a metering plan (Exhibit "C") setting forth the milestones and schedule that the Contractor will implement to comply with the requirements of this Article. Beginning January 2006, the Contractor shall provide an annual written report to the Contracting Officer describing the Contractor's metering plan implementation progress. The Contractor shall use the information obtained from such water measuring devices or water measuring methods to ensure its proper management of the water, to bill water users for water delivered by the Contractor; and, if applicable, to record water delivered for M&I purposes by customer class as defined in the Contractor's water conservation plan provided for in Article 26 of this Contract. Nothing herein contained, however, shall preclude the Contractor from

establishing and collecting any charges, assessments, or other revenues authorized by California law. The Contractor shall include a summary of all its annual surface water deliveries in the annual report described in subdivision (c) of Article 26.

(b) To the extent the information has not otherwise been provided, upon execution of this Contract, the Contractor shall provide to the Contracting Officer a written report describing the measurement devices or water measuring methods being used or to be used to implement subdivision (a) of this Article and identifying the M&I service connections or alternative measurement programs approved by the Contracting Officer, at which such measurement devices or water measuring methods are being used, and, if applicable, identifying the locations at which such devices and/or methods are not yet being used including a time schedule for implementation at such locations. The Contracting Officer shall advise the Contractor in writing within 60 days as to the adequacy, and necessary modifications, if any, of the measuring devices or water measuring methods identified in the Contractor's report and if the Contracting Officer does not respond in such time, they shall be deemed adequate. If the Contracting Officer notifies the Contractor that the measuring devices or methods are inadequate, the parties shall within 60 days following the Contracting Officer's response, negotiate in good faith the earliest practicable date by which the Contractor shall modify said measuring devices and/or measuring methods as required by the Contracting Officer to ensure compliance with subdivision (a) of this Article.

(c) All new surface water delivery systems installed within the Contractor's Service Area after the effective date of this Contract shall also comply with the measurement provisions described in subdivision (a) of this Article.

(d) The Contractor shall inform the Contracting Officer and the State of California in writing by April 30 of each Year of the monthly volume of surface water delivered within the Contractor's Service Area during the previous Year.

(e) The Contractor shall inform the Contracting Officer and the Operating Non-Federal Entity on or before the 20th calendar day of each month of the quantity of M&I Water taken during the preceding month.

(f) In the event the provisions of subdivision (a) of this Article or any portion thereof, are challenged in a judicial proceeding, the parties agree to meet and confer promptly and as often as necessary to employ their reasonable best efforts to coordinate their response to the challenge and, as appropriate, develop revisions to this Contract.

RATES AND METHOD OF PAYMENT FOR WATER

7. (a) The Contractor shall pay the United States as provided in this Article for all Delivered Water at Rates, Charges, and the Tiered Pricing Component established in accordance with (i) the Secretary's then-existing ratesetting policy for M&I Water. Such ratesetting policies shall be amended, modified, or superseded only through a public notice and comment procedure; (ii) applicable Federal Reclamation law and associated rules and regulations, or policies; and (iii) other applicable provisions of this Contract. Payments shall be made by cash transaction, electronic funds transfer, or any other mechanism as may be agreed to in writing by the Contractor and the Contracting Officer. The Rates, Charges, and Tiered Pricing Component applicable to the Contractor upon execution of this Contract are set forth in Exhibit "B", as may be revised annually.

(b) The Contracting Officer shall notify the Contractor of the Rates, Charges, and Tiered Pricing Component as follows:

(1) Prior to July 1 of each Calendar Year, the Contracting Officer shall provide the Contractor an estimate of the Charges for Project Water that will be applied to the period October 1, of the current Calendar Year, through September 30, of the following Calendar Year, and the basis for such estimate. The Contractor shall be allowed not less than two months to review and comment on such estimates. On or before September 15 of each Calendar Year, the Contracting Officer shall notify the Contractor in writing of the Charges to be in effect during the period October 1 of the current Calendar Year, through September 30, of the following Calendar Year, and such notification shall revise Exhibit "B."

(2) Prior to October 1 of each Calendar Year, the Contracting Officer shall make available to the Contractor an estimate of the Rates and Tiered Pricing Component for Project Water for the following Year and the computations and cost allocations upon which those Rates are based. The Contractor shall be allowed not less than two months to review and comment on such computations and cost allocations. By December 31 of each Calendar Year, the Contracting Officer shall provide the Contractor with the final Rates and Tiered Pricing Component to be in effect for the upcoming Year, and such notification shall revise Exhibit "B."

(c) At the time the Contractor submits the initial schedule for the delivery of Project Water for each Year pursuant to subdivision (b) of Article 4 of this Contract, the Contractor shall make an advance payment to the United States equal to the total amount payable pursuant to the applicable Rate(s) set under subdivision (a) of this Article, for the Project Water scheduled to be

delivered pursuant to this Contract during the first two calendar months of the Year. Before the end of the first month and before the end of each calendar month thereafter, the Contractor shall make an advance payment to the United States, at the Rate(s) set under subdivision (a) of this Article, for the Water Scheduled to be delivered pursuant to this Contract during the second month immediately following. Adjustments between advance payments for Water Scheduled and payments at Rates due for Water Delivered shall be made before the end of the following month: Provided, That any revised schedule submitted by the Contractor pursuant to Article 4 of this Contract which increases the amount of Water Delivered pursuant to this Contract during any month shall be accompanied with appropriate advance payment, at the Rates then in effect, to assure that Project Water is not delivered to the Contractor in advance of such payment. In any month in which the quantity of Water Delivered to the Contractor pursuant to this Contract equals the quantity of Water Scheduled and paid for by the Contractor, no additional Project Water shall be delivered to the Contractor unless and until an advance payment at the Rates then in effect for such additional Project Water is made. Final adjustment between the advance payments for the Water Scheduled and payments for the quantities of Water Delivered during each Year pursuant to this Contract shall be made as soon as practicable but no later than April 30th of the following Year, or 60 days after the delivery of Project Water carried over under subdivision (g) of Article 3 of this Contract if such water is not delivered by the last day of February.

(d) The Contractor shall also make a payment in addition to the Rate(s) in subdivision (c) of this Article to the United States for Water Delivered, at the Charges and the appropriate Tiered Pricing Component then in effect, before the end of the month following the

month of delivery. The payments shall be consistent with the quantities of M&I Water Delivered as shown in the water delivery report for the subject month prepared by the Operating Non-Federal Entity or, if there is no Operating Non-Federal Entity, by the Contracting Officer. Such water delivery report shall be the basis for payment of Charges and Tiered Pricing Component by the Contractor, and shall be provided to the Contractor by the Operating Non-Federal Entity or the Contracting Officer (as applicable) within five days after the end of the month of delivery. The water delivery report shall be deemed a bill for the payment of Charges and the applicable Tiered Pricing Component for Water Delivered. Adjustment for overpayment or underpayment of Charges shall be made through the adjustment of payments due to the United States for Charges for the next month. Any amount to be paid for past due payment of Charges and the Tiered Pricing Component shall be computed pursuant to Article 20 of this Contract.

(e) The Contractor shall pay for any Water Delivered under subdivision (a), (f), or (g) of Article 3 of this Contract as determined by the Contracting Officer pursuant to applicable statutes, associated regulations, any applicable provisions of guidelines or ratesetting policies: Provided, That the Rate for Water Delivered under subdivision (f) of Article 3 of this Contract shall be no more than the otherwise applicable Rate for M&I Water under subdivision (a) of this Article.

(f) Payments to be made by the Contractor to the United States under this Contract may be paid from any revenues available to the Contractor.

(g) All revenues received by the United States from the Contractor relating to the delivery of Project Water or the delivery of non-Project water through Project facilities shall be

allocated and applied in accordance with Federal Reclamation law and the associated rules or regulations, and the then-current Project ratesetting policies for M&I Water.

(h) The Contracting Officer shall keep its accounts pertaining to the administration of the financial terms and conditions of its long-term contracts, in accordance with applicable Federal standards, so as to reflect the application of Project costs and revenues. The Contracting Officer shall, each Year upon request of the Contractor, provide to the Contractor a detailed accounting of all Project and Contractor expense allocations, the disposition of all Project and Contractor revenues, and a summary of all water delivery information. The Contracting Officer and the Contractor shall enter into good faith negotiations to resolve any discrepancies or disputes relating to accountings, reports, or information.

(i) The parties acknowledge and agree that the efficient administration of this Contract is their mutual goal. Recognizing that experience has demonstrated that mechanisms, policies, and procedures used for establishing Rates, Charges, and Tiered Pricing Components, and/or for making and allocating payments, other than those set forth in this Article may be in the mutual best interest of the parties, it is expressly agreed that the parties may enter into agreements to modify the mechanisms, policies, and procedures for any of those purposes while this Contract is in effect without amending this Contract.

(j) (1) Beginning at such time as the total of the deliveries of Class 1 Water and Class 2 Water in a Year exceed 80 percent of the Contract Total, then before the end of the month following the month of delivery the Contractor shall make an additional payment to the United States equal to the applicable Tiered Pricing Component. The Tiered Pricing Component for the total of the

deliveries of Class 1 Water and Class 2 Water in excess of 80 percent of the Contract Total, but less than or equal to 90 percent of the Contract Total, shall equal one-half of the difference between the Rate established under subdivision (a) of this Article and the M&I Full Cost Water Rate. The Tiered Pricing Component for the total of the deliveries of Class 1 Water and Class 2 Water which exceeds 90 percent of the Contract total shall equal the difference between (i) the Rate established under subdivision (a) of this Article and (ii) the M&I Full Cost Water Rate.

(2) Omitted.

(3) For purposes of determining the applicability of the Tiered Pricing Component pursuant to this Article, Water Delivered shall include Project Water that the Contractor transfers to others but shall not include Project Water transferred and delivered to the Contractor.

(k) For the term of this Contract, Rates under the respective ratesetting policies will be established to recover only reimbursable O&M (including any deficits) and capital costs of the Project, as those terms are used in the then-current Project ratesetting policies, and interest, where appropriate, except in instances where a minimum Rate is applicable in accordance with the relevant Project ratesetting policy. Changes of significance in practices which implement the Contracting Officer's ratesetting policies will not be implemented until the Contracting Officer has provided the Contractor an opportunity to discuss the nature, need, and impact of the proposed change.

(l) Except as provided in subsections 3405(a)(1)(B) and 3405(f) of the CVPIA, the Rates for Project Water transferred by the Contractor shall be the Contractor's Rates adjusted upward or downward to reflect the changed costs, if any, incurred by the Contracting Officer in the

delivery of the transferred Project Water to the transferee's point of delivery in accordance with the then-applicable Project ratesetting policy.

(m) Omitted.

(n) Omitted.

8. Omitted.

SALES, TRANSFERS, OR EXCHANGES OF WATER

9. (a) The right to receive Project Water provided for in this Contract may be sold, transferred, or exchanged to others for reasonable and beneficial uses within the State of California if such sale, transfer, or exchange is authorized by applicable Federal and State laws, and applicable guidelines or regulations then in effect. No sale, transfer, or exchange of Project Water under this Contract may take place without the prior written approval of the Contracting Officer, except as provided for in subdivision (b) of this Article, and no such sales, transfers, or exchanges shall be approved absent all appropriate environmental documentation including, but not limited to, documents prepared pursuant to the NEPA and ESA. Such environmental documentation should include, as appropriate, an analysis of groundwater impacts and economic and social effects, including environmental justice, of the proposed water transfers on both the transferor and transferee.

(b) In order to facilitate efficient water management by means of water transfers of the type historically carried out among Project Contractors located within the same geographical area and to allow the Contractor to participate in an accelerated water transfer program during the term of this Contract, the Contracting Officer shall prepare, as appropriate, all necessary environmental

documentation including, but not limited to, documents prepared pursuant to NEPA and ESA, analyzing annual transfers within such geographical areas, and the Contracting Officer shall determine whether such transfers comply with applicable law. Following the completion of the environmental documentation, such transfers addressed in such documentation shall be conducted with advance notice to the Contracting Officer, but shall not require prior written approval by the Contracting Officer. Such environmental documentation and the Contracting Officer's compliance determination shall be reviewed every five years and updated, as necessary, prior to the expiration of the then-existing five-year period. All subsequent environmental documentation shall include an alternative to evaluate not less than the quantity of Project Water historically transferred within the same geographical area.

(c) For a water transfer to qualify under subdivision (b) of this Article, such water transfer must: (i) be for irrigation purposes for lands irrigated within the previous three years, for M&I use, groundwater recharge, water banking, or fish and wildlife resources; not lead to land conversion; and be delivered to established cropland, wildlife refuges, groundwater basins or M&I use; (ii) occur within a single Year; (iii) occur between a willing seller and a willing buyer; (iv) convey water through existing facilities with no new construction or modifications to facilities and be between existing Project Contractors and/or the Contractor and the United States, Department of the Interior; and (v) comply with all applicable Federal, State, and local or tribal laws and requirements imposed for protection of the environment and Indian Trust Assets, as defined under Federal law.

APPLICATION OF PAYMENTS AND ADJUSTMENTS

10. (a) The amount of any overpayment by the Contractor of the Contractor's O&M, capital, and deficit (if any) obligations for the Year shall be applied first to any current liabilities of the Contractor arising out of this Contract then due and payable. Overpayments of more than $1,000 shall be refunded at the Contractor's request. In lieu of a refund, any amount of such overpayment, at the option of the Contractor, may be credited against amounts to become due to the United States by the Contractor. With respect to overpayment, such refund or adjustment shall constitute the sole remedy of the Contractor or anyone having or claiming to have the right to the use of any of the Project Water supply provided for herein. All credits and refunds of overpayments shall be made within 30 days of the Contracting Officer obtaining direction as to how to credit or refund such overpayment in response to the notice to the Contractor that it has finalized the accounts for the Year in which the overpayment was made.

(b) All advances for miscellaneous costs incurred for work requested by the Contractor pursuant to Article 25 of this Contract shall be adjusted to reflect the actual costs when the work has been completed. If the advances exceed the actual costs incurred, the difference will be refunded to the Contractor. If the actual costs exceed the Contractor's advances, the Contractor will be billed for the additional costs pursuant to Article 25.

TEMPORARY REDUCTIONS--RETURN FLOWS

11. (a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make

all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract.

(b) The Contracting Officer or Operating Non-Federal Entity may temporarily discontinue or reduce the quantity of Water Delivered to the Contractor as herein provided for the purposes of investigation, inspection, maintenance, repair, or replacement of any of the Project facilities or any part thereof necessary for the delivery of Project Water to the Contractor, but so far as feasible the Contracting Officer or Operating Non-Federal Entity will give the Contractor due notice in advance of such temporary discontinuance or reduction, except in case of emergency, in which case no notice need be given: Provided, That the United States shall use its best efforts to avoid any discontinuance or reduction in such service. Upon resumption of service after such reduction or discontinuance, and if requested by the Contractor, the United States will, if possible, deliver the quantity of Project Water which would have been delivered hereunder in the absence of such discontinuance or reduction.

(c) The United States reserves the right to all seepage and return flow water derived from Water Delivered to the Contractor hereunder which escapes or is discharged beyond the Contractor's Service Area: Provided, That this shall not be construed as claiming for the United States any right to seepage or return flow being put to reasonable and beneficial use pursuant to this Contract within the Contractor's Service Area by the Contractor or those claiming by, through, or under the Contractor.

CONSTRAINTS ON THE AVAILABILITY OF WATER

12. (a) In its operation of the Project, the Contracting Officer will use all reasonable means to guard against a Condition of Shortage in the quantity of water to be made available to the Contractor pursuant to this Contract. In the event the Contracting Officer determines that a Condition of Shortage appears probable, the Contracting Officer will notify the Contractor of said determination as soon as practicable.

(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer, or actions taken by the Contracting Officer to meet legal obligations then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom.

(c) The United States shall not execute contracts which together with this Contract, shall in the aggregate provide for furnishing during the life of this Contract or any renewals hereof Class 1 Water in excess of 800,000 acre-feet per Year or Class 2 Water in excess of 1,401,475 acre-feet per Year: Provided, That, subject to subdivision (l) of Article 3 of this Contract, the limitation placed on Class 2 Water contracts shall not prohibit the United States from entering into temporary contracts of one year or less in duration for delivery of Project Water to other entities if such water is not necessary to meet the schedules as may be submitted by all Friant Division long-term water service contractors entitled to receive Class 1 Water and/or Class 2 Water under their water service contracts. Nothing in this subdivision shall limit the Contracting Officer's ability to take actions that result in the availability of new water supplies to be used for Project purposes and

allocating such new supplies: Provided, That the Contracting Officer shall not take such actions until after consultation with the Friant Division Project Contractors.

(d) The Contracting Officer shall not deliver any Class 2 Water pursuant to this or any other contract for water service heretofore or hereafter entered into any Year unless and until the Contracting Officer determines that the cumulative total quantity of Class 1 Water specified in subdivision (c) of this Article will be available for delivery in said Year. If the Contracting Officer determines there is or will be a shortage in any Year in the quantity of Class 1 Water available for delivery, the Contracting Officer shall apportion the available Class 1 Water among all contractors entitled to receive such water that will be made available at Friant Dam in accordance with the following:

(1) A determination shall be made of the total quantity of Class 1 Water at Friant Dam which is available for meeting Class 1 Water contractual commitments, the amount so determined being herein referred to as the available supply.

(2) The total available Class 1 supply shall be divided by the Class 1 Water contractual commitments, the quotient thus obtained being herein referred to as the Class 1 apportionment coefficient.

(3) The total quantity of Class 1 Water under Article 3 of this Contract shall be multiplied by the Class 1 apportionment coefficient and the result shall be the quantity of Class 1 Water required to be delivered by the Contracting Officer to the Contractor for the respective Year, but in no event shall such amount exceed the total quantity of Class 1 Water specified in subdivision (a) of Article 3 of this Contract.

(e) If the Contracting Officer determines there is less than the quantity of Class 2 Water which the Contractor otherwise would be entitled to receive pursuant to Article 3 of this Contract, the quantity of Class 2 Water which shall be furnished to the Contractor by the Contracting Officer will be determined in the manner set forth in paragraphs (1), (2), and (3), of subdivision (d) of this Article substituting the term "Class 2" for the term "Class 1."

(f) In the event that in any Year there is made available to the Contractor, by reason of any shortage or apportionment as provided in subdivisions (a), (d), or (e) of this Article, or any discontinuance or reduction of service as set forth in subdivision (b) of Article 11 of this Contract, less than the quantity of water which the Contractor otherwise would be entitled to receive hereunder, there shall be made an adjustment on account of the amounts already paid to the Contracting Officer by the Contractor for Class 1 Water and Class 2 Water for said Year in accordance with Article 10 of this Contract.

13. Omitted.

RULES AND REGULATIONS

14. (a) The parties agree that the delivery of Project Water or use of Federal facilities pursuant to this Contract is subject to Federal Reclamation law, as amended and supplemented, and the rules and regulations promulgated by the Secretary of the Interior under Federal Reclamation law.

(b) The terms of this Contract are subject to any enforceable order, judgment, and/or settlement in NRDC v. Patterson, No. CIVS 88-1658-LKK-EM and shall be timely modified as necessary to effectuate or facilitate any final order, judgment, or settlement in said litigation.

(c) Omitted.

WATER AND AIR POLLUTION CONTROL

15. The Contractor, in carrying out this Contract, shall comply with all applicable water and air pollution laws and regulations of the United States and the State of California, and shall obtain all required permits or licenses from the appropriate Federal, State, or local authorities.

QUALITY OF WATER

16. (a) Project facilities used to deliver Project Water to the Contractor pursuant to this Contract shall be operated and maintained to enable the United States to deliver Project Water to the Contractor in accordance with the water quality standards specified in subsection 2(b) of the Act of August 26, 1937 (50 Stat. 865), as added by Section 101 of the Act of October 27, 1986 (100 Stat. 3050) or other existing Federal laws. The United States is under no obligation to construct or furnish water treatment facilities to maintain or to improve the quality of Water Delivered to the Contractor pursuant to this Contract. The United States does not warrant the quality of Water Delivered to the Contractor pursuant to this Contract.

(b) The O&M of Project facilities shall be performed in such manner as is practicable to maintain the quality of raw water made available through such facilities at the highest level reasonably attainable as determined by the Contracting Officer. The Contractor shall be responsible for compliance with all State and Federal water quality standards applicable to surface and subsurface agricultural drainage discharges generated through the use of Federal or Contractor facilities or Project Water provided by the Contractor within the Contractor's Service Area.

WATER ACQUIRED BY THE CONTRACTOR OTHER THAN FROM THE UNITED STATES

17. (a) Omitted.

(b) Water or water rights now owned or hereafter acquired by the Contractor, other than from the United States, may be stored, conveyed, and/or diverted through Project facilities, subject to the completion of appropriate environmental documentation, with the approval of the Contracting Officer and the execution of any contract determined by the Contracting Officer to be necessary, consistent with the following provisions:

(1) The Contractor may introduce non-Project water into Project facilities and deliver said water within the Contractor's Service Area subject to payment to the United States and/or to any applicable Operating Non-Federal Entity of an appropriate rate as determined by the applicable Project ratesetting policy, the RRA, and the Project use power policy, if such Project use power policy is applicable, each as amended, modified, or superseded from time to time.

(2) Delivery of such non-Project water in and through Project facilities shall only be allowed to the extent such deliveries do not: (i) interfere with other Project purposes as determined by the Contracting Officer; (ii) reduce the quantity or quality of water available to other Project Contractors; (iii) interfere with the delivery of contractual water entitlements to any other Project Contractors; or (iv) interfere with the physical maintenance of the Project facilities.

(3) Neither the United States nor the Operating Non-Federal Entity shall be responsible for control, care, or distribution of the non-Project water before it is introduced into or after it is delivered from the Project facilities. The Contractor hereby releases and agrees to defend

and indemnify the United States and the Operating Non-Federal Entity, and their respective officers, agents, and employees, from any claim for damage to persons or property, direct or indirect, resulting from the acts of the Contractor its officers', employees', agents', or assigns' act(s) in (i) extracting or diverting non-Project water from any source, or (ii) diverting such non-Project water into Project facilities.

(4) Diversion of such non-Project water into Project facilities shall be consistent with all applicable laws, and if involving groundwater, consistent with any groundwater management plan for the area from which it was extracted.

(5) After Project purposes are met, as determined by the Contracting Officer, the United States and the Contractor shall share priority to utilize the remaining capacity of the facilities declared to be available by the Contracting Officer for conveyance and transportation of non-Project water prior to any such remaining capacity being made available to non-Project contractors.

OPINIONS AND DETERMINATIONS

18. (a) Where the terms of this Contract provide for actions to be based upon the opinion or determination of either party to this Contract, said terms shall not be construed as permitting such action to be predicated upon arbitrary, capricious, or unreasonable opinions or determinations. Both parties, notwithstanding any other provisions of this Contract, expressly reserve the right to seek relief from and appropriate adjustment for any such arbitrary, capricious, or unreasonable opinion or determination. Each opinion or determination by either party shall be provided in a timely manner. Nothing in subdivision (a) of Article 18 of this Contract is intended to

or shall affect or alter the standard of judicial review applicable under Federal law to any opinion or determination implementing a specific provision of Federal law embodied in statute or regulation.

(b) The Contracting Officer shall have the right to make determinations necessary to administer this Contract that are consistent with the expressed and implied provisions of this Contract, the laws of the United States and of the State of California, and the rules and regulations promulgated by the Secretary of the Interior. Such determinations shall be made in consultation with the Contractor to the extent reasonably practicable.

COORDINATION AND COOPERATION

19. (a) In order to further their mutual goals and objectives, the Contracting Officer and the Contractor shall communicate, coordinate, and cooperate with each other, and with other affected Project Contractors, in order to improve the operation and management of the Project. The communication, coordination, and cooperation regarding operations and management shall include, but not be limited to, any action which will or may materially affect the quantity or quality of Project Water supply, the allocation of Project Water supply, and Project financial matters including, but not limited to, budget issues. The communication, coordination, and cooperation provided for hereunder shall extend to all provisions of this Contract. Each party shall retain exclusive decision making authority for all actions, opinion, and determinations to be made by the respective party.

(b) Within 120 days following the effective date of this Contract, the Contractor, other affected Project Contractors, and the Contracting Officer shall arrange to meet with interested Project Contractors to develop a mutually agreeable, written Project-wide process, which may be amended as necessary, separate and apart from this Contract. The goal of this process shall be to

provide, to the extent practicable, the means of mutual communication and interaction regarding significant decisions concerning Project operation and management on a real-time basis.

(c) It is the intent of the Secretary to improve water supply reliability. To carry out this intent:

(1) The Contracting Officer will, at the request of the Contractor, assist in the development of integrated resource management plans for the Contractor. Further, the Contracting Officer will, as appropriate, seek authorizations for implementation of partnerships to improve water supply, water quality, and reliability.

(2) The Secretary will, as appropriate, pursue program and project implementation and authorization in coordination with Project Contractors to improve the water supply, water quality, and reliability of the Project for all Project purposes.

(3) The Secretary will coordinate with Project Contractors and the State of California to seek improved water resource management.

(4) The Secretary will coordinate actions of agencies within the Department of the Interior that may impact the availability of water for Project purposes.

(5) The Contracting Officer shall periodically, but not less than annually, hold division level meetings to discuss Project operations, division level water management activities, and other issues as appropriate.

(d) Without limiting the contractual obligations of the Contracting Officer under the other Articles of this Contract, nothing in this Article shall be construed to limit or constrain the Contracting Officer's ability to communicate, coordinate, and cooperate with the Contractor or other

interested stakeholders or to make decisions in a timely fashion as needed to protect health, safety, or the physical integrity of structures or facilities.

CHARGES FOR DELINQUENT PAYMENTS

20. (a) The Contractor shall be subject to interest, administrative, and penalty charges on delinquent installments or payments. When a payment is not received by the due date, the Contractor shall pay an interest charge for each day the payment is delinquent beyond the due date. When a payment becomes sixty (60) days delinquent, the Contractor shall pay an administrative charge to cover additional costs of billing and processing the delinquent payment. When a payment is delinquent ninety (90) days or more, the Contractor shall pay an additional penalty charge of six (6%) percent per year for each day the payment is delinquent beyond the due date. Further, the Contractor shall pay any fees incurred for debt collection services associated with a delinquent payment.

(b) The interest charge rate shall be the greater of the rate prescribed quarterly in the Federal Register by the Department of the Treasury for application to overdue payments, or the interest rate of one-half of one (0.5%) percent per month prescribed by Section 6 of the Reclamation Project Act of 1939 (Public Law 76-260). The interest charge rate shall be determined as of the due date and remain fixed for the duration of the delinquent period.

(c) When a partial payment on a delinquent account is received, the amount received shall be applied, first to the penalty, second to the administrative charges, third to the accrued interest, and finally to the overdue payment.

EQUAL OPPORTUNITY

21. During the performance of this Contract, the Contractor agrees as follows:

(a) The Contractor will not discriminate against any employee or applicant for employment because of race, color, religion, sex, or national origin. The Contractor will take affirmative action to ensure that applicants are employed, and that employees are treated during employment, without regard to their race, color, religion, sex, or national origin. Such action shall include, but not be limited to, the following: Employment, upgrading, demotion, or transfer; recruitment or recruitment advertising; layoff or termination, rates of payment or other forms of compensation; and selection for training, including apprenticeship. The Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices to be provided by the Contracting Officer setting forth the provisions of this nondiscrimination clause.

(b) The Contractor will, in all solicitations or advertisements for employees placed by or on behalf of the Contractor, state that all qualified applicants will receive consideration for employment without discrimination because of race, color, religion, sex, or national origin.

(c) The Contractor will send to each labor union or representative of workers with which it has a collective bargaining agreement or other contract or understanding, a notice, to be provided by the Contracting Officer, advising the said labor union or workers' representative of the Contractor's commitments under Section 202 of Executive Order 11246 of September 24, 1965, and shall post copies of the notice in conspicuous places available to employees and applicants for employment.

(d) The Contractor will comply with all provisions of Executive Order No. 11246 of September 24, 1965, as amended, and of the rules, regulations, and relevant orders of the Secretary of Labor.

(e) The Contractor will furnish all information and reports required by said amended Executive Order and by the rules, regulations, and orders of the Secretary of Labor, or pursuant thereto, and will permit access to its books, records, and accounts by the Contracting Officer and the Secretary of Labor for purposes of investigation to ascertain compliance with such rules, regulations, and orders.

(f) In the event of the Contractor's noncompliance with the nondiscrimination clauses of this Contract or with any of the said rules, regulations, or orders, this Contract may be canceled, terminated, or suspended, in whole or in part, and the Contractor may be declared ineligible for further Government contracts in accordance with procedures authorized in said amended Executive Order, and such other sanctions may be imposed and remedies invoked as provided in said Executive Order, or by rule, regulation, or order of the Secretary of Labor, or as otherwise provided by law.

(g) The Contractor will include the provisions of paragraphs (a) through (g) in every subcontract or purchase order unless exempted by the rules, regulations, or orders of the Secretary of Labor issued pursuant to Section 204 of said amended Executive Order, so that such provisions will be binding upon each subcontractor or vendor. The Contractor will take such action with respect to any subcontract or purchase order as may be directed by the Secretary of Labor as a means of enforcing such provisions, including sanctions for noncompliance: Provided, however, That in the event the Contractor becomes involved in, or is threatened with, litigation with a subcontractor or vendor as a result of such direction, the Contractor may request the United States to enter into such litigation to protect the interests of the United States.

GENERAL OBLIGATION--BENEFITS CONDITIONED UPON PAYMENT

22. (a) The obligation of the Contractor to pay the United States as provided in this Contract is a general obligation of the Contractor notwithstanding the manner in which the obligation may be distributed among the Contractor's water users and notwithstanding the default of individual water users in their obligations to the Contractor.

(b) The payment of charges becoming due hereunder is a condition precedent to receiving benefits under this Contract. The United States shall not make water available to the Contractor through Project facilities during any period in which the Contractor may be in arrears in the advance payment of water rates due the United States. The Contractor shall not furnish water made available pursuant to this Contract for lands or parties which are in arrears in the advance payment of water rates levied or established by the Contractor.

(c) With respect to subdivision (b) of this Article, the Contractor shall have no obligation to require advance payment for water rates which it levies.

COMPLIANCE WITH CIVIL RIGHTS LAWS AND REGULATIONS

23. (a) The Contractor shall comply with Title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d), Section 504 of the Rehabilitation Act of 1975 (P.L. 93-112, as amended), the Age Discrimination Act of 1975 (42 U.S.C. 6101, et seq.) and any other applicable civil rights laws, as well as with their respective implementing regulations and guidelines imposed by the U.S. Department of the Interior and/or Bureau of Reclamation.

(b) These statutes require that no person in the United States shall, on the grounds of race, color, national origin, handicap, or age, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any program or activity receiving financial assistance from the Bureau of Reclamation. By executing this Contract, the Contractor agrees to immediately take any measures necessary to implement this obligation, including permitting officials of the United States to inspect premises, programs, and documents.

(c) The Contractor makes this agreement in consideration of and for the purpose of obtaining any and all Federal grants, loans, contracts, property discounts, or other Federal financial assistance extended after the date hereof to the Contractor by the Bureau of Reclamation, including installment payments after such date on account of arrangements for Federal financial assistance which were approved before such date. The Contractor recognizes and agrees that such Federal assistance will be extended in reliance on the representations and agreements made in this Article, and that the United States reserves the right to seek judicial enforcement thereof.

24. Omitted.

CONTRACTOR TO PAY CERTAIN MISCELLANEOUS COSTS

25. In addition to all other payments to be made by the Contractor pursuant to this Contract, the Contractor shall pay to the United States, within 60 days after receipt of a bill and detailed statement submitted by the Contracting Officer to the Contractor for such specific items of direct cost incurred by the United States for work requested by the Contractor associated with this Contract plus indirect costs in accordance with applicable Bureau of Reclamation policies and procedures. All such amounts referred to in this Article shall not exceed the amount agreed to in writing in advance by the Contractor. This Article shall not apply to costs for routine contract administration.

WATER CONSERVATION

26. (a) Prior to the delivery of water provided from or conveyed through Federally constructed or Federally financed facilities pursuant to this Contract, the Contractor shall be implementing an effective water conservation and efficiency program based on the Contractor's water conservation plan that has been determined by the Contracting Officer to meet the conservation and efficiency criteria for evaluating water conservation plans established under Federal law. The water conservation and efficiency program shall contain definite water conservation objectives, appropriate economically feasible water conservation measures, and time schedules for meeting those objectives. Continued Project Water delivery pursuant to this Contract shall be contingent upon the Contractor's continued implementation of such water conservation program. In the event the Contractor's water conservation plan or any revised water conservation plan completed pursuant to subdivision (d) of Article 26 of this Contract have not yet been determined by the Contracting Officer to meet such

criteria, due to circumstances which the Contracting Officer determines are beyond the control of the Contractor, water deliveries shall be made under this Contract so long as the Contractor diligently works with the Contracting Officer to obtain such determination at the earliest practicable date, and thereafter the Contractor immediately begins implementing its water conservation and efficiency program in accordance with the time schedules therein.

(b) Should the amount of M&I Water delivered pursuant to subdivision (a) of Article 3 of this Contract equal or exceed 2,000 acre-feet per Year, the Contractor shall implement the Best Management Practices identified by the time frames issued by the California Urban Water Conservation Council for such M&I Water unless any such practice is determined by the Contracting Officer to be inappropriate for the Contractor.

(c) The Contractor shall submit to the Contracting Officer a report on the status of its implementation of the water conservation plan on the reporting dates specified in the then-existing conservation and efficiency criteria established under Federal law.

(d) At five-year intervals, the Contractor shall revise its water conservation plan to reflect the then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law and submit such revised water management plan to the Contracting Officer for review and evaluation. The Contracting Officer will then determine if the water conservation plan meets Reclamation's then-current conservation and efficiency criteria for evaluating water conservation plans established under Federal law.

(e) If the Contractor is engaged in direct groundwater recharge, such activity shall be described in the Contractor's water conservation plan.

EXISTING OR ACQUIRED WATER OR WATER RIGHTS

27. Except as specifically provided in Article 17 of this Contract, the provisions of this Contract shall not be applicable to or affect non-Project water or water rights now owned or hereafter acquired by the Contractor or any user of such water within the Contractor's Service Area. Any such water shall not be considered Project Water under this Contract. In addition, this Contract shall not be construed as limiting or curtailing any rights which the Contractor or any water user within the Contractor's Service Area acquires or has available under any other contract pursuant to Federal Reclamation law.

OPERATION AND MAINTENANCE BY OPERATING NON-FEDERAL ENTITY

28. (a) The O&M of a portion of the Project facilities which serve the Contractor, and responsibility for funding a portion of the costs of such O&M, have been transferred to the Operating Non-Federal Entity by separate agreement between the United States and the Operating Non-Federal Entity. That separate agreement shall not interfere with or affect the rights or obligations of the Contractor or the United States hereunder.

(b) The Contracting Officer has previously notified the Contractor in writing that the O&M of a portion of the Project facilities which serve the Contractor has been transferred to the Operating Non-Federal Entity, and therefore, the Contractor shall pay directly to the Operating Non-Federal Entity, or to any successor approved by the Contracting Officer under the terms and conditions of the separate agreement between the United States and the Operating Non-Federal Entity described in subdivision (a) of this Article, all rates, charges, or assessments of any kind, including any assessment for reserve funds, which the Operating Non-Federal Entity or such successor

1007 determines, sets, or establishes for (i) the O&M of the portion of the Project facilities operated and
1008 maintained by the Operating Non-Federal Entity or such successor, or (ii) the Friant Division's share
1009 of the operation, maintenance, and replacement costs for physical works and appurtenances
1010 associated with the Tracy Pumping Plant, the Delta-Mendota Canal, the O'Neill Pumping/Generating
1011 Plant, the Federal share of the O'Neill Forebay, the Mendota Pool, and the Federal share of San Luis
1012 Unit joint use conveyance and conveyance pumping facilities. Such direct payments to the Operating
1013 Non-Federal Entity or such successor shall not relieve the Contractor of its obligation to pay directly
1014 to the United States the Contractor's share of the Project Rates, Charges, and Tiered Pricing
1015 Component(s) except to the extent the Operating Non-Federal Entity collects payments on behalf of
1016 the United States in accordance with the separate agreement identified in subdivision (a) of this
1017 Article.

1018 (c) For so long as the O&M of any portion of the Project facilities serving the
1019 Contractor is performed by the Operating Non-Federal Entity, or any successor thereto, the
1020 Contracting Officer shall adjust those components of the Rates for Water Delivered under this
1021 Contract representing the cost associated with the activity being performed by the Operating
1022 Non-Federal Entity or its successor.

1023 (d) In the event the O&M of the Project facilities operated and maintained by the
1024 Operating Non-Federal Entity is re-assumed by the United States during the term of this Contract, the
1025 Contracting Officer shall so notify the Contractor, in writing, and present to the Contractor a revised
1026 Exhibit "B" which shall include the portion of the Rates to be paid by the Contractor for Project
1027 Water under this Contract representing the O&M costs of the portion of such Project facilities which

have been re-assumed. The Contractor shall, thereafter, in the absence of written notification from the Contracting Officer to the contrary, pay the Rates, Charges, and Tiered Pricing Component(s) specified in the revised Exhibit "B" directly to the United States in compliance with Article 7 of this Contract.

CONTINGENT UPON APPROPRIATION OR ALLOTMENT OF FUNDS

29. The expenditure or advance of any money or the performance of any obligation of the United States under this Contract shall be contingent upon appropriation or allotment of funds. Absence of appropriation or allotment of funds shall not relieve the Contractor from any obligations under this Contract. No liability shall accrue to the United States in case funds are not appropriated or allotted.

BOOKS, RECORDS, AND REPORTS

30. (a) The Contractor shall establish and maintain accounts and other books and records pertaining to administration of the terms and conditions of this Contract, including: the Contractor's financial transactions, water supply data, and Project land and right-of-way agreements; water use data; and other matters that the Contracting Officer may require. Reports thereon shall be furnished to the Contracting Officer in such form and on such date or dates as the Contracting Officer may require. Subject to applicable Federal laws and regulations, each party to this Contract shall have the right during office hours to examine and make copies of the other party's books and records relating to matters covered by this Contract.

(b) Notwithstanding the provisions of subdivision (a) of this Article, no books, records, or other information shall be requested from the Contractor by the Contracting Officer unless such books, records, or information are reasonably related to the administration or performance of this Contract. Any such request shall allow the Contractor a reasonable period of time within which to provide the requested books, records, or information.

(c) At such time as the Contractor provides information to the Contracting Officer pursuant to subdivision (a) of this Article, a copy of such information shall be provided to the Operating Non-Federal Entity.

ASSIGNMENT LIMITED--SUCCESSORS AND ASSIGNS OBLIGATED

31. (a) The provisions of this Contract shall apply to and bind the successors and assigns of the parties hereto, but no assignment or transfer of this Contract or any right or interest therein shall be valid until approved in writing by the Contracting Officer.

(b) The assignment of any right or interest in this Contract by either party shall not interfere with the rights or obligations of the other party to this Contract absent the written concurrence of said other party.

(c) The Contracting Officer shall not unreasonably condition or withhold approval of any proposed assignment.

SEVERABILITY

32. In the event that a person or entity who is neither (i) a party to a Project contract, nor (ii) a person or entity that receives Project Water from a party to a Project contract, nor (iii) an association or other form of organization whose primary function is to represent parties to Project contracts, brings an action in a court of competent jurisdiction challenging the legality or enforceability of a provision included in this Contract and said person, entity, association, or organization obtains a final court decision holding that such provision is legally invalid or unenforceable and the Contractor has not intervened in that lawsuit in support of the plaintiff(s), the parties to this Contract shall use their best efforts to (i) within 30 days of the date of such final court decision identify by mutual agreement the provisions in this Contract which must be revised and

(ii) within three months thereafter promptly agree on the appropriate revision(s). The time periods specified above may be extended by mutual agreement of the parties. Pending the completion of the actions designated above, to the extent it can do so without violating any applicable provisions of law, the United States shall continue to make the quantities of Project Water specified in this Contract available to the Contractor pursuant to the provisions of this Contract which were not found to be legally invalid or unenforceable in the final court decision.

RESOLUTION OF DISPUTES

33. Should any dispute arise concerning any provisions of this Contract, or the parties' rights and obligations thereunder, the parties shall meet and confer in an attempt to resolve the dispute. Prior to the Contractor commencing any legal action, or the Contracting Officer referring any matter to Department of Justice, the party shall provide to the other party 30 days' written notice of the intent to take such action: Provided, That such notice shall not be required where a delay in commencing an action would prejudice the interests of the party that intends to file suit. During the 30-day notice period, the Contractor and the Contracting Officer shall meet and confer in an attempt to resolve the dispute. Except as specifically provided, nothing herein is intended to waive or abridge any right or remedy that the Contractor or the United States may have.

OFFICIALS NOT TO BENEFIT

34. No Member of or Delegate to Congress, Resident Commissioner, or official of the Contractor shall benefit from this Contract other than as a water user or landowner in the same manner as other water users or landowners.

CHANGES IN CONTRACTOR'S SERVICE AREA

35. (a) While this Contract is in effect, no change may be made in the Contractor's Service Area, by inclusion or exclusion of lands, dissolution, consolidation, merger, or otherwise, except upon the Contracting Officer's written consent.

(b) Within 30 days of receipt of a request for such a change, the Contracting Officer will notify the Contractor of any additional information required by the Contracting Officer for processing said request, and both parties will meet to establish a mutually agreeable schedule for timely completion of the process. Such process will analyze whether the proposed change is likely to: (i) result in the use of Project Water contrary to the terms of this Contract; (ii) impair the ability of the Contractor to pay for Project Water furnished under this Contract or to pay for any Federally-constructed facilities for which the Contractor is responsible; and (iii) have an impact on any Project Water rights applications, permits, or licenses. In addition, the Contracting Officer shall comply with the NEPA and the ESA. The Contractor will be responsible for all costs incurred by the Contracting Officer in this process, and such costs will be paid in accordance with Article 25 of this Contract.

FEDERAL LAWS

36. By entering into this Contract, the Contractor does not waive its rights to contest the validity or application in connection with the performance of the terms and conditions of this Contract of any Federal law or regulation: Provided, That the Contractor agrees to comply with the terms and conditions of this Contract unless and until relief from application of such Federal law or regulation to the implementing provision of the Contract is granted by a court of competent jurisdiction.

NOTICES

37. Any notice, demand, or request authorized or required by this Contract shall be deemed to have been given, on behalf of the Contractor, when mailed, postage prepaid, or delivered to the Area Manager, South-Central California Area Office, 1243 "N" Street, Fresno, California 93721, and on behalf of the United States, when mailed, postage prepaid, or delivered to the City of Fresno, Public Utilities Director, 2600 Fresno Street, Room 3065, Fresno, California 93721-3624. The designation of the addressee or the address may be changed by notice given in the same manner as provided in this Article for other notices.

CONFIRMATION OF CONTRACT

38. The Contractor, after the execution of this Contract, shall furnish to the Contracting Officer evidence that pursuant to the laws of the State of California the Contractor is a legally constituted entity, and the Contract is lawful, valid, and binding on the Contractor. This Contract shall not be binding on the United States until such evidence has been provided to the Contracting Officer's satisfaction.

IN WITNESS WHEREOF, the parties hereto have executed this Contract as of the day and year first above written.

THE UNITED STATES OF AMERICA

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
James E Jackson
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

(SEAL)

CITY OF FRESNO

By: _____
City Manager

Attest:

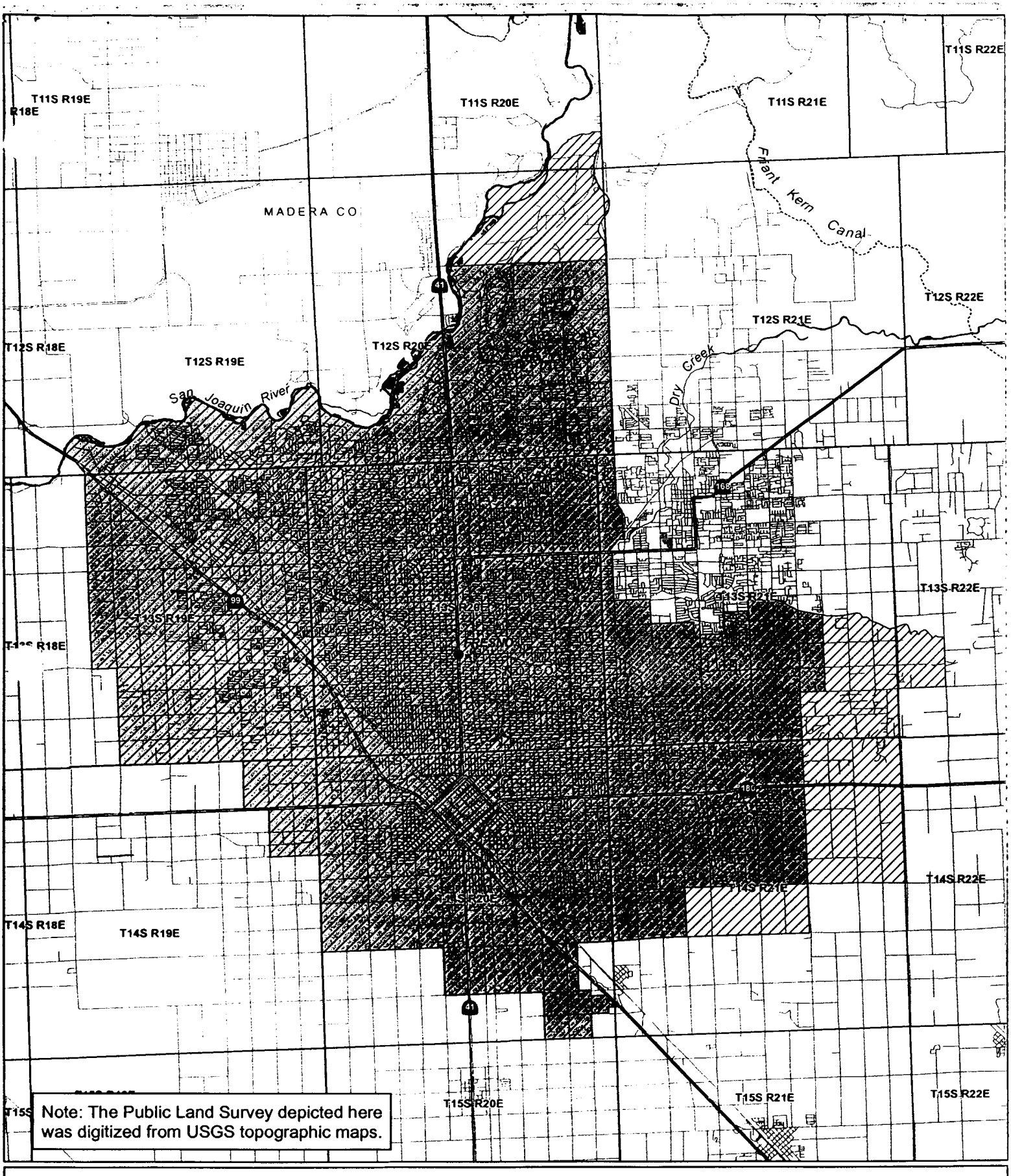
By: Rebecca E Klisch
City Clerk 7-25-05

By: _____
Public Utilities Director

Approved as to form:

Hilda Cantu Montez
City Attorney

(I:\LTRC\Final Draft LTRC's – Fresno, Tracy\City of Fresno R. O. Final Draft Contract 05-04-2005.doc)



Contractor's Proposed Service Area (Sphere of Influence)

Contractor's Current Service Area

City of Fresno

Contract No. 14-06-200-8901-LTR1

EXHIBIT A

Miles

0 0.5 1 2 3 4

Date: October 26, 2004

File Name: N:\districts\contracts\city_of_fresno\city_of_fresno2.mxd

214-208-12705

EXHIBIT B
CITY OF FRESNO
WATER RATES AND CHARGES

	2005 Rates Per Acre-Foot M&I Water
O&M AND COST-OF-SERVICE RATES:	
Capital Rates:	$20.04
O&M Rates:	
Water Marketing	$ 3.89
Storage	$ 6.67
Conveyance	*
Deficit Rates:	
Non-Interest Bearing	
Interest Bearing	$53.53
CFO/PER Adj. Rate **	$ 1.70
TOTAL COST-OF-SERVICE RATES (COS):	$85.83
M&I FULL-COST RATE	$97.15
Tiered Pricing Component>80%<=90% of Contract Total [Full Cost Rate – COS Rate /2]:	$ 5.66
Tiered Pricing Component>90% of Contract Total [Full Cost Rate – COS Rate]:	$11.32
SURCHARGES UNDER PUB. L. 102-575 TO RESTORATION FUND***	
Friant Surcharge [3406(c)(1)]	$ 7.00
Restoration Payments [3407(d)(2)(A)]	$15.87

* Conveyance and Conveyance Pumping Operation and Maintenance Costs were removed for ratesetting purposes and are to be billed directly to the water authorities.

** Chief Financial Officer (CFO) Adjustment and Provision for Replacement (PFR) Credit are being distributed over a 5-year period beginning in FY2003 for the contractors that requested that the costs be deferred.

*** The surcharges are payments in addition to the water rates and were determined pursuant to Title XXXIV of Public Law 102-575. Restoration fund surcharges under P. L. 102-575 are on a fiscal year basis (10/1-9/30).

EXHIBIT C
METERING PLAN

Completion Date	Item	Comments
03/05*	Contract effective	
01/06	Implementation study	Select and obtain consultant study re implementation
01/06	Submit progress report to Bureau	
12/06	Confirmation of existing meters	Verify integrity and servicing of existing meters
01/07	Submit progress report to Bureau	
06/07	Secure installation contract	Begin implementation of consultant recommendations
12/07	Draft rate ordinance	Initial development of tiered rate structure
01/08	Submit progress report to Bureau	
01/08	Initiate retrofit	Begin installation of meters on existing dwellings
12/08	Meter installation progress	29% (30,000 of approximately 105,000 units installed)
01/09	Submit progress report to Bureau	
12/09	Meter installation progress	43% (45,000 units)
01/10	Submit progress report to Bureau	
03/10	Impose new rate ordinance (fees based on metered use)	New rate structure applicable to currently metered customers. Rates to be effective as new meter installations occur.
12/10	Meter installation progress	62% (65,000 units)
01/11	Submit progress report to Bureau	
12/11	Adopt new rate ordinance	81% (85,000 units)
01/12	Submit compliance report to Bureau	
12/12	Meter installation progress	100% (105,000 units)
01/13	Submit completion report	Retrofit complete.

Schedule subject to change due to unforeseen circumstances.

*This date will be revised at the time the contract is executed on behalf of the United States.

Amendment to Contract
No. 14-06-200-8901-LTR1

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF RECLAMATION
Central Valley Project, California

AMENDMENT TO LONG-TERM RENEWAL CONTRACT BETWEEN
THE UNITED STATES
AND
CITY OF FRESNO
PROVIDING FOR PROJECT WATER SERVICE FROM FRIANT DIVISION

THIS CONTRACT AMENDMENT, is made this 6th day of April, 2007, in pursuance generally of the Act of Congress of June 17, 1902 (32 Stat. 388), and the acts amendatory thereof or supplementary thereto, including, but not limited to, the Acts of August 26, 1937 (50 Stat. 844), as amended and supplemented, August 4, 1939 (53 Stat. 1187), as amended and supplemented, July 2, 1956 (70 Stat. 483), June 21, 1963 (77 Stat. 68), October 12, 1982 (96 Stat. 1263), October 27, 1986 (100 Stat. 3050), as amended, and Title XXXIV of the Act of October 30, 1992 (106 Stat. 4706), all collectively hereinafter referred to as Federal Reclamation law, between THE UNITED STATES OF AMERICA, hereinafter referred to as the United States, and, CITY OF FRESNO, hereinafter referred to as the Contractor, a public agency of the State of California, duly organized, existing, and acting pursuant to the laws thereof;

WITNESSETH, That:

EXPLANATORY RECITALS

[1st] WHEREAS, the United States and the Contractor entered into a contract dated August 18, 2005, designated Contract No. 14-06-200-8901-LTR1, providing for water service from the Central Valley Project, hereinafter referred to as the "Existing Contract;" and

[2nd] WHEREAS, pursuant to subdivision (b) of Article 14 of the Existing Contract, the terms of the Existing Contract are subject to any enforceable order, judgment and/or settlement in *NRDC* v. *Patterson*, No. CIVS 88-1658-LKK-EM (now styled *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH) and that the Existing Contract shall be timely modified as necessary to effectuate or facilitate any final order, judgment or settlement in said litigation; and

[3rd] WHEREAS, the parties to said litigation have reached agreement on a global resolution of all Claims for Relief in the Seventh Amended Complaint, on the terms and conditions stated in the Stipulation of Settlement dated September 13, 2006, designated Exhibit 1 in the Order Approving Stipulation dated October 23, 2006; and

[4th] WHEREAS, the parties hereto desire to amend the Existing Contract as required by said Stipulation of Settlement.

NOW, THEREFORE, in consideration of the mutual and dependent covenants herein contained, it is hereby agreed as follows:

1. Subdivision (a) of Article 3 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(a) During each Year, consistent with all applicable State water rights, permits, and licenses, Federal law, and the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, and the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH, and subject to the provisions set forth in Articles 11 and 12 of this Contract, the Contracting Officer shall make available for delivery to the Contractor 60,000 acre-feet of Class 1 Water for M&I purposes. The quantity of Water Delivered to the Contractor in accordance with this subdivision shall be scheduled and paid for pursuant to the provisions of Articles 4 and 7 of this Contract."

2. Subdivision (a) of Article 11 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(a) Subject to: (i) the authorized purposes and priorities of the Project and the requirements of Federal law, and the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH and (ii) the obligations of the United States under existing contracts, or renewals thereof, providing for water deliveries from the Project, the Contracting Officer shall make all reasonable efforts to optimize Project Water deliveries to the Contractor as provided in this Contract."

3. Subdivision (b) of Article 12 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(b) If there is a Condition of Shortage because of errors in physical operations of the Project, drought, other physical causes beyond the control of the Contracting Officer or actions taken by the Contracting Officer to meet legal obligations, including but not limited to obligations pursuant to the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH then, except as provided in subdivision (a) of Article 18 of this Contract, no liability shall accrue against the United States or any of its officers, agents, or employees for any damage, direct or indirect, arising therefrom."

4. Subdivision (b) of Article 14 of the Existing Contract is deleted in its entirety, and the following is substituted in lieu thereof:

"(b) The terms of this Contract are subject to the Stipulation of Settlement dated September 13, 2006, the Order Approving Stipulation of Settlement, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement in *Natural Resources Defense Council, et al.* v. *Rodgers, et al.*, No. CIV-S-88-1658 LKK/GGH. Nothing in this Contract shall be interpreted to limit or interfere with the full implementation of this Settlement, Order, the Judgment and further orders issued by the Court pursuant to terms and conditions of the Settlement."

5. Except as specifically amended herein, the Existing Contract is valid and shall continue in full force and effect as originally written and executed.

IN WITNESS WHEREOF, the parties hereto have executed this Contract Amendment as of the day and year first above written.

APPROVED AS TO LEGAL FORM AND SUFFICIENCY
James E. Turner
OFFICE OF REGIONAL SOLICITOR
DEPARTMENT OF THE INTERIOR

THE UNITED STATES OF AMERICA

By: _____
Regional Director, Mid-Pacific Region
Bureau of Reclamation

CITY OF FRESNO

(SEAL)

By: _____
City Manager

By: _____
Public Utilities Director

Attest:

By: _____
City Clerk (3/26/07)

Approved as to form:

By: _____
City Attorney

City of Fresno and Fresno Irrigation District Agreements

REVISED, AMENDED AND RESTATED COOPERATIVE AGREEMENT BETWEEN FRESNO IRRIGATION DISTRICT AND CITY OF FRESNO FOR WATER UTILIZATION AND CONVEYANCE

THIS AGREEMENT is entered into as of December 20, 2016 by and between the Fresno Irrigation District, an irrigation district (herein called "District") and City of Fresno, a municipal corporation (herein called "City").

WITNESSETH:

WHEREAS, District is an irrigation district organized and existing under the laws of the State of California and is the owner of certain water supplies, water rights and a water distribution system that can convey water to lands both within and outside District boundaries; and

WHEREAS, City is a municipal corporation with boundaries largely overlapping those of District and is the owner of a water distribution system for the distribution of water to lands both in and outside the exterior boundaries of City; and

WHEREAS, District and City have heretofore entered into a cooperative program of water utilization between said parties evidenced by a written agreement for such water utilization and conveyance dated August 12, 1970, which by its terms and by the terms of amendments thereto terminated on May 30, 1976; and

WHEREAS, District and City continued with said cooperative program and entered into a replacement contract for water utilization and conveyance dated May 25, 1976 ("1976 Agreement"); and

WHEREAS, District and City wish to amend and restate the 1976 Agreement in its entirety in order to continue with and expand said cooperative program to recognize changed circumstances affecting them via this Revised, Amended and Restated Cooperative Agreement between Fresno Irrigation District and City of Fresno for Water Utilization and Conveyance ; and

WHEREAS, certain provisions of this Agreement are specifically authorized by, and entered into pursuant to, Chapter 9 (commencing with Section 26670), Part 10, Division 11 of the California Water Code; and

WHEREAS, by agreement dated December 22, 2010 between City and the United States of America identified as Contract No. 14-06-200-8901D (the "City Bureau Contract"), City is entitled to purchase certain water from the United States; and

WHEREAS, by agreement dated December 22, 2010 between District and the United States of America identified as Contract No. 14-06-200-1122D (the "District Bureau Contract"), District is entitled to purchase certain water from the United States; and

WHEREAS, District holds rights to Kings River water and storage in Pine Flat Reservoir on the Kings River, subject to various contracts with the United States of America, water supply schedules and agreements by and among members of the Kings River Water Association and others, judicial and regulatory decrees, and the water rights governing the diversion and use of Kings River water, all as they may be amended or supplemented from time to time (collectively, the "Kings River Agreements"); and

WHEREAS, it is recognized by District and City that District is primarily charged with the distribution and delivery of water within District for Agricultural Use and that its canals and distribution system must primarily be used for that purpose; and

WHEREAS, it is recognized by both District and City that many inhabitants of District also require water for domestic, industrial or fire protection purposes supplied to them by City; and

WHEREAS, under the 1976 Agreement, Kings River water was available to City once lands within District boundaries with surface water allotments were annexed into City and were covered by the 1976 Agreement's contract rate for surface water delivery to City by District for those lands; and

WHEREAS, City and District now wish to limit the amount of Kings River water available to City to provide more certainty regarding water supply availability and to address City's current and anticipated needs and circumstances; and

WHEREAS, City and District are both committed to working cooperatively under the Sustainable Groundwater Management Act ("SGMA") so that the groundwater basin shared by City and District is sustainable and so that undesirable results (as defined in SGMA) are minimized or avoided; and

WHEREAS, City and District recognize that changes to the operations of the Central Valley Project have impacted the availability of water from said project; and

WHEREAS, City has heretofore used much of the water delivered to it under the 1976 Agreement for groundwater recharge because of City's historical reliance on groundwater, and therefore did not require delivery of water year around; and

WHEREAS, City desires to use more of its surface water for direct delivery to its water users and ratepayers while limiting its reliance on groundwater; and

WHEREAS, with the development of its surface water treatment facilities ("SWTFs") City now requires a long-term, reliable and certain surface water supply, deliverable continuously year around; and

WHEREAS, conveyance of raw surface water to the SWTFs on a continuous year around basis will require, among other things, (i) new conveyance infrastructure built by City to overcome certain operational challenges and/or interruptions to District's infrastructure to accommodate normal and routine maintenance of District's canals and pipelines than have historically delivered surface water to City, (ii) District to alter its operations and incur additional

costs to make Out of Season Deliveries, and (iii) the use of new management techniques by District, with the attendant costs, including without limitation water sales, purchases, transfers and exchanges, to meet the need for a continuous supply of surface water to City's SWTFs, all while addressing SGMA and other legal and regulatory requirements that impact the groundwater basin shared by District and City; and

WHEREAS, providing Out of Season Deliveries by District to City may also require the development of new water supplies and projects to provide the water being sought by City; and

WHEREAS, City acknowledges that District has a great depth of experience, knowledge and expertise in the management of surface water supply resources (including but not limited to water supply sales, purchases, transfers and exchanges); and

WHEREAS, City recognizes that the coordinated management of both District's and City's water supplies by District is desirable to maximize the use of the current water supplies and the future development of water supplies for both parties; and

WHEREAS, City has determined that it is in City's interest, and in the interest of its water users and ratepayers, to engage District to employ District's experience, knowledge and expertise on behalf of City in the management of City's Surface Water pursuant to the terms hereof in order to achieve City's and District's goals described herein and to accommodate City's desire for a continuous year around surface water supply, and District has agreed to be so engaged; and

WHEREAS, the changing conditions and manner of management of water supplies throughout the State of California, and other factors beyond the control of City and District, will require increased vigilance on the part of water purveyors in the Fresno area to cooperate with each other on long-range implementation strategies to improve the availability, reliability, and drought resiliency of water supplies; and

WHEREAS, through this Agreement and additional cooperative efforts, City, District and other entities in the region intend to capture of flood released waters, optimize existing water supply storage assets, develop new water supply storage assets, expand groundwater recharge capacities, engage in strategic water supply sales, transfers and exchanges and enhance the utilization of recycled and/or treated waters; and

WHEREAS, in light of SGMA, environmental regulations, water supply challenges and competition with other users and regions in the State for water supplies, City and District wish to further enhance their cooperative working relationship for the benefit of the water users and ratepayers they serve by entering into this Agreement to provide for strategic, long-range and coordinated water supply planning and management that will optimize water conservation, the efficient uses of water for agricultural and municipal uses, the capture of flood released water, the use of existing water supply storage assets, the development of new water supply storage assets, the expansion of groundwater recharge capacity, the effectiveness of strategic water supply sales, transfers, exchanges and purchases, and the enhancement of recycled water utilization.

NOW, THEREFORE, adopting the foregoing recitals as being applicable to this Agreement, it is mutually agreed as follows:

1. Term. The term of this Agreement shall be for a period commencing on the date it is executed by both District and City and ending at 12:00 o'clock p.m. on the last day of June in the year 2035, and thereafter until terminated by either party as of the last day of February of any subsequent year by written notice to the other party mailed prior to September 1st of the previous year. Upon the execution of this Agreement the 1976 Agreement and all amendments thereto shall be of no further force or effect, except that City agrees to pay District any monies owing or to become owing to District under and according to the terms of the 1976 Agreement, if any.

2. Agreement Subject to Other Obligations. This Agreement shall be at all times subject to all of the terms and conditions of the City Bureau Contract, the District Bureau Contract and the Kings River Agreements, and to the extent that any agreement contained herein is contrary to or inconsistent with any term or condition of those contracts or agreements, that contrary provision of this Agreement shall be unenforceable. In the event any such agreement contained herein shall become unenforceable, the entire Agreement may be terminated by the party adversely affected as of the last day of February of the next succeeding year, by written notice served upon the other party on or before the first day of September of the year preceding such termination.

3. Definitions. For the purpose of this Agreement, the following terms shall be defined as follows:

(a) "Agricultural Use" means the use of water primarily in the production of agricultural crops or livestock including but not restricted to domestic use incidental to such agricultural purposes, the watering of livestock, and underground water replenishment conducted by District.

(b) "City's Friant Supply" means all water to which City is entitled under the City Bureau Contract or otherwise as a result of City's status as a long-term repayment contractor for water service from the Friant Division of the Central Valley Project (CVP), including without limitation Class 1 water, Section 215 water, uncontrolled season water, unreleased restoration flows and recirculated water. City's Friant Supply shall not include any water available to District under the District Bureau Contract or as a result of District's status as a long-term repayment contractor in the Friant Division of the CVP, which water is not governed by this Agreement.

(c) "City's Kings River Supply" means the percentage of District's Kings River Supply available to be delivered to City in a Water Year under this Agreement.

(d) "District's Kings River Supply" means the Kings River water District may deliver to its water users under the Kings River Agreements and applicable judicial and regulatory decrees in a Water Year as the result of the calculated natural flow of the Kings River during that Water Year.

(e) "City's Surface Water" means all water available to City in a Water Year by means other than pumping from the underground water supply, including without limitation

City's Kings River Supply and City's Friant Supply and any surface water supply acquired or developed after the date of this Agreement.

(f) "City's Water Service Area" means all lands within the exterior boundaries of City, and also all lands outside such boundaries that are within the exterior boundaries of District, to which City now delivers water or hereafter consents to deliver water by means of the City Water System and that are not hereafter designated or assessed by District as lands receiving or to receive District Water Service.

(g) "City Water System" means the conduits, pipes and other facilities (including without limitation the SWTFs) owned by City and used by City to convey water to lands whether in or outside City.

(h) "District Water Service" means the furnishing of water by District directly to lands within District by means of the District Water System other than pumping conducted by a landowner or water user directly from the underground water supply upon the lands receiving such water.

(i) "District Water System" means the conduits, pipes, canals, pumping stations and other facilities owned and/or used by District to convey water to lands or facilities whether in or outside of District.

(j) "Excluded Areas" means those acres within the City's Water Service Area that are outside of the District's boundaries.

(k) "Included Acres" means those acres within the City's Water Service Area that are within the District's boundaries.

(l) "Municipal, Industrial and Domestic Uses" means the use of water other than for Agricultural Use, and underground water replenishment conducted by City.

(m) "Out of Season Deliveries" means deliveries of City's Surface Water via the District Water System during periods when District is not otherwise delivering irrigation water to its landowners or water users via the portions of the District Water System used to convey City's Surface Water to the points on the District Water System where City will assume physical control of the delivered water.

(n) "Point of Delivery" means, for water delivered to City via the District Water System, the headworks of the Gould Canal and the Fresno Canal as specified in the applicable schedule, for water delivered to City via the Friant-Kern Canal Raw Water Pipeline, the headworks of the Friant-Kern Canal Raw Water Pipeline, for water delivered to City via the South Raw Water Pipeline, the headworks of the Fresno Canal, and such other location(s) as City and District may mutually agree.

(o) "Transfer" means a water sale, transfer or exchange involving any of City's Friant Supply.

(p) "Water Year" means March 1 of one year through the last day of the following February when used in reference to City's Friant Supply and October 1 of one year through September 30 for the following year when used in reference to City's Kings River Supply or District's Kings River Supply.

4. Management of City's Surface Water. To fulfill the purposes of this Agreement, and to facilitate the continuous and year around supply of water to City's Water System and facilities, District shall undertake, and is hereby appointed by City as City's exclusive agent for the management of City's Surface Water pursuant and subject to the terms of this Agreement, including but not limited to subsection 4(f) below. District's management authority and responsibilities shall terminate with respect to any of City's Surface Water upon delivery of that water to City.

(a) The management authority hereby granted to District shall include without limitation the exclusive right to:

i. Direct the storage and release of City's Surface Water;

ii. Schedule, order and provide for the delivery of City's Surface Water to District's points of diversion;

iii. Facilitate the reasonable and beneficial use of City's Surface Water and other water supplies available to City, while also providing for delivery of water to the applicable Point(s) of Delivery as specified in this Agreement;

iv. Pursue and implement Transfers pursuant to this Agreement; and

v. Take all other actions associated with the management and administration of City's Surface Water prior to its delivery to the applicable Point of Delivery in furtherance of the goals provided in subsection 4(f).

(b) District shall not voluntarily take any action that would:

i. Breach City's Bureau Contract or any other agreement governing any of City's Surface Water;

ii. Result in a long-term reduction in amount of City's Surface Water; or

iii. Result in management or use of City Surface Water inconsistent with the goals provided in subsection 4(f) below, unless City provides prior written authorization of such management or use.

(c) Notwithstanding District's management of City's Surface Water, City shall be solely responsible for, and shall timely pay, all charges and other amounts payable in connection with any of City's Surface Water.

(d) Subject to the express rights of City under this Agreement, City shall take no action that interferes with District's management of City's Surface Water as long as District provides the deliveries thereof in accordance with Section 5.

(e) District shall coordinate with City to define and identify uses of City's Surface Water that benefit City's water users and ratepayers. This coordination shall be performed as described in this subsection.

i. As frequently as appropriate and necessary, and at least annually, City and District shall confer to review available water supply information and data, including without limitation: precipitation, snow pack, and runoff conditions; water storage conditions; relevant environmental programs and projects; forecasted Municipal, Industrial and Domestic Uses; surface water delivery priorities for City; forecasted groundwater pumping required to meet City's forecasted Municipal, Industrial and Domestic Uses; and other pertinent information and data related to water supply availability and water demands for the relevant Water Year(s). City and District shall also confer regarding the anticipated availability of City's Friant Supply, if any, for Transfers.

ii. City will be responsible for providing periodic updates to the City Council and City administration. At least annually, City staff shall provide an informational workshop to the City Council, summarizing ongoing water supply conditions, the implementation of this Agreement and fulfillment of the water supply goals as listed in 4(f), as well as any anticipated water supply issues of concern for the relevant Water Year(s). District shall make reasonable efforts to coordinate with City staff to provide any data, information, and materials required for this annual informational workshop to the City Council.

iii. It is understood that during any given Water Year it may be necessary to adjust the water supply planning forecast established pursuant to the above described process as water supply availability and demands change, and additional information and data are obtained, reviewed, and assessed. City and District shall employ reasonable efforts to meet and confer as necessary to keep each party informed to the extent water supply conditions and plans may change through the relevant Water Year. City shall be responsible for providing informational updates to the City administration to the extent there are material changes to the water supply conditions in any given Water Year.

(f) District's management of City's Surface Water shall at all times be in furtherance of one or more of the following water supply goals:

i. Providing continuous year around water supply to City's SWTFs;

ii. Improving the water supply reliability and drought-resiliency for City;

iii. Improving the operation and utilization of City-owned recharge basins;

iv. Implementing conjunctive-use water management strategies to comply with the SGMA that directly benefit City's water users and ratepayers and indirectly benefit groundwater users in the North Kings Subbasin.

(g) Included as a part of the management of City's Surface Water as described above, District shall diligently pursue Transfers of any of City's Friant Supply that City advises District that City will not require during a particular Water Year ("Temporarily Unused Friant Water").

i. Upon identifying a potential Transfer opportunity, and prior to executing the Transfer, District shall notify City of the potential Transfer opportunity, and the water quantity, unit price, delivery dates and terms, and any other material matters associated with the Transfer. This is a notification procedure and not an approval procedure.

ii. All Transfers of Temporarily Unused Friant Water pursued by District shall be in full conformance with City's water supply goals as described in Section 4(f) or otherwise agreed by City and District, and shall be limited to supporting Agricultural Use rather than urban growth or development in other jurisdictions.

iii. City shall not be prohibited from unilaterally pursuing Transfers of Temporarily Unused Friant Water; provided, that any such Transfers shall first be discussed and coordinated with District before they are implemented and shall not be undertaken over District's reasonable objection and the benefits of any such Transfer shall be allocated in accordance with subsections (h), (i) and (j) below.

iv. For avoidance of doubt, District's obligations under this Section 4(g) are limited to making reasonable and diligent efforts to pursue Transfers of Temporarily Unused Friant Water, and City acknowledges that no assurances can be provided by District that such Transfers can be made or arranged.

(h) The benefits resulting from Transfers shall be allocated in accordance with this subsection. For purposes of this Section 4, "benefits" of a Transfer include, without limitation:

i. The difference between all costs incurred in connection with a Transfer and the amount(s) received as a result of the Transfer,

ii. Water returned as a result of a Transfer, and

iii. Water supply storage or conveyance capacities made available as a result of a Transfer.

To the extent benefits include payments, City shall be reimbursed for its actual and reasonable out of pocket expenses incurred for City's Friant Supply involved in the Transfer,

and each of the parties shall next be reimbursed for any actual and reasonable out of pocket expenses incurred in connection with the Transfer. The net revenue associated with a Transfer shall be the revenue remaining after all parties have been reimbursed their actual and reasonable expenses incurred for the Transfer.

(i) To the extent benefits of a Transfer consist of water supplies, water supply storage or conveyance capacities, the allocation of such benefits as between the parties shall be negotiated by the parties before the Transfer is implemented. In the event the parties cannot negotiate such allocation, the Transfer shall not be pursued.

(j) For each Transfer that generates net revenue, City and District agree that the net revenue shall be distributed and used as follows:

i. 25-percent of the net revenue shall be deposited with City's water enterprise fund;

ii. 25-percent of the net revenue shall be deposited with District for the inspection, operations, maintenance and repair of the District's Conveyance System, which City acknowledges provides a benefit to City ratepayers;

iii. 50-percent off the net revenue shall be deposited into a Water Supply Development Fund to be used to finance water supply development programs and projects that mutually-benefit City and District.

The Water Supply Development Fund shall be a restricted-use fund to be used exclusively for water supply programs and projects that improve water supply availability, reliability and drought resiliency for both District and City. Programs and projects that may be financed from the Water Supply Development Fund include, but are not limited to, water supply purchases, transfers, and exchanges; groundwater storage; and groundwater recharge. Expenditures for water supply purchases, transfers, and exchanges may include any carryover charges and conveyance charges that may be assessed by the State of California, the United States, or other agency, to store, transport and deliver surface water, for the mutual benefit of City and District, using state or federal storage and conveyance facilities.

The Water Supply Development Fund may receive contributions from City, District, and other public agencies approved by both City and District. The Water Supply Development Fund may not receive contributions from private persons, companies, businesses, or organizations.

Prior to encumbering funds from the Water Supply Development Fund, District and City shall mutually agree in writing on the recommended expenditure and the amount to be financed with the Water Supply Development Fund.

District shall serve as the fiscal agent for the Water Supply Development Fund and implement generally accepted public agency or governmental accounting practices in managing the fund assets. District shall subject the fund to an annual audit by independent auditors during the course of District's annual audit of its financial statements. The audit shall

be conducted in accordance with the generally accepted auditing standards by the independent certified public accountant auditing District's financial statements. Upon presentation of District's comprehensive audit report to the District Board of Directors, District shall provide City with a copy of District's audit report. At any time during the term of this Agreement, City may, at its own cost, request to review and audit the financial and accounting records associated with the Water Supply Development Fund. District shall have 30 working days to submit the requested records to City for review and audit.

In the event this Agreement terminates and uncommitted amounts remain in the Water Supply Development Fund, one half of all such amounts shall be promptly distributed free of any restrictions to each of the parties.

(k) By the 25th day of each month, District shall provide City with a written summary of District's utilization of City's Friant Supply for the previous month in substantially the form attached hereto as **Exhibit A**. The written summary will identify water volumes delivered to recharge basins, surface water treatment facilities, other Points of Delivery designated by City, and Transfers. The written summary may be delivered to City by email, facsimile or U.S. mail. For Transfers, the monthly report shall include information regarding the parties involved in the Transfer, the water quantity, unit price, delivery dates and terms, and any other material matters associated with the Transfer.

5. Water Made Available to City.

(a) Subject to all other provisions of this Agreement, District shall deliver to City during each applicable Water Year, for distribution and use by City within City's Water Service Area, each day of each year on a continuous basis in accordance with Section 8 of this Agreement, the City's Surface Water available during relevant Water Year(s) that can be diverted by District at the headworks of the Gould Canal, the Fresno Canal or the Friant-Kern Canal Raw Water Pipeline. City acknowledges that the water delivered may not be City's Surface Water, but rather other water controlled by District in the District Water System of similar quality and equal quantity, including without limitation water recovered from water banks, other water for which City's Surface Water is exchanged, and/or water purchased by District for delivery to City at District's cost, and that references in this Agreement to deliveries of City's Surface Water shall include deliveries thereof of a substitute supply by means of one or more exchanges, transfers, purchases or combinations thereof. At all times, District shall have the right to exchange and to convey for City in place thereof other water of similar quality and equal quantity (except sewer effluent or industrial wastes) available to District.

(b) City's Surface Water shall be deemed delivered to City when it reaches the Point of Delivery specified in the applicable schedule provided and approved under Section 8 of this Agreement, provided that for deliveries made via the District Water System, District shall thereafter convey such water to the points on the District Water System where City will assume physical control of the delivered water.

(c) The parties acknowledge that there may be times when the City Water System is undergoing routine or emergency repairs and maintenance, or subject to other conditions, that preclude City from accepting deliveries under this Agreement. Similarly, the parties

acknowledge that there may be times when the District Water System is undergoing routine or emergency repairs and maintenance, or subject to other conditions, that preclude District from delivering water to City under this Agreement. The parties shall cooperate with the other to minimize the impacts of such events, but neither shall be in breach of this Agreement as a result thereof.

(d) Water delivered to City under this Agreement shall be used by City within City's Water Service Area only for Municipal, Industrial and Domestic Uses, Agricultural Uses incidental thereto, and within the boundaries of District for recharge of the underground water supply by percolation.

City shall not sell, transfer, deliver or exchange any surface water or groundwater to or with any other person or entity without written consent of District first had and obtained.

However, this provision shall not prevent City from entering into separate agreements with any other entity which may have a similar agreement with District for the distribution and use of water received from District under such agreements, provided such separate agreements are entered into with the written consent of District first had and obtained and are subject to all the terms and conditions of this Agreement and District's agreements with such other entities.

(e) District has entered into this Agreement with the understanding that it is, and will continue to be, City's policy to (i) require urban growth to occur sequentially in designated growth areas around City, (ii) promote infill development with City's existing boundaries and (iii) facilitate the successful implementation of SGMA within the groundwater basin shared by City and District by conditioning land use and annexation decisions on the existence of an available water supply to support new development in annexed areas. Consistent with that understanding, for the term of this Agreement, as a condition of the provision of City water service, City shall require the proponent of any proposed development project located outside of City's Water Service Area boundary as of the date of this Agreement to:

i. Define the peak water demands, plus fire protection demands, required to meet the total water supply demands of the entire project at build-out conditions;

ii. Obtain a perpetual surface water supply allocation, right, entitlement or similar from District, or other surface water supply agency, to meet the peak water demands, plus fire protection demands, at build out conditions; and

iii. Dedicate, transfer or assign the perpetual surface water supply allocation, right, entitlement or similar to City.

Once the perpetual water supply has been dedicated, transferred, or assigned to City, the water supply shall be incorporated into City's Surface Water managed by District for City under this Agreement.

In addition, to improve, restore, and maintain the availability, reliability, and drought resiliency of the groundwater and surface water resources in the North Kings Subbasin,

City and District shall jointly advocate that all public water supply systems in the North Kings Subbasin should require the proponents of new development projects to obtain perpetual surface water supply rights, allocations, entitlements, and similar, in sufficient quantity, to meet the all demands at full build out.

(f) In furtherance of the parties' goals under this Agreement, City shall utilize City's Friant Supply to provide water to the City's SWTF served by the South Raw Water Pipeline (as defined below) for the purpose of serving the Excluded Area.

6. Raw Water Pipelines. As soon as reasonably practicable, City shall construct, at its sole cost and expense, two raw water pipelines to serve City's SWTFs (the "Raw Water Pipelines"). One Raw Water Pipeline shall be a direct connection from the Friant-Kern Canal to City's SWTF located at Mile Point 7.58 (the "Friant-Kern Canal Raw Water Pipeline"). The other Raw Water Pipeline shall be a direct connection from the Fresno Canal downstream of the headworks for such canal to City's SWTF located at Trimmer Spring Road (the "South Raw Water Pipeline"). City's T3 SWTF shall continue to be served by the Enterprise and Jefferson Canals that are a part of the District Water System. Once operational, the Raw Water Pipelines shall be used to convey portions of City's Surface Water directly to the SWTFs, and all costs of the operation, maintenance, repair and replacement of the Raw Water Pipelines shall be borne by City; provided, that District shall be entitled to utilize for its own purposes any capacity in the Raw Water Pipelines not required to deliver City's Surface Water, and District shall reimburse City upon demand for any operational costs incurred as a result of District's use of the Raw Water Pipelines. Any third-party property damages resulting from City's efforts and activities related to the operation, maintenance, repair, and replacement of the Raw Water Pipelines shall be received and processed by City in accordance with City's Risk Management policies and procedures.

7. City's Friant Supply. While this Agreement is in effect, City (i) shall not convey any interest in the City Bureau Contract to any party other than District, (ii) shall at all times maintain the City Bureau Contract in effect and (ii) shall not voluntarily decrease the quantity of City's Friant Supply to be made available to City thereunder without the written consent of District. City will use every effort to obtain its maximum entitlement to City's Friant Supply annually as it may become available, and will seek to maximize any other surface water opportunities that may be available to City via the Friant Division of the Central Valley Project. Nothing in this Agreement conveys any ownership interest in the City Bureau Contract to District, which shall at all times remain the sole property of City, nor does this Agreement convey any interest in the District Bureau Contract to City, which shall at all times remain the sole property of District.

8. Schedules of Delivery and Conveyance of Water.

(a) District shall deliver City's Surface Water to City in accordance with schedules provided from time to time by City for approval by District, which approval shall not be unreasonably withheld, delayed or conditioned. Such schedules shall set forth the amounts of water desired by City, the desired timing of deliveries, the facilities by which such water is to be delivered, and the point(s) on the District Water System where City will assume physical control of the delivered water. Deliveries of water by District will take into consideration all relevant

factors, including without limitation (i) the capacity and condition the applicable portions of the District Water System, (ii) City's Bureau Contract, (iii) the District Bureau Contract, (iv) the Kings River Agreements, (v) actual and anticipated water supply conditions, (vi) the requirements of other contracts between the District and third parties (including without limitation the City of Clovis and Fresno County Waterworks District No. 19) and (vii) all other factors pertaining to the distribution, apportionment and use of water available to District.

(b) All schedules submitted by City during each Water Year shall provide for the delivery during that Water Year of all of City's Surface Water that becomes available to City during that Water Year. Notwithstanding the foregoing, City may schedule up to 10,000 acre feet of City's Surface Water that becomes available to City during one Water Year for delivery in the succeeding Water Year ("Rescheduled Water"). City shall timely pay in full all costs imposed by third parties, including without limitation the United States Bureau of Reclamation, as the result of any Rescheduled Water requests or deliveries.

9. Conveyance Losses. City shall bear all losses incurred in the District Water System downstream of the applicable Point of Delivery; provided, that no such losses shall be assessed against City when District is delivering irrigation water to its landowners or water users via the portions of the District Water System used to convey City's Surface Water to the points on the District Water System where City will assume physical control of the delivered water. Conveyance losses chargeable to City shall be computed by multiplying the losses in that portion of any canal used for conveyance of City's Surface Water during the period such water is being so conveyed by the total amount of water being conveyed for City in that canal during such time, divided by the total amount of water flowing in that portion of that canal during the same period.

10. Use by District of Water Not Used by City.

(a) Except for Rescheduled Water, in the event City is unable to use or does not use any of City's Kings River Supply in any Water Year, City shall lose the right to receive such water, and District shall have the right to take and use such water for Agricultural Use in such manner as it may determine.

(b) Except for Rescheduled Water, in the event City is unable to use or does not use any part of City's Friant Supply and District reasonably concludes that it cannot effect a Transfer for all of such unused water as Temporarily Unused Friant Water as described in Section 4(g), City shall nevertheless take and pay for such unused water and District shall have the right to use such water for Agricultural Use, but City may require District to so use such water at such locations as City may direct; provided, however, in the event City does not direct the location at which said water shall be used in time that it may be so used or in the event the District Water System will not permit the conveyance of such water to such location when so directed, or if for any other reason the conveyance of such water to such location at that time is not feasible or practicable, District shall have the right to use such water upon the same conditions as are provided in Section 10(a). Such use of any such water by District shall not relieve City from any payments required to be made by it under the City Bureau Contract or under the terms of this Agreement and its use by District shall not require any payment from District to City.

(c) Except for Rescheduled Water, in the event City is unable to use or does not use any of City's Surface Water that is neither City's Kings River Supply or City's Friant Supply in any Water Year, City shall lose the right to receive such water, and District shall have the right to take and use such water for Agricultural Use in such manner as it may determine. In such event, insofar as the District Water System will permit, and insofar as otherwise may be practicable and equitable as to other landowners, District will use such water for irrigation or percolation in areas in City or east or northeast of City, and will discuss its use with City before it is used elsewhere. However, the ultimate decision concerning such use of such water shall be within the discretion of District.

11. Water Rights Not Transferred. As was the case under the 1976 Agreement, City acknowledges that its rights to City's Kings River Supply under this Agreement are contractual rights and not water rights. Nothing in this Agreement authorizes or shall be construed or deemed to constitute the sale or transfer of a water right from either party to the other and nothing in this Agreement shall constitute the dedication by either party of water or storage to a public use. No right in any water, storage right or water right owned by District or City shall be acquired or lost by virtue of this Agreement or the actions contemplated hereby. At no time shall City make any claim, assert any right or otherwise seek, confirm or perfect in any forum any legal or beneficial interest, right or title to any of District's water supply or storage rights except as expressly set forth herein.

12. City's Sewage Effluent. City shall retain its sewage effluent and recycled water within the boundaries of District for the term of this Agreement, except with the written consent of District first had and obtained. It is the intent of City and District to develop and execute a new agreement addressing such effluent and recycled water use, and this Agreement is to be interpreted so as to be consistent with such new agreement if and when it is executed by the parties.

13. Acreages and City's Kings River Supply.

(a) City's Water Service Area consists of Included Acres and Excluded Acres, and on an annual basis City and District shall prepare a map showing the total number of acres in each area as of the first day of March of each year. When so approved, said map shall be incorporated herein by reference as **Exhibit B** and shall become a part hereof. Said map shall be amended and reapproved by both parties as of the first day of March each year and added to this Agreement as an updated **Exhibit B**. However, City shall keep the District currently advised during the year of any new lands outside of City's Water Service Area to which it commences or consents to deliver water, and District shall keep City so advised as to any new lands designated or assessed by it as lands receiving or to receive District Water Service. When so amended and reapproved as of the first day of March of each year, said map shall conclusively establish the boundaries of and the acreage in each area for all purposes of this Agreement.

(b) City's Kings River Supply shall be the herein-contracted for percentage of District's Kings River Water Supply. Such percentage shall be based on the ratio of Included Acres within City's Water Service Area to the total acres within District's boundaries. In computing the acreage within the Included Acres, the entire acreage shall be measured including properties that may be exempt from assessment for taxation and including adjacent streets,

alleys, roads, highways and other public ways to the center lines thereof. As of the execution of Agreement, and based on the land area sizes defined above, City's Kings River Supply is 25.54 percent of the District's Kings River Supply.

(c) Notwithstanding any other provision of this Agreement, and notwithstanding increases in the Included Acres, City's Kings River Supply shall be limited to 29.00 percent of District's Kings River Supply. At such time when the ratio of Included Acres within City's Water Service Area to the total acres within District equals 29.00 percent, City's Kings River Supply shall remain fixed at 29.00 percent. City and District mutually agree that the increase percentages reflected in this Section 13 include allowances for moderate growth in Growth Area 1 of City's Sphere of Influence as shown in **Exhibit C** (as depicted as Figure IM-2 of the Fresno General Plan).

(d) To improve, restore, and maintain the availability, reliability, and drought resiliency of the groundwater and surface water resources in the North Kings Subbasin, District shall support, and to the extent it has the legal authority to do so shall require, the establishment of water supply limits on all municipal water systems in the North Kings Subbasin.

District acknowledges that it may enter into surface water utilization and conveyance agreements similar to this one with other municipalities in the Kings Subbasin that provide for the delivery of portions of District's Kings River Supply. Subject to the following paragraph of this Agreement, all such agreements entered into after the date of this Agreement shall provide that the percentage of District's Kings River Supply made available to the municipality entering into such agreement shall be determined in a manner similar and comparable to that applied to City in this Agreement.

Should the District enter into such a water utilization and conveyance agreement with another municipality in the Kings River Subbasin after the date of this Agreement that makes available a percentage of District's Kings River Supply to such municipality determined in a manner that is not similar and comparable to that applied to City in this Agreement, at City's request the parties shall negotiate in good faith an adjustment in City's Kings River Supply to apply the same methodology used, and provide the same percentage increase, as granted to the other municipality; provided, that to the extent such other municipality provides additional consideration to District for such different methodology, City shall provide comparable consideration if it requests that such different methodology be used for this Agreement. Any disputes arising as a result of such negotiation shall be resolved pursuant to Section 19.

14. Payment by City to District. In consideration of the water supplies and services provided by District to City under this Agreement, City shall pay to District each Water Year in which this Agreement is effective the following:

(a) The sum calculated by multiplying the number of Included Acres by the per acre assessment imposed as of March 1 of that Water Year on lands in District receiving District Water Service, plus the sum calculated by multiplying the number of Excluded Acres by the per acre assessment imposed as of March 1 of that Water Year on lands in District not receiving District Water Service. Amounts payable to District pursuant to this Section 14(a) shall be paid by City 60% on or before the 20th day of December preceding the Water Year for which such

amounts are due, and the remaining 40% shall be paid on or before the 20th day of June of the following Water Year. City and District acknowledge that during the term of this Agreement, District may convert its rate structure to include a volumetric charge. Concurrently with such a rate structure modification, the parties shall negotiate modifications to this Section 14 so that charges imposed on City under the revised District rate structure are equitable and comparable in proportion and magnitude to the charges imposed on other District customers receiving water for Agricultural Use. Without limiting the foregoing, any volumetric charges imposed on City shall be determined in the same manner as volumetric charges imposed on other District customers receiving water for Agricultural Use.

(b) An out of season water delivery fee determined in accordance with the procedure described in the attached **Exhibit D** for each acre foot of water delivered to City under this Agreement as an Out of Season Delivery (the "Water Delivery Fee"). The Water Delivery Fee shall be payable within 30 days after District delivers City an invoice for such fee indicating the amount of water delivered during the invoice period and the total Water Delivery Fee due. City acknowledges that such fee is in part to compensate District for additional costs and risks incurred for operating its system to make Out of Season Deliveries. No such fee shall be due for water deliveries to City under this Agreement that are not Out of Season Deliveries.

(c) A rescheduling fee for each acre foot of Rescheduled Water determined in accordance with the procedure described in the attached **Exhibit E** (the "Rescheduling Fee"). The Rescheduling Fee shall be payable annually after March 1 of each Water Year within 30 days after District delivers City an invoice for such fee indicating the amount of Rescheduled Water for the applicable Water Year and the total Rescheduling Fee due. City acknowledges that the Rescheduling Fee is necessary to compensate District for additional costs and risks incurred to reschedule water for City from one Water Year to the succeeding Water Year. The Rescheduled Water Fee shall not be applied to any of City's Friant Supply carried over in Millerton Lake, as the Bureau has established a separate fee schedule for City to reschedule City's Friant Water Supply from one Water Year to the succeeding Water Year.

(d) While this Agreement is in effect, District shall not impose District assessments or other charges on landowners within City's Water Service Area or adopt special "municipal and industrial" assessments, rates or charges that would be imposed on or as a result of water deliveries to City under this Agreement. Only the amounts described in this Agreement shall be imposed on any party as a result of deliveries of City's Surface Water by District to City.

(e) Time shall be of the essence for the making of the payments described in this Section 14. If any such payment is not made on the date provided, City shall pay to District in addition to said payment costs, penalties and interest equal to those provided by law to be paid by landowners within District for the late payment of assessments. Such costs, penalties and interest are in addition to any other remedy which District may have against City because of City's failure to pay said payment as above provided.

(f) City acknowledges and agrees that the amounts payable by City pursuant to this Section 14 will vary from year to year and may increase over time. City further acknowledges that, while some of such amounts will be determined with reference to District assessments on its landowners, no amounts payable by City under this Agreement are assessments on City's

landowners. City further agrees that, as they relate to City, such amounts will be imposed as a matter of contract and are not assessments, fees or charges to which Article XIIID of the California Constitution applies. City shall be permitted to participate in public hearings and meetings held in connection with rate-setting, but City shall not assert that Article XIIID of the California Constitution applies to payments required under this Agreement. If City makes such an assertion, this Agreement may be terminated by District in its entirety as of the last day of February of the next succeeding year by written notice served upon City. City shall be responsible to set its rates to its utility users in accordance with applicable law, and shall indemnify and defend District against any claims or legal actions commenced by City's water users or ratepayers to challenge the amounts payable by or to City.

15. Re-negotiations. City and District acknowledge that changed circumstances in the future may:

i. Result in material changes in the size of City's Water Service Area, the number of Excluded Acres and/or the number of Included Acres, and/or

ii. Render the amount of City's Kings River Supply as an increasing percentage of District's Kings River Water Supply inequitable.

Such changed circumstances could result from, among other causes:

i. Annexations or detachments from City and/or District;

ii. Updates in City's Urban Water Management Plan or the Fresno General Plan;

iii. Significant regional economic development projects that require the extension of the City Water System outside of City's Water Service Area. Significant regional economic development projects shall be those that qualify for federal, state, county, or local economic development incentives; or

iv. New legal, regulatory, or environmental requirements placed on water supply agencies by a state or federal government agency.

Should either party to this Agreement determine after January 1, 2036 that such changed circumstances have arisen, it may notify the other of such determination and request that the parties meet to discuss mutually acceptable changes in the number of Excluded Acres, the number of Included Acres and/or the percentage used to determine City's Kings River Supply. Neither party shall be required to engage in such discussions prior to January 1, 2036.

The parties shall thereupon meet in good faith in an attempt to reach agreement on such changes; provided, that if no such agreement is reached within 180 days of the initial meeting, neither party shall be obligated to continue such meetings.

The number of Excluded Acres, the number of Included Acres and City's Kings River Supply shall remain unchanged pending agreement on the changes, and therein documented by a written amendment to this Agreement and executed by both parties.

16. Protection of District Facilities. City shall not permit the development of any parcel of land or the use of any public utility or other easements affecting land within its boundaries if any of the District Water System is located on, under or adjacent to such parcel until City, the landowner and/or the developer enters into an agreement acceptable to District for the repair, rehabilitation, relocation, replacement, reconfiguration or pipelining of the facilities on the parcel, and on any adjacent parcels, all as District determines is necessary or appropriate in order to (i) avoid disruption of District operations or maintenance activities as a result of the development, (ii) make District facilities suitable for operation within a developed area, or (iii) address public safety concerns.

17. No Warranty of Quality. City recognizes that City's Surface Water will be "raw," non-potable and untreated, and that the amount of water included in City's Surface Water will vary from year to year due to a variety of factors beyond the control of District. City further recognizes that wastewater (both treated and untreated) and drainage water are sometimes discharged into the District's canals, and that such discharges from a number or sources will occur and/or continue during the term of this Agreement. Accordingly, except as expressly set forth in this Agreement, District makes no representations or warranties regarding the quality of the water or the amount of water to be delivered to City each Water Year. City recognizes that the treatment of City's Surface Water to make it potable shall be the sole responsibility of City, and City shall assume all risk and responsibility therefor. The character or quality of the water furnished or conveyed hereunder may vary from time to time for reasons including, but not restricted to, the application by District of chemicals to control aquatic and ditch bank weeds, and the open canals of District are always subject to possible pollution from outside sources. District does not guarantee in any respect or assume any responsibility for the chemical, bacterial or other quality of the water made available to City through the District Water System.

18. Indemnity. City and District each agree to indemnify the other and save the other free and harmless of and from any and all liability, damage, loss, cost or expense, incurred or suffered by the other, by reason of damage to the property of the other or injury to any other person or property arising out of its own conduct, acts, omissions or faults, in connection with any matter related to this contract.

19. Dispute Resolution.

(a) District and City staff shall exercise every effort to resolve disputes through the development of a consensus.

(b) To the extent District and City staff cannot promptly resolve an issue in dispute; the parties shall promptly convene a meeting of senior party representatives to attempt to resolve the dispute. Either party may request a dispute resolution meeting pursuant to this section by providing written notice to the other party, including a summary of the issue in dispute. District representatives shall be its Board chair or president and another Board member. City representatives shall be the Mayor and City Council President. These senior party representatives shall make reasonable efforts to meet as frequently and as promptly as possible to negotiate the terms and conditions of a resolution. If these party representatives are unable to resolve the dispute through this informal process within a reasonable period, either party may pursue any remedy it may have under law or equity.

(c) The dispute resolution process described above shall be limited to material disputes regarding matters related to Transfers, expenditures from the Water Supply Development Fund, changes in City's Kings River Supply, revisions of this Agreement pursuant to Section 13(d), City's Friant Supply, changes proposed for **Exhibits B or C**, calculation procedures for fees for Out Of Season Deliveries and Rescheduling Fees, and similar matters.

(d) In cases where a dispute arises between the parties that, if unresolved, may result in imminent danger to the public, health, safety or welfare, the parties shall not be obligated to engage in dispute resolution pursuant to this Section 19.

20. Defense of Agreement. In the event of litigation this Agreement, the parties shall cooperate to provide a joint defense of the litigation. Each party shall bear its own costs of such litigation, including attorneys' fees and expert witness fees.

21. No New Agency. This Agreement is not intended to create a new joint powers authority or other entity. Each party shall conduct itself under this Agreement in good faith, using its diligent best efforts to comply with this Agreement and to achieve the objectives of the parties set forth herein. Each party shall make its personnel and resources reasonably available as required to achieve the purposes of this Agreement.

22. Approvals. Except as expressly provided in this Agreement, compliance with all legal/regulatory requirements and governmental or other third party restrictions on the use or delivery of City's Surface Water to it City water users shall be the responsibility of City. District shall be excused from delivering any water supply under this Agreement if, by so doing, District would become subject to additional legal requirements or third party restrictions imposed on deliveries of water to City's water users.

23. Entire Agreement. This Agreement and each of the exhibits referred to herein, which are incorporated by this reference, constitute the entire agreement between the parties pertaining to the subject matter hereof and supersede all prior and contemporaneous agreements and/or obligations concerning these obligations which are merged into this Agreement. Each party has made its own independent investigation of the matters settled and is not relying upon any representation not specified herein.

24. Applicable Law. This Agreement shall be construed under and shall be governed by the laws of the State of California. Any action to interpret or enforce any aspect of this Agreement shall be brought in the California Superior Court of Fresno County, California. City and District hereby expressly waive any right to remove any action to a county other than Fresno County as permitted pursuant to California Code of Civil Procedure Section 394.

25. Construction of Agreement. This Agreement is the product of negotiation and preparation by and among each party hereto and its attorneys, and the parties agree that this Agreement shall not be deemed to have been prepared or drafted by any one party. Accordingly, the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of this Agreement.

26. Modification of Agreement. No supplement, modification, waiver, or amendment with respect to this Agreement shall be binding unless executed in writing by the party against whom enforcement of such supplement, modification, waiver or amendment is sought.

27. Counterparts. This Agreement may be signed in any number of counterparts by the parties, each of which shall be deemed to be an original, and all of which together shall be deemed one and the same instrument. Facsimile or other electronic signatures shall be binding.

28. Further Acts. The parties shall reasonably cooperate with each and take such further actions as may be necessary, including the execution of all necessary further documents, to carry out the purpose and intent of this Agreement. Each of the parties shall diligently and in good faith proceed to negotiate such other agreements as may be necessary to implement this Agreement.

29. Binding Effect. This Agreement shall be of binding legal effect only when it has been executed by all of the parties. No rights or duties under this Agreement may be assigned or delegated by a party without the express written consent of the other party, which may be withheld in the sole and absolute discretion of such other party. Subject to the foregoing, this Agreement shall be binding upon and inure to the benefit of the successors and assigns of the parties.

30. Notice to Parties. Any notice or other communication given under the terms of this Agreement shall be in writing and shall be given personally, by facsimile or by certified mail, postage prepaid and return receipt requested. Any notice shall be delivered or addressed to the parties at the addresses or facsimile numbers set forth below or at such other address or facsimile numbers as shall be designated by notice in writing in accordance with the terms of this Agreement. The date of receipt of the notice shall be the date of actual personal service or facsimile transmission with written confirmation of successful transmission, or three days after the postmark on certified mail. All notices required under or regarding this Agreement shall be made in writing addressed as follows:

Fresno Irrigation District 2907 S Maple Avenue Fresno, CA 93725 Attn: General Manager Facsimile No.: 559-233-8227	City of Fresno 2600 Fresno Street Fresno, CA, 93721 Attn: Director of Public Utilities Facsimile No.: 559-498-1304

31. Attorneys' Fees. In the event of any action or arbitration between the parties seeking enforcement or interpretation of any of the terms and conditions of this Agreement, the prevailing party in such action shall be awarded, in addition to damages, injunctive or other relief, its reasonable costs and expenses, including, but not limited to, taxable costs and reasonable attorneys' fees.

32. Cumulative Rights; Waiver. No failure by any party to exercise, and no delay in exercising any rights, shall be construed or deemed to be a waiver thereof, nor shall any single or partial exercise by any party preclude any other or future exercise thereof or the exercise of any other right. Any waiver of any provision or of any breach of any provision of this Agreement

must be in writing, and any waiver by a party of any breach of any provision of this Agreement shall not operate as or be construed to be a waiver of any other breach of that provision or of any breach of any other provision of this Agreement.

33. Severability. Subject to the parties' rights under Section 2 of this Agreement, if any provision of this Agreement is determined by a court of competent jurisdiction to be invalid, illegal or unenforceable, such provision shall be automatically reformed so as to be valid, legal and enforceable to the maximum extent permitted and the balance of this Agreement shall remain in full force and effect notwithstanding such invalidity, illegality or unenforceability.

34. No Third Party Beneficiaries. This Agreement does not create, and shall not be construed to create, any rights enforceable by any person, partnership, corporation, joint venture, limited liability company, district or other form of organization or association of any kind that is not a party. Without limiting the generality of the foregoing, landowners, residents, water users and ratepayers of the parties are not intended to be third party beneficiaries of this Agreement.

35. Force Majeure. Notwithstanding any other provision of this Agreement, neither party shall be liable for any failure to perform resulting from any cause outside the reasonable control of that party. For purposes of this Agreement, routine and emergency repairs and maintenance of the District Water System shall be deemed causes outside of the reasonable control of District (including without limitation the annual shut down of the Enterprise Canal for maintenance), provided that District shall use reasonable efforts to schedule routine maintenance so as to avoid interference with deliveries of City's Surface Water.

//

IN WITNESS WHEREOF, the parties have executed this Agreement to be effective as of the date first above written.

"District"

The Fresno Irrigation District, a California irrigation district

By _____
Ryan Jacobsen, President

By _____
Gary R. Serrato, General Manager

ATTEST:

_____
Secretary

"City"

The City of Fresno, a municipal corporation

By: _____
Ashley Swearengin, Mayor

By _____
Bruce Rudd, City Manager

ATTEST:
Yvonne Spence, CMC
City Clerk

By: _____ 1/11/17
Deputy

APPROVED AS TO FORM:
City Attorney, Douglas Sloan

By: _____ 12/22/16
AMANDA FREEMAN, DEPUTY

ATTACHMENTS:

EXHIBITS

Exhibit A – Monthly Water Supply Utilization Report
Exhibit B – City Water Service Area Map
Exhibit C – Fresno General Plan Map
Exhibit D – Out of Season Delivery Cost Methodology
Exhibit E – Rescheduled Water Cost Methodology

EXHIBIT A

EXHIBIT A

CITY OF FRESNO FMFCD BASINS
MONTHLY REPORT (AC.FT.)
2015-2016

FMFCD BASINS IN FRESNO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Basin A													
Basin AB													
Basin AC													
Basin AD													
Basin AE													
Basin AF													
Basin AG													
Basin AH													
Basin AJ													
Basin AL													
Basin AO													
Basin AW2													
Basin AZ													
Basin BE													
Basin BF													
Basin BH													
Basin BM													
Basin BO													
Basin BQ													
Basin BU													
Basin BV													
Basin BW													
Basin BZ													
Basin CC													
Basin CL													
Basin CM													
Basin CN													
Basin CO2													
Basin CS													
Basin CW													
Basin CX													
Basin CY													
Basin CZ													
Basin DD													
Basin DH													
Basin EE													
Basin EF													
Basin EG													

CITY OF FRESNO FMFCD BASINS
MONTHLY REPORT (AC.FT.)
2015-2016

FMFCD BASINS IN FRESNO	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Basin EL													
Basin EM													
Basin FF													
Basin GG													
Basin HH													
Basin II1													
Basin II2													
Basin J													
Basin JJ													
Basin K													
Basin KK													
Basin L													
Basin LL													
Basin MM													
Basin N													
Basin O													
Basin OO													
Basin P													
Basin R													
Basin RR1													
Basin RR2													
Basin RR3													
Basin S													
Basin T													
Basin TT													
Basin U													
Basin UU2													
Basin UU3													
Basin Y													
Basin Z													
Basin ZZ													
Fresno's FMFCD Total													

CITY OF FRESNO RECHARGE
MONTHLY REPORT (AC.FT.)
2015-2016

OTHER FRESNO RECHARGE	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	YEAR TO DATE
Leaky Acres													
Woodward Park													
Copper River Country Club													
Big Dry Detention													
Fancher Basin (South)													
Chestnut Ave. Basin													
North Central Basin													
Kearney Basin													
Big Dry Creek West of Winery Ave.													
Delivery System Recharge Fresno													
Copper River Country Club total is the amount exceeding the Phillips Ditch entitlement of 77 ac ft per month (during FID's irrigation season).													
Basin BF Water comes from Chestnut Ave. Basin													
Fresno's Total Recharge													
Fresno's SWTP N/E & T-3													
Fresno's Total Usage													

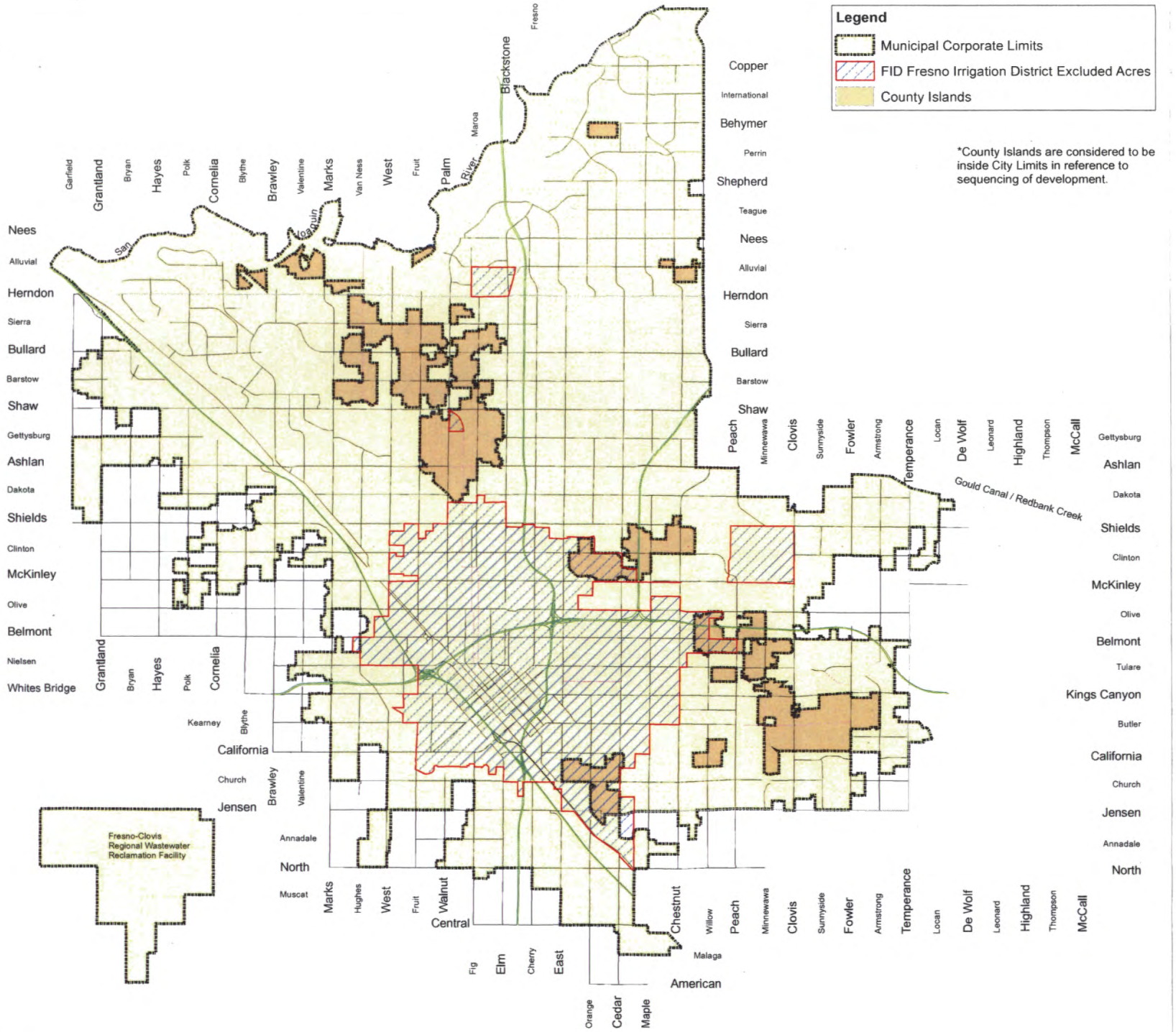
EXHIBIT B

City of Fresno
Water Service Area Boundary
Exhibit "B"
December 13, 2016

"The City's Water Service Area consists of Included Acres and Excluded Acres, and on an annual basis City and District shall revised this Exhibit B map to show the total number of acres in each area as of the first day of March of each year."



Miles
0 0.5 1 2 3



S:\USERS\PET\2016\Thomas Esqueda\Water Service Areas Map\Water Service Area Boundary Ex B Map.mxd

EXHIBIT C

EXHIBIT C

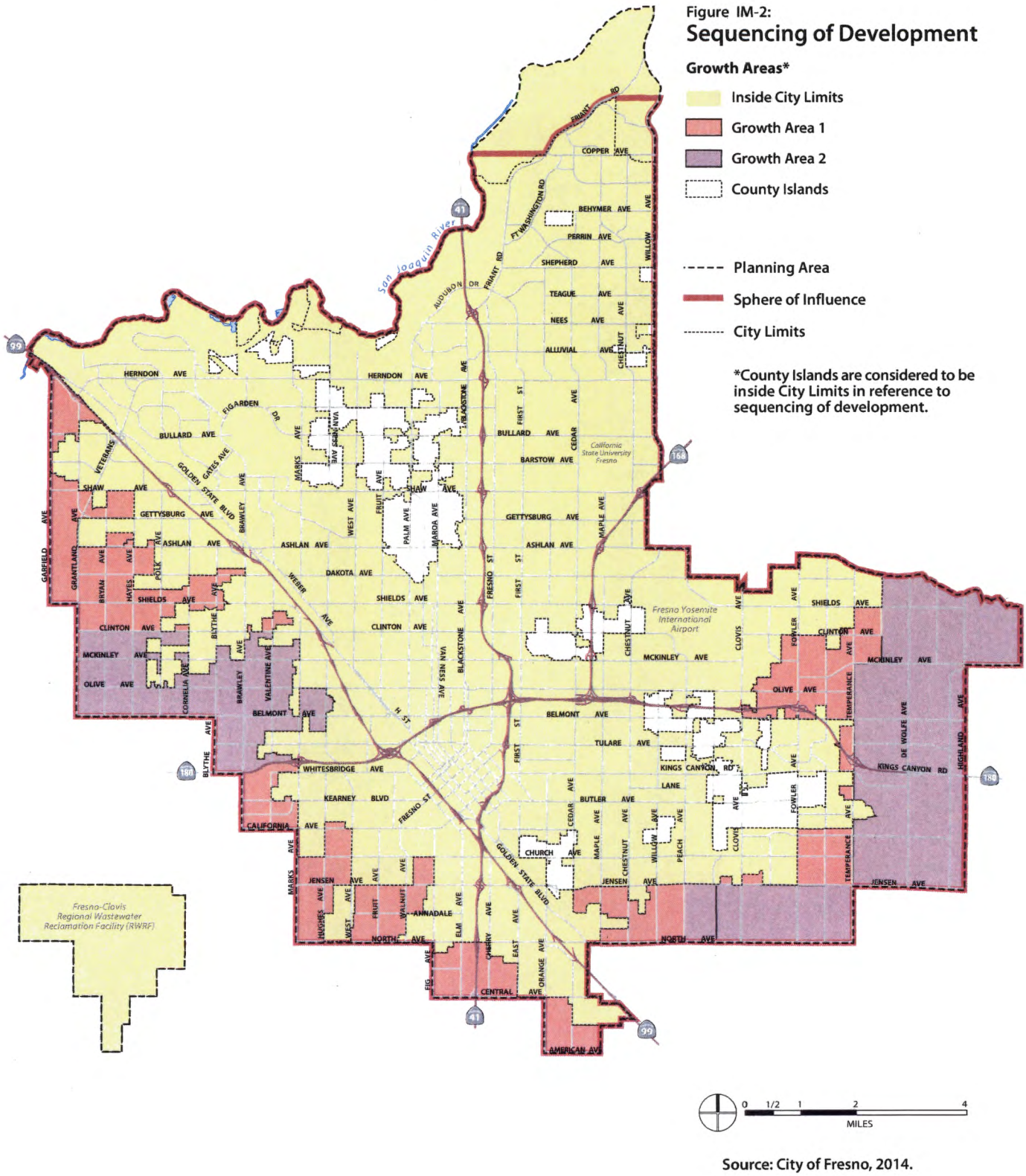

Figure IM-2:
Sequencing of Development
Growth Areas*
Inside City Limits
Growth Area 1
Growth Area 2
County Islands
Planning Area
Sphere of Influence
City Limits
*County Islands are considered to be inside City Limits in reference to sequencing of development.
San Joaquin River
Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF)
California State University Fresno
Fresno Yosemite International Airport
0 1/2 1 2 4
MILES
Source: City of Fresno, 2014.

EXHIBIT D

EXHIBIT D

The City will be responsible for paying the District for all costs associated with delivering water Out of Season Deliveries which will include but not limited to:

i. Staff time to deliver water (includes salary wage, labor burden and overhead.
ii. Cost to operate vehicles to operate and inspect the canal system.
iii. Power costs associated with running District's SCADA/Telemetry system, automated gate valves, flow meters, automated trash screens, etc.
iv. Repairs to the canals system which are caused by water running outside the normal irrigation season. Repairs may include but not limited to canal lining, gate replacement, structure replacement, earthwork (grading, dredging, etc.) weed treatment (aquatic or terrestrial), all-weather road maintenance, trash/debris removal, etc.

EXHIBIT E

EXHIBIT E

The Rescheduling Fee for each rescheduling request here under shall be equal to the last Friant carry over charge assessed for a water year prior to the date to the request.

47087

RECORDED IN OFFICIAL RECORDS OF FRESNO COUNTY, CALIFORNIA
AT 41 MIN. PAST 3 P.M.
JUN 24 1974
H. L. MASINI, County Recorder
FEE $

BOOK 6316 PAGE 31

AGREEMENT BETWEEN FRESNO IRRIGATION DISTRICT AND CITY OF FRESNO FOR EXCHANGE OF RECYCLED WATER

This agreement entered into this 20th day of June 1974, by and between FRESNO IRRIGATION DISTRICT, a public corporation (herein called "District"), and the CITY OF FRESNO, a municipal corporation (herein called "City");

WITNESSETH:

WHEREAS, Fresno Irrigation District is the owner of water rights on the Kings River and a water distribution system for the distribution of irrigation waters for agricultural use within the District and has entered into contracts with the United States for an additional supply of water from the Friant-Kern Canal and for storage in Pine Flat Reservoir on the Kings River for the purpose of supplementing the water available for such use within the District; and

WHEREAS, the City of Fresno is located entirely within the exterior boundaries of the District and is the owner of a water distribution system used by City for delivering water to persons and lands both within and outside its City limits for municipal, industrial and domestic uses and is also the owner of a liquid waste treatment plant located within the District southwest of the city limits which is used for the treatment, percolation, purification, recycling and other disposition of liquid effluent from the City and intends to enlarge and improve said facilities and to produce by such treatment, percolation, purification and recycling, water which is of a quality suitable for agricultural use; and

WHEREAS, the entire area represented by the District and by the City is a water deficient area and the District is in need of additional waters for agricultural use and the City is in need of additional water for municipal, industrial and domestic uses; and

To be recorded without fee on behalf of Fresno Irrigation District

WHEREAS, the amount of water available to the District for agricultural use may be increased by the use of water recycled by the City as above described and the amount of water available to the City for use in its water distribution system for municipal, industrial and domestic uses may be increased by the exchange of such recycled water for the use by District of additional Kings River and/or Friant-Kern Canal water in that portion of the District northeast of the City; and

WHEREAS, City is desirous of maintaining a water level under its liquid waste treatment plant that will provide for maximum efficiency in the operation of its said plant; and

WHEREAS, a greater beneficial use and more economical utilization of all of the waters available to both the District and to the City can be obtained by the use of such waters as herein provided and both parties believe it is in the best interests of all the landowners and inhabitants within the District and within the City to enter into such an agreement;

NOW, THEREFORE, it is mutually agreed as follows:

1. Approval by United States and State Water Quality Board. Immediately upon the approval of this contract by the parties hereto, it shall be presented to the United States, and also to the California Regional Water Quality Control Board, or its successor agency, for their approval and shall not become effective for any purpose until such approval has been obtained.

This contract shall be at all times subject to all of the terms and conditions of the City Bureau Contract, the District Bureau Contracts and the District Kings River Intra-Association Agreements and to the extent that any agreement contained herein is contrary to or inconsistent with any term or condition of those contracts or agreements, this contract shall be unenforceable. In the event the performance of any agreement contained herein shall become unenforceable or shall be in violation of any Federal,

State or local statute or ordinance or of any decision of any court of competent jurisdiction, the entire contract may be terminated by either party upon written notice mailed to the other party.

2. Definitions. For purposes of this agreement the following words and phrases shall be defined as follows:

(a) "Agricultural use" means the use of water primarily in the production of agricultural crops, including the irrigation of lands and underground water replenishment.

(b) "Recycled water" means water which has been treated and percolated into the underground water supply under the City's liquid waste treatment plant in the southwest portion of the District which is thereafter pumped from said underground water supply.

(c) "City Bureau Contract" means that certain contract between the United States and the City of Fresno providing for water service dated January 12, 1961.

(d) "District Bureau Contracts" means those certain contracts between the United States and Fresno Irrigation District more particularly described as follows:

Contract between the United States of America and Fresno Irrigation District Providing for the Payment of the District's Share of the Cost of Pine Flat Dam and Reservoir Allocated to Irrigation, dated December 23, 1963.

Contract for Operation and Maintenance of Irrigation Storage Space of Pine Flat Reservoir dated December 23, 1963.

Kings River Allocation Contract, dated December 23, 1963.

Conveyance and Covenants in Compromise and Settlement of Fresno Slough Claims, dated April 23, 1965.

Contract between the United States and Fresno Irrigation District Providing for Water Service, dated July 20, 1964.

(e) "District Kings River Intra-Association Agreements" means those certain contracts relating to Kings River and storage in Pine Flat Reservoir more particularly described as follows:

Water Right Indenture, dated May 3, 1927.

Administrative Agreement and Monthly Diversion Schedule dated May 3, 1927.

Agreement Supplementing and Amending Water Right Indenture Dated May 3, 1927, and Supplementing and Amending Administrative Agreement Dated May 3, 1927, Relating to Kings River Water Association, and Amended Monthly Diversion Schedule, dated June 1, 1949.

Agreement Admitting Kings River Water District As a Member of Kings River Water Association and Agreement Re: Centerville Bottoms Schedule, dated September 10, 1963.

Agreement Supplementing and Amending Water Right Indenture Dated May 3, 1927, and Administrative Agreement Dated May 3, 1927, Each as Amended and Supplemented June 1, 1949, Relating to Kings River Water Association, dated September 10, 1963.

3. Agreement to Deliver and Accept Recycled Water. During the term of this agreement City agrees to deliver and District agrees to accept from City recycled water pumped by City from the area under its liquid waste treatment plant in amounts and under the terms and conditions hereinafter provided. When so delivered to District said water shall become the property of the District to be used for agricultural purposes and for underground water replenishment in the southwest portion of the District as the District shall see fit.

4. Water Quality. The City shall not deliver to District or discharge into District's canals any such recycled water which is not of a quality suitable for all agricultural use or which shall be deleterious to plant or animal life and all water so delivered shall meet all the quality standards of the California Regional Water Quality Control Board, or its successor agency, for agriculture and irrigation use and any other federal, state or local agency having jurisdiction or control over water quality standards. City agrees at its expense to make such periodical tests to determine the quality of the water discharged into District's canals at the point where said water is so discharged as may be required by any such board or agency or as may be required by the District's manager and to submit the results

of such tests in writing to the District forthwith after such tests are made. City further agrees that any complaint that said recycled water does not meet the above standards, including but not limited to complaints from any such board or agency, the County of Fresno, any mosquito abatement district or any user of such recycled water, must be corrected and resolved to the satisfaction of District before any further discharge of water into said canals shall be made without the express consent of the District.

5. Exhibit A. A map showing the exterior boundaries of the District, the District's canal system, the city limits of the City of Fresno, the location of City's liquid waste treatment plant site, the exact locations at which City may discharge water into the District's canal system, the type and capacity of the discharge facilities by which each such discharge may be made, the location of observation wells as provided in Paragraph 9, and those portions of the District designated by the parties as the "easterly" and "westerly" portions of the District for purposes of this agreement shall be prepared by the District's engineering department and approved in writing upon said map by the authorized representatives of the District and the City. When so approved said maps shall be incorporated herein by reference as Exhibit A and shall become a part hereof. One duplicate so approved shall be kept in the office of the City and one in the office of the District. Said map may be amended in writing upon said map and reapproved in writing as above set forth.

6. Place and Time of Delivery. City will deliver all such water to the District during the District's irrigation season which may at the election of the District be extended to accommodate the recycled water received under this agreement. Said water delivered by the City to the District shall be discharged by the City into the District's Dry Creek Canal No. 77 and/or Houghton-

Canal No. 78 at the locations approved by the District and shown on the map marked Exhibit A and at no other location or locations.

7. Amount to be Delivered. The City shall deliver to the District under this agreement, subject to District's acceptance as provided herein, recycled water pumped by the City, which shall be delivered at a minimum rate of delivery of 100,000 acre feet in each ten-year period of this contract, provided, however, such delivery will not exceed the amount of 30,000 acre feet in any one year except that such maximum may be increased upon agreement between the District's manager and the Director of Public Works of the City. At least 10 days prior to the first day of each calendar month during the term of this agreement City will submit to District in writing a schedule of the daily amount of such water proposed to be delivered to District at each discharge point during that month and the rate of flow indicated in cubic feet per second at which said water will be delivered. Upon receiving said schedule District's manager will approve the amount of such water the District is willing to accept at each said discharge point during each day of that month and thereafter City shall deliver to District the daily amount of such water so approved. Said daily deliveries shall be at a continuous and constant rate of flow during the entire 24 hour period of each said day. In no event shall the discharge into Dry Creek Canal No. 77 in any one month be in excess of one-half of the total amount delivered to District in that month or the discharge into the Houghton Canal No. 78 in any one month be more than two-thirds of the total amount delivered to the District in that month and in no event shall the rate of discharge of water into Dry Creek Canal No. 77 exceed 60 c.f.s. or the rate of discharge into Houghton Canal No. 78 exceed 120 c.f.s. No such discharges shall be made into District's canals until said discharges have been approved

gives immediate notice thereof to the District. In such event City shall use all reasonable effort to immediately restore the delivery of water to the level approved by District's manager as provided in paragraph 7. District's manager may refuse to agree to any such change in schedule or to accept water under such changed schedule if he reasonably determines that such change may result in damage to a District canal or to other property of the District or any other person or will interfere with the operation, alteration, repair or maintenance of the canal into which said discharge is to be made or will interfere with some other operation or function of the District.

9. Ground Water Level. City shall not pump said recycled water from the underground water reservoir in such a manner or to the extent that it will adversely affect the elevation of the water table in the area surrounding its liquid waste treatment plant as determined by the District. Such effect shall not be deemed to be adverse if the ground water level is not lowered below the gradients established by the District as existing on August 1 of the previous year. City agrees to monitor ground water levels in the area from which said recycled water is pumped on a monthly basis by means of observation wells located within an area surrounding its liquid waste treatment plant. The number and location of said wells shall be agreed upon by the City and the District, and when so agreed upon shall be shown on Exhibit A as provided in paragraph 5. Each month at the time City submits its schedule of proposed discharges, City shall supply District with the results of said observations and shall also supply District with a statement of the amounts discharged into District's canals during the previous month. Said schedule and said information shall be given to District upon a standard form approved by District's manager.

10. Construction and Maintenance of Facilities. All

discharge facilities to be used by City in discharging said water into said canals and suitable measuring devices required to measure the amount of water discharged into District's canals shall be constructed by City at its expense according to plans and specifications approved by District and shall thereafter be maintained in good operating and working condition by and at the expense of City. Said discharge facilities shall have a discharge capacity not greater than that shown on said map marked Exhibit A and shall be equipped with positive shut-off controls by which any and all discharges of water into District's canal system may be shut off immediately and at any time. City shall at all times protect said canals and their banks from any damage, injury or erosion at the locations of said facilities into said canals and any such damage or injury at such locations shall be repaired at the expense of City. If City fails to do so District shall be entitled to make said repairs and the expense thereof shall forthwith be reimbursed by City.

11. Use of Water Available to District. In consideration of the agreements of the City herein contained, District agrees that insofar as feasible and practical, it will make available from its Kings River water or from the water received by it under its Bureau Contracts an additional amount of water equivalent to 46% of the water received by it from the City under this agreement for agricultural use and for ground water replenishment in the easterly portion of the District as indicated on Exhibit A. The term "additional amount of water" as above used shall mean water in addition to the amount of water which would have been made available for use in that area if said recycled water had not been received by the District and used in the westerly portion of the District as indicated on Exhibit A. If the District shall determine that the use of said water in said area is not feasible or practicable it may, after discussion with the City, use such

water elsewhere. If in the future it is deemed desirable to do so, City, with the approval of District, may cause the dividing line between the easterly portion of the District and the westerly portion of the District to be moved to the west and the percentage of water to be made available in said easterly portion of the District to be increased in proportion to the increase in the area of land within said easterly portion.

12. District's Representative. Wherever it is provided in this agreement that District's manager shall do and act or exercise his discretion in respect to any particular matter said act and said exercise of discretion may be performed by any other representative of the District to whom such authority shall be delegated either by the District's Board of Directors or by said manager. In exercising his said discretion, the District's manager or his authorized representative shall weigh and balance the equities of the parties in respect to the interests of each and the necessities of District's operations in relation to those of the City. However, in any such case, his decision shall be final.

13. Ownership of District's Water Rights, Canals and Storage. Nothing contained in this agreement shall in any way affect District's ownership of its canal system or of its water right or its right to storage in Pine Flat Reservoir or give City any right or interest therein.

14. Expense of Performance. The performance of all terms and conditions of this agreement to be performed by City shall be at the expense of City and the performance of all terms of this agreement to be performed by District shall be at the expense of District.

15. Indemnity. City agrees to indemnify District and save District harmless of, from and against any loss, cost, expense, liability or attorney's fees incurred by District as the result of

any claim made by any third party because of the City's pumping from the underground water supply as above described or in any way arising out of the execution or performance of this agreement unless such loss, cost, expense or liability is caused by independent negligence on the part of the District in performing the terms and conditions of this agreement on its part to be performed.

16. Successors and Assigns. This agreement shall be binding upon the successors and assigns of the parties hereto provided that City's right to discharge water into District's canal system is not transferable or assignable and shall not pass to any successor in interest without the consent of District. This agreement is not made for the benefit of any person, firm, corporation or public entity not a party hereto and no person, firm, corporation or public entity except a party hereto or its successor or assign shall have any right to enforce said agreement under California Civil Code §1559 or otherwise.

17. Amendments. Except as otherwise provided herein this agreement may not be amended except by the written agreement of the parties hereto.

18. Term, Termination. The term of this contract shall be twenty years from its date, except that it may be cancelled upon mutual agreement between the parties hereto. The contract shall continue in effect after the end of said term except that it may be terminated thereafter by either party upon one year's written notice of such termination. Notwithstanding the foregoing, this contract may be terminated at any time, upon sixty days' written notice by either party, given on and because of substantial breach by the other party, which breach is not repaired or corrected before the end of said sixty-day period.

IN WITNESS WHEREOF, the parties hereto have executed this

agreement the day and year first above written.

FRESNO IRRIGATION DISTRICT

By Winston Strong
President

By Ardys T. Gorder
Secretary

ATTEST:

CITY OF FRESNO

Gladys Douglass
City Clerk Deputy

By F. W. Hanley
Chief Administrative Officer

State of California)
County of Fresno) ss.

On this 20th day of June in the year one thousand nine hundred and seventy-four, before me, Paul H. Willison a Notary Public in and for said County and State, residing therein, duly commissioned and sworn, personally appeared ..... known to me to be the President and Winston Strong known to me to be the Secretary of the Fresno Irrigation District the corporation that executed the within instrument, and known to me to be the person S who executed the within instrument on behalf of the corporation therein named, and acknowledged to me that such corporation executed the same.

IN WITNESS WHEREOF, I have hereunto set my hand and affixed my official seal at my office in said County, the day and year in this Certificate first above written.

Paul H. Willison
Notary Public in and for said County and State

OFFICIAL SEAL
PAUL H. WILLISON
NOTARY PUBLIC, CALIFORNIA
PRINCIPAL OFFICE IN
FRESNO COUNTY
My Commission Expires November 19, 1977

CORPORATION ACKNOWLEDGMENT
Kilner Stationery Co.
1916 Echo

FORM K108

APPROVED AS TO FORM
SPENCER THOMAS, JR., City Attorney

By Assistant Macomber
Senior Deputy

Mail to: City of Fresno Waste Water Treatment Plant
5607 W Jensen Avenue
Fresno, Ca. 93706
Attn: Mr. Joel Dekker

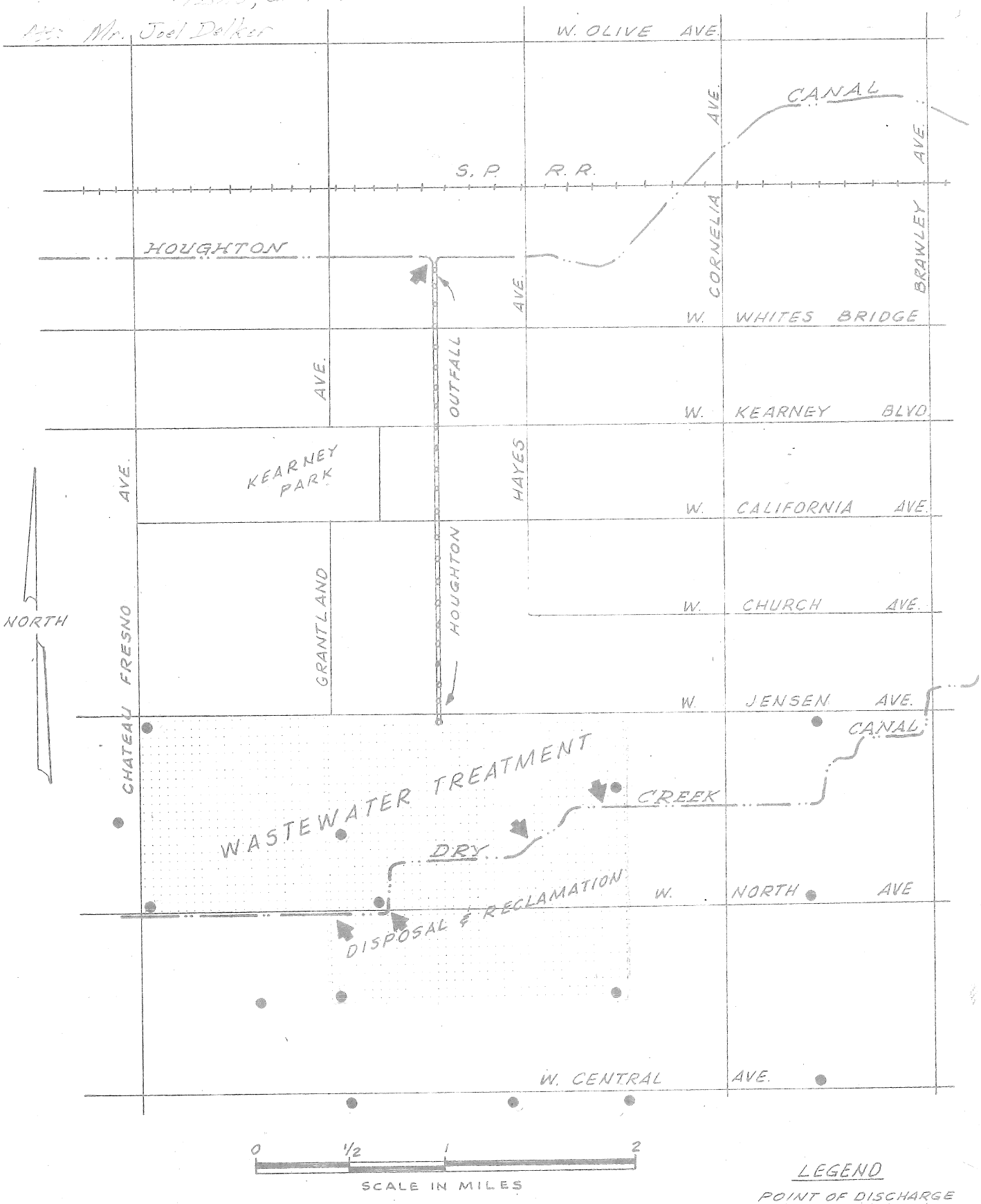


EXHIBIT A-1

J

Water Shortage Contingency Plan

City of FRESNO
Department of Public Utilities

2020 Water Shortage Contingency Plan

Final

JULY 2021 | CITY OF FRESNO



Photo Credit: Downtown Fresno Partnership

WSC

City of FRESNO
Department of Public Utilities

CITY OF FRESNO

Final
2020 Water Shortage Contingency Plan

JULY 2021



Prepared by Water Systems Consulting, Inc.

WSC

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ACRONYMS & ABBREVIATIONS

AMI	advanced metering infrastructure
City	City of Fresno
CWC	California Water Code
DPU	Department of Public Utilities
DRA	Drought Risk Assessment
DWR	Department of Water Resources
FID	Fresno Irrigation District
FMC	Fresno Municipal Code
SWTF	Surface Water Treatment Facility
USBR	United States Bureau of Reclamation
UWMP	Urban Water Management Plan
WSCP	Water Shortage Contingency Plan
WSIP	Water Storage Investment Program

1.1 Introduction

The Water Shortage Contingency Plan (WSCP) is a detailed plan on how the City of Fresno (City) intends to respond to foreseeable and unforeseeable water shortages. A water shortage occurs when the water supply is reduced to a level that cannot support typical demand at any given time. The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for responsible management of any water shortage with predictability and accountability. Preparation provides the tools to maintain reliable supplies and reduce the impacts of supply interruptions due to extended drought and catastrophic supply interruptions.

The WSCP describes the following:

1. **Water Supply Reliability Analysis:** summarizes the City's water supply analysis and reliability and identifies any key issues that may trigger a shortage condition
2. **Annual Water Supply and Demand Assessment Procedures:** describes the key data inputs, evaluation criteria, and methodology for assessing the system's reliability for the coming year and the steps to formally declare any water shortage levels and response actions
3. **Six Standard Shortage Stages:** establishes water shortage levels to clearly identify and prepare for shortages
4. **Shortage Response Actions:** describes the response actions that may be implemented or considered for each stage to reduce gaps between supply and demand as well as minimize social and economic impacts to the community
5. **Communication Protocols:** describes communication protocols under each stage to ensure customers, the public, and government agencies are informed of shortage conditions and requirements
6. **Compliance and Enforcement:** defines compliance and enforcement actions available to administer demand reductions
7. **Legal Authority:** lists the legal documents that grant the City the authority to declare a water shortage and implement and enforce response actions
8. **Financial Consequences of WSCP Implementation:** describes the anticipated financial impact of implementing water shortage stages and identifies mitigation strategies to offset financial burdens
9. **Monitoring and Reporting:** summarizes the monitoring and reporting techniques to evaluate the effectiveness of shortage response actions and overall WSCP implementation, with results used to determine if additional shortage response actions should be activated or if efforts are successful and response actions should be reduced
10. **WSCP Refinement Procedures:** describes the factors that may trigger updates to the WSCP and outlines how to complete an update
11. **Special Water Features Distinctions:** identifies exemptions for ponds, lakes, fountains, pools, and spas, etc.
12. **Plan Adoption, Submittal, and Availability:** describes the process for the WSCP adoption, submittal, and availability after each revision

This WSCP was prepared in conjunction with the City's 2020 Urban Water Management Plan (UWMP) and is a standalone document that can be modified as needed. This document is compliant with the California Water Code (CWC) Section 10632 and incorporated guidance from the State of California Department of Water Resources (DWR) UWMP Guidebook.

Water purveyor planning for possible water supply shortages has become an increasingly important subject considering the drought conditions over the last several years. The City adopted its first WSCP in 1994 in response to the 1991 Assembly Bill 11X, which mandated all water purveyors with more than 3,000 connections develop a WSCP. The WSCP was revised as part of the 2005 UWMP and adopted by the City in 2008. The WSCP was further refined in 2016 during preparation of the 2015 UWMP and is being updated in 2021 as a standalone document, developed in parallel with the 2020 UWMP. The 2020 WSCP is still based on the original 1994 plan. The revisions are intended to meet new CWC requirements and streamline the plan's usefulness and enable the City to manage the necessary conservation measures to be enacted if a water shortage condition exists. The 2020 WSCP will be reviewed and adopted in conjunction with the 2020 UWMP.

The plan is intended to provide guidance, rather than absolute direction, for City action in response to water shortages and provide the City with options to responsibly manage water shortages.

1.2 Water Supply Reliability Analysis

This section is consistent with CWC Section 10632(a)(1) and describes the key findings of the water supply reliability analysis conducted pursuant to CWC Section 10635, which is presented in **Chapter 7** of the City's 2020 UWMP. As part of the 2020 UWMP, water suppliers must perform long-term (2025-2045) water service reliability assessment to evaluate reliability under normal, single dry year, and five-year consecutive dry year periods and a short-term (2021-2025) Drought Risk Assessment (DRA) to evaluate reliability under a five-year consecutive dry year period. Water supply reliability reflects the City's ability to meet the water needs of its customers with water supplies under varying conditions. The analysis considers plausible hydrological and regulatory variability, infrastructure capacity, climate conditions, and other factors that affect the City's water supply and demand.

The City's current water supply portfolio includes groundwater from the Kings Subbasin, surface water from the Central Valley Project Friant Division through a contract with the United States Bureau of Reclamation (USBR), and surface water from the Kings River through a contract with Fresno Irrigation District (FID), as well as recycled water produced at the Fresno-Clovis Regional Water Reclamation Facility and North Fresno Water Reclamation Facility. The City manages the surface water supplies and groundwater conjunctively such that surface water supplies are used more heavily for direct use and recharge during wet periods and groundwater is used more heavily during dry periods. Over the long term, the City aims to maximize recharge to store water for future use and help groundwater levels recover. Key issues that may create a shortage conditions include reduced surface water availability due to dry hydrologic conditions, reduction in groundwater due to contamination issues, or emergency conditions that reduce the City's water supply.

The water supply reliability analysis concluded that the City's supply portfolio is highly reliable and allows the City flexibility to use a majority of surface water when available in normal years and switch to a majority of groundwater in dry years, when surface water supplies are reduced.

The City is projected to meet potable demands with its existing supplies in all year types through conjunctive use of its groundwater and the City is projected to recharge water in most years to help store water for dry years.

1.3 Annual Water Supply and Demand Assessment

As established by CWC Section 10632.1, urban water suppliers must conduct an Annual Water Supply and Demand Assessment (Annual Assessment) and submit an Annual Water Shortage Assessment Report to DWR, with the first deadline July 1, 2022[1]. The Annual Assessment is an evaluation of the short-term outlook for supplies and demands for the current year and one projected single dry year conditions to determine whether the potential for a supply shortage exists and whether there is a need to trigger a WSCP shortage stage, appropriate response actions, compliance and enforcement actions, and communication protocols.

1.3.1 Key Data Inputs

Key data inputs and their sources for the Annual Assessments are summarized in **Table 1,** and described below**.**

Table 1. Key Data Inputs for the Annual Assessment

KEY DATA INPUT	DESCRIPTION	SOURCE
Customer demands	Estimates current year unconstrained demand plus a modest growth factor	Customer billing data, 2020 UWMP projections, input from City staff
Recharge demands	Estimates current year recharge demand	Surface water allocations, historical recharge, groundwater levels
State mandates	Reflects State orders and mandatory compliance with water use efficiency standards	Executive orders from the governor, orders and policies from the State Water Resources Control Board, input from City staff, or other sources
Surface water allocation	Reflects the City's available surface water supplies for treatment, recharge, and potential exchanges and transfers	Initial allocations from USBR and FID, typically available in April
Groundwater conditions	Reflects status of groundwater conditions	Production data, static water levels, and input from City staff
Infrastructure capacity	Reflects production and distribution capacity due to a variety of factors, including human-caused or natural catastrophic events	Production data, well production capacity, wells impacted by contamination, surface water treatment facilities' capacity, distribution system constraints, input from City staff

[1] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

1.3.1.1 Customer Demands

Upcoming year customer demands will be estimated based on the previous year's demand, with increases to address: (1) near-term projected growth of customers; (2) unconstrained water use if the previous year included any water use restrictions; and (3) potential water losses not accounted for in the previous year's demand.

1.3.1.2 Recharge Demands

Upcoming year recharge demands will be estimated by (1) availability of surface water not used at the surface water treatment facilities (SWTFs) and (2) projected availability of recharge basins.

1.3.1.3 State Mandates

The City has historically been required by the State to reduce demand regardless of supply reliability at the given time. As described previously, compliance with State mandates for water use efficiency can be declared during drought or in preparation for future droughts, such as in response to the governor's drought declarations in the 2012–2016 drought with subsequent Executive Order B-37-16 and related legislation for Making Conservation a California Way of Life. The City may consider State mandates and mandatory compliance with water use efficiency standards in determining water shortage levels.

1.3.1.4 Surface Water

The City has contracts for surface water with USBR and FID. The available surface water is dependent on hydrology, and in dry years less surface water is available to the City. Final allocations from both USBR and FID are known in April of each year, following the rainy season. In April, the City works with FID to develop a delivery schedule of surface water supplies and submits it USBR. The surface water allocation and delivery schedule will determine the City's operation of its SWTFs for the year, recharge operations, and if it will engage in any exchanges or transfers of supplies. In dry years, when less surface water is available, the City will also plan for increased groundwater use to meet its demands.

1.3.1.5 Groundwater Conditions

Groundwater level and production trends will be compiled and considered by the City staff, or with a hydrogeologist, based on the following actions:

- Plot static groundwater levels on hydrographs to determine trends.
- Plot historic and projected production data to determine trends.
- Compare historic and projected groundwater levels against production data for average and dry years.

1.3.1.6 Infrastructure Capacity

Infrastructure capabilities and overall production will be analyzed to determine if a possible power outage or deficiency may occur or continue in the coming year due to a variety of factors, potentially including human-caused or natural catastrophic events. This analysis may include well replacement, evaluation of wells for possible contamination, SWTFs capacities, and other considerations.

1.3.2 Evaluation Criteria

Staff will use the key data inputs to develop and compare supply and demand projections to determine if water shortage actions may be necessary. A preliminary Annual Assessment template is included in **Attachment 1**. Note that supply projections will incorporate infrastructure constraints and an operational buffer factor of 10% will be added to the demand estimate to account for supply and demand projection uncertainties. The estimated amount of supply available versus the estimated demand will be compared with the water shortage condition triggers presented in **Table 2**. Various trigger conditions, which summarize specific evaluation criteria for each shortage level and can be used to determine a water shortage level, are described in the following sections. Triggers are based on current conditions, and the City will evaluate these triggers and modify them as needed.

A shortage emergency may be declared when it is demonstrated that conditions threaten the ability to provide water for public health, safety, and welfare of the community. Furthermore, compliance with State mandates for water use efficiency can be declared during drought or in preparation for future droughts, such as in response to the governor's drought declarations in the 2012–2016 drought with subsequent Executive Order B-37-16 and related legislation for "Making Conservation a California Way of Life".

Short-term and long-term supply shortages may be caused by constrained production capacity or natural or human-caused catastrophic emergencies, such as: power outages, winter storms, wildfires, earthquakes, structural failures, contamination, and bomb threats. These types of emergencies may limit the City's immediate ability to provide adequate water service to meet the requirements for human consumption, sanitation, and fire protection. Impacts of such emergencies vary in duration. Thus, consumption reduction measures and prohibitions may differ for short-term and long-term conditions or shortages.

1.3.3 Annual Assessment Procedures

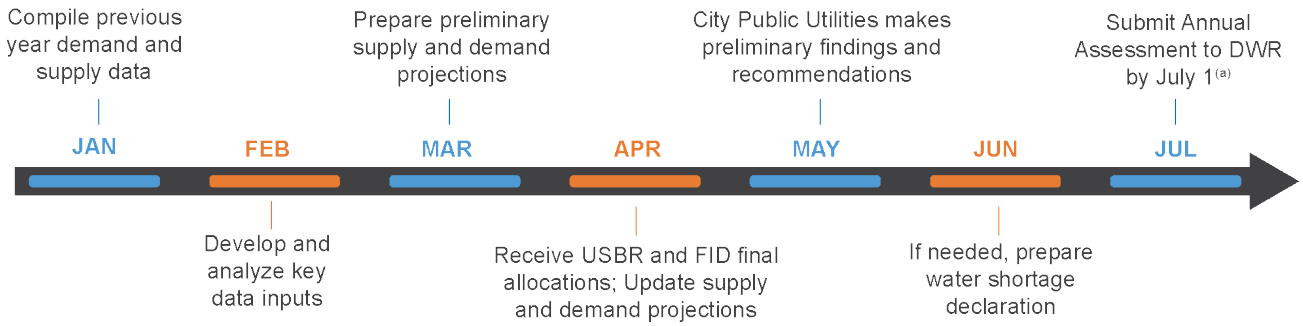
City staff will perform the Annual Assessment following initial allocations from USBR and initial projections for Kings River entitlements by FID, which is typically at the end of rainy season in April. The Annual Assessments are due to DWR by July 1 of each year[2] with the first Annual Assessment Report due to DWR by July 1, 2022. A preliminary annual assessment timeline is shown in **Figure 1.** The City may update the assessment after submission if key data inputs substantially change or other new information becomes available.

[2] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

Steps to conduct the Annual Assessment are as follows:

1. Staff gathers the key inputs, compiles historical data, and analyzes potential supply and demand gaps.
2. Demand trends, water supply conditions, and production capacity are analyzed.
3. A hydrogeologist may be consulted to provide additional groundwater condition information.
4. City Public Utilities staff will review findings and, if necessary, determine a recommended level of conservation required at the implementation or termination of each stage that will then be brought to the City Manager or Mayor for approval.
5. The City Manager, or designee, will declare and implement the level of conservation required at the implementation or termination of each level, and the declaration shall remain in effect until the City Manager, or designee, so otherwise declares. If a conservation level declaration is made, the declaration shall be published at least once in a newspaper of general circulation.
6. The City will develop and/or implement appropriate communication protocols and applicable response actions.

Figure 1. Annual Assessment Approximate Timeline



[a] For USBR contractors, the assessment is due by July 1 or within 14 days of receiving final USBR water allocation, whichever is later.

1.4 Standard Water Shortage Levels

This section is consistent with CWC Section 10632(a)(2) and describes the City's water shortage levels. New to the 2020 UWMP, water suppliers must now consider six standard water shortage levels. Shortage levels indicate the gap between supply and demand compared to normal-year conditions. DWR standardized six shortage levels to provide a consistent regional and statewide approach to measure water supply shortage conditions. The six shortage levels correspond to 10%, 20%, 30%, 40%, 50%, and greater than 50% shortage in supplies compared to demands under normal conditions. However, a water supplier may use its own shortage levels if a crosswalk is included, relating its existing shortage levels to the six standard levels.

The City has elected to keep the previously established four water shortage stages from the 2016 WSCP and add a fifth stage to classify supply shortage greater than 50%. A crosswalk between the City's stages and DWR's standard levels is shown in **Figure 2**.

Figure 2. Water Shortage Stages Crosswalk

City of Fresno Shortage Stage	Percent Shortage Range	Standard WSCP Level	Percent Shortage Level
1	10%	1	10%
2	10 - 25%	2	20%
3	25 - 35%	3	30%
4	35 - 50%	4	40%
5	>50%	5	50%
		6	>50%

Although the water shortage stages are classified by the same percentages as the 2015 UWMP, the City has reevaluated the supply conditions and criteria to enter that stage to better reflect its supply portfolio in comparison to demand. **Table 2** lists the water shortage stages and the conditions that would trigger each stage. Any stage listed within the WSCP may be enacted by the City Manager, or designee, as deemed appropriate based on the water shortage condition.

Table 2. Water Shortage Contingency Plan Levels (DWR 8-1)

SHORTAGE LEVEL	PERCENT SHORTAGE[a]	WATER SHORTAGE CONDITION
0		No water shortage condition. Corresponds with year-round water use measures listed in Section 1.5.1 and demand reduction measures listed for "All" stages in Table 3.
1	0-10%	Stage 1 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **100%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 2 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10-25%	Stage 2 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **90%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 3 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
3	25-35%	Stage 3 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **75%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 4 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
4	35-50%	Stage 4 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **65%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment; or • After having been in a Stage 5 classification from drought conditions, the upcoming water year USBR and FID allocations results in normal-dry water year type[b] or higher; or • After having been in a higher classification as a result of emergency, original trigger for a previous higher-stage classification has been rectified to a point that is consistent with the above conditions for this stage.
5	>50%	Stage 5 may be triggered by any of the following conditions: • The available water supplies for the next year are projected to be less than **50%** of projected demand considering infrastructure constraints and an operational buffer. The available water supplies, infrastructure constraints, projected demand, and operational buffer will be estimated at least once per calendar year – and more often as appropriate - as part of the Annual Water Supply and Demand Assessment. Section 1.3 of the City's Water Shortage Contingency Plan describes the key data inputs, evaluation criteria, and procedures for the annual assessment.

[a] Shortage levels indicate the gap between supply and demand compared to normal-year conditions. The Annual Assessment incorporates a 10% buffer on top of projected demands for conservative planning.

[b] Water year types were defined 2006 San Joaquin River Restoration Settlement Agreement for USBR allocations and characterized in Section 6.2 of the City's 2020 UWMP.

1.5 Shortage Response Actions

The Fresno Municipal Code (FMC) contains sections on water conservation that are to take place under normal water supply conditions. Regulations in place under normal water supply conditions encourage smart water use and help the City manage its water supply. Some of those regulations include year-round outdoor water schedules; turf type restrictions; turf irrigation methods; and prohibition of willful or negligent water wasting, flood irrigating, washing hardscape with potable water, and frequent draining of pools. Additional details of these regulations can be found in FMC Section 6-520(a) (**Attachment 2**). These restrictions are mandated year-round by the City and must be observed. In addition to the normal restrictions on water usage, the City developed shortage response actions to implement during a water shortage on the City level and consumer level in order to reduce demands that are described in **Section 1.5.2** and detailed in **Table 3**.

In the event of a potential water shortage, the City will evaluate the cause of the shortage to help inform which response actions should be implemented. Depending on the nature of the water shortage, the City can elect to implement one or several response actions to mitigate the shortage and reduce gaps between supply and demand. The City has identified actions that fall within the demand reduction, supply augmentation, operational changes, and additional mandatory restrictions, as stated by DWR. It should be noted that all prohibitions listed for Stage 1 will apply to Stage 2 and, likewise, all restrictions that apply to Stage 2 will apply to Stage 3 and so on, until Stage 5 is reached. Also, due to the City's diverse supply portfolio, Stage 1 imposes only voluntary consumer reductions, while Stages 2–5 all include mandatory reduction actions. If necessary, the City may adopt additional actions not listed here in extreme circumstances.

1.5.1 Year-Round Measures

FMC Section 6-520(a) lists actions that are prohibited at all times, whether or not there is a shortage condition and include:

- Use of potable water to irrigate or water outdoor landscaping in a manner that causes runoff.
- Keep, maintain, operate, or use any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage.
- Willfully or negligently waste water as defined in FMC Section 6-501.
- Sprinkle or irrigate any yard, ground, premise, or vegetation except as set forth in the City's Outdoor Water Use Schedule.
- Sprinkle or irrigate any yard, ground, premise, or vegetation, unless watering device used is controlled by a shutoff device or a person is in immediate attendance of the hose or watering device.
- Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground, or other hard-surfaced areas, except where necessary for public health or safety.
- Use potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.
- Irrigation of ornamental turf on public street medians with potable water, except where the turf serves a community or neighborhood function, there is incidental irrigation by an irrigation system designed to irrigate trees, or the turf is irrigated with recycled water.

- Irrigating outdoor landscapes with potable water during and within 48 hours after measurable rain.
- Serve drinking water other than upon request in eating or drinking establishments, including but not limited to, restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served or purchased.
- Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.
- Automatically changing towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily.
- Drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer.
- Prohibit filling new or refurbished swimming pools without obtaining a pool fill permit from the City.
- Refill (top off) established swimming pools except during times when outdoor water use is allowed at the property address pursuant to the Outdoor Water Use Schedule

The City may update these year-round restrictions in the future as needed. For the latest permanent restrictions refer to FMC Section 6-520(a) (**Attachment 2**) and the latest WSCP Resolution (**Attachment 3**).

1.5.2 Demand Reduction

The City has identified a variety of demand reduction actions to offset supply shortages. Demand reduction measures are strategies intended to decrease water demand to close the gap between supply and demand. Demand reduction actions available to the City that may be considered during water shortage conditions are summarized in **Table 3**. Although it is difficult to estimate the volume of savings for each action, the City expects to meet required reductions through a combination of response actions in conjunction with outreach and communication efforts to the extent necessary to mitigate any impacts from a water shortage.

Table 3. Demand Reduction Actions by City (DWR 8-2)

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?[a]	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT[b]
All	Expand Public Information Campaign	Not Applicable	Community outreach includes classroom presentations, outreach educational information, and water tours. Increase communication as drought stages increase.	Not Applicable
All	Improve Customer Billing	Not Applicable	Water bills show customer usage vs. average usage for the customer category. Increase customer notifications of high water use based on advanced metering infrastructure data as drought stages increase.	Not Applicable
All	Offer Water Use Surveys	Not Applicable	Use water leak surveys with all community members.	Not Applicable
All	Provide Rebates for Landscape Irrigation Efficiency	Not Applicable	The City offers rebates for micro-irrigation conversions, soil moisture sensors, smart irrigation controller, and rain sensors to improve efficiencies.	Not Applicable
All	Provide Rebates for Turf Replacement	Not Applicable	The City provides rebates for community members who wish to replace their turf with a drought-resistant garden.	Not Applicable
All	Provide Rebates on Plumbing Fixtures and Devices	Not Applicable	The City offers rebates on a variety of high-efficiency plumbing fixtures, such as washers, toilets, and urinals.	Not Applicable
All	Decrease Line Flushing	Not Applicable	The City uses NO-DES for regular pipe flushing to eliminate discharging water.	Not Applicable
All	Reduce System Water Loss	Not Applicable	The City has a comprehensive system water loss reduction program in place. Increase efforts to correct water system losses as drought stages increase.	Not Applicable
1	Decrease Line Flushing	0 to 100% of shortage gap	For dead-end flushing where the NO-DES truck cannot be used, reduce normal flushing time.	Not Applicable
1	Increase Water Waste Patrols	0 to 100% of shortage gap	Increase monitoring of AMI reporting and communication with customers; Conduct patrols based on public input.	Not Applicable
1	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Voluntary limits: Summer: three days/week Winter: one day/week	No
2	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: three days/week Winter: one day/week	Yes
3	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: two days/week Winter: one day/week	Yes
4	Landscape — Limit landscape irrigation to specific times	0 to 100% of shortage gap	Summer: one day/week Winter: one day/week	Yes
4	Other — Prohibit use of potable water for construction and dust control	0 to 100% of shortage gap	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, and building washdowns where non-potable or recycled water is sufficient.	Yes

SHORTAGE LEVEL	DEMAND REDUCTION ACTIONS	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?[a]	ADDITIONAL EXPLANATION OR REFERENCE	PENALTY, CHARGE, OR OTHER ENFORCEMENT[b]
4	Other — Prohibit vehicle washing except at facilities using recycled or recirculating water	0 to 100% of shortage gap	Prohibit washing cars, boats, trailers, aircraft, or other vehicles, except at commercial or fleet vehicle-washing facilities using water recycling equipment.	Yes
4	Pools and Spas - Require covers for pools and spas	0 to 100% of shortage gap	Require covers for swimming pools when not in use.	No
4	Other	0 to 100% of shortage gap	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City manager.	Not Applicable
4	Other	0 to 100% of shortage gap	Prohibit use of outdoor misters.	No
5	Landscape — Prohibit all landscape irrigation	0 to 100% of shortage gap	Prohibit outdoor irrigation year-round.	Yes
5	Moratorium or Net Zero Demand Increase on New Connections	0 to 100% of shortage gap	The City will temporarily limit or ban new water service connections within the service area.	Not Applicable

[a] Reduction in the shortage gap is estimated and can vary significantly.
[b] Refer to Section 1.7 for Penalties for Water Wastage.

1.5.3 Supply Augmentation

Given the consistent supply of groundwater through pumping, the City has no immediate plan to augment supply. However, the City could purchase additional USBR or FID surface water, if available. Also, the Cities of Fresno and Clovis have an agreement for interconnection of their potable water systems to provide service during emergencies and other times of hardship in either community. Although these options are discretionary and quantifying their ability to reduce the shortage gap can vary significantly, they are readily available if needed, as indicated in **Table 4**.

Table 4. Supply Augmentation & Other Actions (DWR 8-3R)

SHORTAGE LEVEL	SUPPLY AUGMENTATION METHODS AND OTHER ACTIONS BY WATER SUPPLIER	HOW MUCH IS THIS GOING TO REDUCE THE SHORTAGE GAP?	ADDITIONAL EXPLANATION OR REFERENCE
1 to 5	Transfers	As Needed	Purchase or exchange available USBR or FID surface water
1 to 5	Other Purchases	As Needed	Interconnection with City of Clovis for use in emergencies

1.5.4 Operational Changes

Operational changes to address a short-term water shortage may be implemented based on the severity of the reduction goal. The City can maximize its supply by implementing operational strategies and demand reduction measures. As part of the Annual Assessment process, the City will consider their operational procedures at the time of a shortage to identify changes that can be implemented to address water shortage on a short-term basis, including but not limited to:

- Utilization of a SWTF to treat pumped groundwater to offset lack of surface water supply
- Expansion of public information campaign to educate and inform customers of the water shortage emergency and required water savings
- Decrease line flushing to only on a compliant basis strictly using the currently operational NO DES truck
- Use water patrols and increase frequency of meter reading by recruiting staff from other departments if necessary
- Offer water use surveys
- Implementing or modifying drought rate structure or surcharge or water emergency tiered pricing, pursuant to the requirements of Proposition 218 and in accordance with California Law
- Prohibit any new permits for hydrant-construction or temporary construction meters.
- Monitoring construction meters and fire hydrant meters for efficient water use in the event that a meter identified wastes water.

- Moratorium on issuing any new building permit unless the: (a) Project is found by the City Manager, or designee, to be necessary for public health, safety. (b) Project will use recycled water for construction. (c) Project will not result in a net increase in non-recycled water use. (d) Project has adequate Conservation Offsets
- Suspending the consideration of annexation to its service area unless the annexation increases the water supply available more than the anticipated demands of the property to be annexed
- Reducing overhead in the short-term and mid-term by deferring non-critical Capital Improvement Plan projects and major maintenance expenditures, and in the long-term by adjusting operational and staffing levels and retail water rate structures to incorporate the reality of lower retail water sales than previously anticipated.
- Decrease in the level or, if need be, even a total interruption in the expenditures for the agency's facility replacement program. Non-critical replacement projects will have little or no impact on the agency or its customers and would only extend the master planned replacement schedule.

1.5.5 Emergency Response Plan

In addition to responding to drought conditions, the City's WSCP can be used to respond to emergency or catastrophic conditions that impact the availability of the City's water supplies, and/or the ability to deliver water within the City's service area. Potential events are listed below:

- Loss of surface water supply
- Loss of groundwater supply
- Area-wide electrical power failure
- Natural disaster — earthquake or flood

In the event of a supply interruption, there are several measures that could be taken that would mitigate the overall negative impacts of a water shortage. The following discussion indicates possible events and actions to maintain water service to the service area.

The City has an agreement with the City of Clovis that discusses an intertie system between the two cities that could provide service during emergencies and other times of hardship in either community. The agreement covers interconnections, including apportionment of capital costs, at two locations: Leonard Avenue at the Gould Canal alignment and Behymer Avenue at Willow Avenue. The Leonard interconnection was constructed and remains in place for emergency uses through manual operation. The agreement also provided for temporary deliveries from Fresno to northern Clovis through the Behymer connection through 2015. However, the Behymer interconnection has yet to be constructed.

The City also cooperates with the County of Fresno's Office of Emergency Services, and the WSCP is included in the County's Disaster Plan. The goal during any emergency scenario is to maintain water supply such that the health and safety of the community is protected.

In the event of contamination of either the surface or ground water supplies, the non-impacted water supply could be used more heavily or the intertie with the City of Clovis could be activated. Additionally, overall demand reduction and the use of other wells or treated surface water would help meet demands.

If a regional power outage were to occur, the City could use backup power generators to operate wells. This measure, in conjunction with demand reduction, could supply sufficient water for health and safety purposes. The City has more than 35 wells with backup power sources. The

City has budgeted for the installation of a backup generator for the Northeast Wastewater Reclamation Facility. The Southeast SWTF and T-3 SWTF are also equipped with backup power generators.

If a natural disaster occurs, in addition to the actions discussed above, the City will isolate any areas of the system that were compromised for emergency repairs and, potentially, use of the intertie with the City of Clovis. Implementing the WSCP could also occur to reduce demands.

For more information on actions during an emergency, refer to the City of Fresno's Risk and Resilience Assessment Report finalized in September 2020 (AARC Consultants, LLC, 2020) and the City of Fresno Emergency Response Plan finalized in March 2020 (AARC Consultants, LLC, 2020).

1.5.6 Seismic Risk Assessment and Mitigation Plan

Refer to Fresno County Multi-Jurisdictional Hazard Mitigation Plan implemented in May 2018, Annex E: City of Fresno attached in **Attachment 4**, for appropriate Seismic Risk Assessment and Mitigation Plan procedures.

1.5.7 Shortage Response Action Effectiveness

The City of Fresno has assessed its overall water reduction by evaluating the water usage trends that were discussed in SBX7-7 in conjunction with the American Water Works Association water loss calculator. See Chapters 5 and 4 of the 2020 UWMP, respectively, for additional information.

The overall decrease of water use per capita and compliance with the 2020 per capita water use target indicate that the reduction measures have been effective in the community. All of the City's customers are metered and the City will use these devices to monitor actual reductions in water use during enacted shortage levels compared to normal year conditions. This data allows the City to determine the effectiveness of the implemented shortage response actions. If reduction goals are not being met, the City Manager, or designee, can make the necessary decisions for corrective action to be taken.

1.6 Communication Protocols

The City's Department of Public Utilities (DPU) currently has a contract with JP Marketing to manage communication and outreach to the customers. The firm's services include strategic planning, creative concepts, public relations, marketing, promotion, research, advertising, media design, copywriting, event creation, and online services. The City also has a public information officer and communications team whose purpose is to communicate water shortage procedures or general utility information effectively and efficiently to the customers.

During normal supply conditions, the Water Division implements informational campaigns to customers that emphasize user-level changes in water use and overall mindfulness of water waste while promoting voluntary conservation. Over the past few years, DPU has increased use of social media to communicate with customers quickly and organically. The City uses Facebook, Twitter, and Instagram to promote water saving tips, notify of shortage conditions, and spotlight DPU employees to foster a sense of community centered around the water supply. The City strives to be proactive in communicating work strategy and conservation efforts with customers.

This WSCP includes a staged plan to communicate the declaration of a shortage stage, inform restrictions, and provide updates during a water shortage emergency. A summary of actions the City could potentially take during a specific shortage stage is outlined in **Table 5**.

Table 5. Communication Protocol During Water Shortage Conditions

SHORTAGE STAGE	ACTION
1	Information posted on the City's website
1	Social media posts (Facebook, Twitter, Instagram, and Nextdoor)
2	Information included in utility bill inserts on a regular basis
2	Promotion of rebates and water conservation services
2	Letters, postcards, and flyers mailed to customers impacted by water use regulations
2	Targeted outreach and technical assistance to highest water users in each use class
2	Engage City councilmembers with resources to share with constituents
3	Increased paid advertising — print, online, radio, TV, streaming, social media, etc.
3	Messaging printed directly on utility bills
3	Press releases to local media (online and print newspapers, TV, radio, etc.)
3	Assembly and promotion of the speaker's bureau for water shortage presentations for neighborhood groups, gardening clubs, homeowners' associations, churches, senior centers, neighborhood associations, business associations, community groups, property management companies, etc.
4	Increased coordination with the local landscaping industry, including water shortage information in their newsletters, publications, and facilities; local wholesale and retail nurseries; and irrigation supply stores
4	Signage posted at nurseries and irrigation supply stores
4	Outreach materials and drought notices mailed to the hospitality industry, including restaurants and lodging

Note: If a water shortage progresses through multiple stages all measures in the previous stage(s) are implemented in addition to current stage actions.

1.7 Compliance and Enforcement

The City has penalties for violation of the water use restrictions in **Table 3**. The City tracks customer usage through advanced metering infrastructure (AMI) in order to enforce water wastage during shortage conditions as detailed in **Section 1.10**. The fines are noted in **Table 6**. Penalties for water waste are based on FMC, Section 6-520(e).

Table 6. Penalties for Water Wastage

INCIDENT MONTH[(a)]	PENALTY AND FINE
1	$0 – Issued a Notice of Water Waste
2	$25
3	$50
4-12	$100
6	If a customer has more than six incident months of water wastage within a one-year period, the City may implement any or all of the following measures: • Require the customer to get a landscape evaluation, lawn water audit, and water budget, as appropriate, in order to learn efficient water use. This work shall be completed at the customer's expense by landscape irrigation auditors certified by the Irrigation Association. • Installation by the City of flow restrictors or termination of water service. • Require a customer to repair any defects in their watering system within 14 days of notice by the City.

Note:
[a] Number of incident months are based on a calendar year.

1.8 Legal Authorities

CWC Section 375 provides the City with the statutory authority to adopt and enforce water conservation restrictions, and CWC Sections 350 et seq. authorize the City to declare a water shortage emergency and impose water conservation measures when it is determined that the City may not be able to satisfy ordinary demands without depleting supplies to an insufficient level.

If necessary, the City will declare a water shortage emergency in accordance with CWC Chapter 3 (commencing with Section 350) of Division 1. Once having declared a water shortage, the City is provided with broad powers to implement and enforce regulations and restrictions for managing a water shortage. For example, CWC section 375(a) provides the following:

> *"Notwithstanding any other provision of the law, any public entity which supplies water at retail or wholesale for the benefit of persons within the service area or area of jurisdiction of the public entity may, by ordinance or resolution adopted by a majority of the members of the governing body after holding a public hearing upon notice and making appropriate findings of necessity for the adoption of a water conservation program, adopt and enforce a water conservation program to reduce the quantity of water used by those persons for the purpose of conserving the water supplies of the public entity."*

Water Code Section 375(a). CWC Section 375(b) grants the City with the authority to set prices to encourage water conservation.

Under California law, including CWC Chapter 3.3 and Chapter 3.5 of Division 1, Parts 2.55 and 2.6 of Division 6, Division 13, and Article X, Section 2 of the California Constitution, the City is authorized to implement the water shortage actions outlined in this WSCP. Prior to enacting a shortage level, the resolution providing the Council with authority to enact each level of the WSCP will be adopted. Resolutions to enact the WSCP can be adopted at any meeting of the City Council. The resolution providing the City Manager, or designee, with authority to enact each stage of the WSCP is included in **Attachment 6**.

The City shall also coordinate with any city or county within which it provides water supply services, as listed below, for the possible proclamation of a local emergency under California Government Code, California Emergency Services Act (Article 2, Section 8558).

1.9 Financial Consequences of WSCP

This section is in accordance with CWC Section 10632(a)(8) and describes the financial consequences of implementing the WSCP and potential mitigation strategies. The City anticipates reduced revenue while implementing the WSCP because of decreased water use by its customers and additional costs associated with implementing water use restrictions and associated reduction actions. The incurred cost may vary depending on the shortage stage and duration of the water shortage emergency. The cost of compliance may be tracked when a shortage is declared. The City may track the staff time and resources used to implement the WSCP, including reduced revenue, implementation and enforcement of shortage response actions, and communication and outreach efforts. Impacts of implementing the WSCP include:

- Impact of quantity of water sales on revenue
- Increased staff, salaries, and overtime required for implementing and enforcing restrictions
- Increased costs of new supplies, transfers, or other exchanges

In 2015, the mandatory conservation goal for the City was 28%, however the corresponding revenue reductions were less than 28% due to the City having a two-component water rate structure that includes the fixed “water meter service charge” for all service connections and a volumetric-based “water quantity charge.” Therefore, the reduction in revenues was affected by a lesser percentage than the overall total reduction in water use. In general, revenue impacts specified in the WSCP would be offset with a combination of the following:

- An increase in water commodity and service charges
- A reduction in annual operating expenses due to decreased demands
- Reserves currently earmarked for long range capital
- General tax fund revenues currently earmarked for future capital improvements

Methods to mitigate revenue/expenditure impacts are discussed in detail below.

1.9.1 Drought Rate Structures and Surcharges

At present, the City does not have in place a drought rate structure. The City plans to hire a rate consultant to review existing water rates and, if appropriate, develop new future water rates. As an additional task to this effort, the consultant will review, develop, and recommend a drought rate structure for the City’s consideration. With such a rate structure in place, should a water shortage take place, the City will be able to institute an alternate water rate structure that may

apply and change depending on the stage of drought that the community is experiencing. At this time, there are no details as to how the rate structure will be developed, but conceptually each of the five stages specified in the WSCP would have a water rate increase associated with it.

The use of this type of structure during a drought will minimize expenditure impacts that are incurred during a drought. The effects of the decrease in revenue due to the drought, with a corresponding increase in expenditure, will allow for the City to function without going into debt.

1.9.2 Use of Financial Reserves

The City of Fresno Water System maintains two reserve funding sources that can be used to meet a portion of the utility's revenue requirements during emergency or drought conditions. They are as follows:

- **Water Operating Reserves** – This is cash set aside in the Water Enterprise Fund that provides a "rainy day savings account" for unexpected cash flow shortages and large, unexpected expenses or losses. Normally, these reserves are not intended to be used to make up income shortfalls. However, in an emergency situation, they can be transferred to the Water Rate Stabilization Fund (see below) for transfer back to the Water Enterprise Fund to meet revenue requirements, including debt coverage ratios.
- **Water Rate Stabilization Fund** – Indentures from previous bond issuances required the establishment of the Water Rate Stabilization Fund. These funds can be drawn on to meet a portion of the utility's revenue requirements through unexpected low-revenue periods and may be applied to debt coverage ratio calculations to help avoid technical default of bond covenants and loan agreements.

In addition, the City maintains funding in the Emergency Reserve Fund for the purpose of meeting unforeseen emergencies (see Section 1212 of the City's Charter for more information). This funding may be used by an affirmative vote of at least five members of the City Council upon presentation of a statement declaring the reason for use of the funding. This funding would be used only if the Water System reserves were insufficient to meet revenue requirements.

1.9.3 Other Measures

If the funding mentioned above is not sufficient to compensate for loss of revenue during a water shortage, the City may temporarily suspend components of its operations and maintenance activities.

1.10 Monitoring and Reporting

As described in **Section 1.3**, the City will track its supplies and project demands annually as part of the Annual Water Supply and Demand Assessment, and, if conditions described in **Table 2** are projected, the City will enact its WSCP. Monitoring demands is essential to ensure the WSCP response actions are adequately meeting reductions and decreasing the supply/demand gap. This will help to analyze the effectiveness of the WSCP or identify the need to activate additional response actions.

The City currently has AMI technology to monitor customer water usage and uses its AMI system to automatically enforce demand reduction measures and restrictions. The AMI system is currently set up to monitor and enforce outdoor watering restrictions. The program monitors customer meter flows against an "excessive use" flowrate, which will vary based on the WSCP stage. The system flags customer meters exceeding the excessive use flowrate during a

day/time outside of permitted outdoor watering hours as excessive use and an incident of water waste. If a customer has one or more incidents of water waste during a month, the customer shall be issued a Notice of Water Waste and, if applicable, be charged fines and penalties. The City may expand this monitoring program in the future to monitor other uses beyond outdoor watering restrictions.

The City can also use the detailed water usage data to monitor customers' response and demand reduction due to restrictions for each stage in the WSCP. The many restrictions and prohibitions assigned to each stage in **Table 3** are inherently flexible so the City can implement certain the restrictions, monitor customer usage, and implement additional restrictions if the demand reductions are not sufficient to close the supply and demand gap. The City also intends to provide reporting to the State based on forthcoming regulations for monthly reporting of water production and other water uses, along with associated enforcement metrics.

1.11 WSCP Refinement Procedures

The City intends to use this WSCP as an adaptive management plan to respond to foreseeable and unforeseeable water shortages. The WSCP is used to provide guidance to the City's governing body and staff and the public by identifying response actions to allow for efficient management of any water shortage with predictability and accountability. To maintain a useful and efficient standard of practice in water shortage conditions, the requirements, criteria, and response actions need to be continually evaluated and improved on to make sure the WSCP provides the tools to maintain reliable supplies and reduce the impacts of supply shortages.

This 2020 WSCP accounts for the latest analysis of the City's robust supply portfolio in relation to demand and adjusted percentage reduction stages to reflect a more appropriate supply shortage that should trigger stages. This is a process that should be reevaluated annually and updated as necessary. Potential changes to the WSCP that would warrant an update include any changes to shortage level triggers, changes to the shortage level structure, and changes to the response actions. Any prospective changes to the WSCP would need to be presented at a public hearing; staff would obtain any comments and adopt the updated WSCP. The steps to formally amend the WSCP are discussed in **Section 1.13**.

Potential refinements will be documented and integrated into the next WSCP update. If new response actions are identified by staff or the public, these could be advertised as voluntary actions until they are formally adopted as mandatory.

1.12 Special Water Feature Distinction

CWC Section 10623 (b) requires that suppliers analyze and define water features that are artificially supplied with water, including ponds, lakes, waterfalls, and fountains, separately from swimming pools and spas, as defined in subdivision (a) of Section 115921 of the Health and Safety Code. As listed in **Table 3 and Section 1.5.1**, there are separate requirements for decorative water features — including decorative fountains, lakes, or ponds — and for pools and spas. The City has separate response actions, enforcement actions, and monitoring programs for both decorative water features and pools and spas. Non-pool or non-spa water features may use or be able to use recycled water, whereas pools and spas must use potable water for health and safety considerations. Limitations to pools and spas may require different considerations compared to non-pool or non-spa water features.

1.13 Plan Adoption, Submittal and Availability

This WSCP update was prepared in tandem with the 2020 UWMP. The City held a public hearing and adopted the 2020 WSCP on July 15, 2021. A copy of the published Notice of Public Hearing is included in **Attachment 5** and a copy of the adopting resolution is included in **Attachment 6**. Before the public hearing, notices were published notifying the public of the date and time of the hearing.

Once the 2020 WSCP has been adopted, a copy will be submitted to DWR, the State Library, and the County of Fresno. Also, a hard copy will be made available for public reference at the City of Fresno Department of Public Utilities office at City Hall (located at 2600 Fresno Street) and the Water Division office (located at 1910 E. University Avenue). Additionally, an electronic copy will be uploaded to the City of Fresno website[1] and made available for public reference.

Based on DWR's review of the WSCP, the City will make any amendments in its adopted WSCP, as required and directed by DWR. If the City revises its WSCP after the UWMP is approved by DWR, then an electronic copy of the revised WSCP will be submitted to DWR within 30 days of its adoption.

[1] www.fresno.gov/Government/DepartmentDirectory/PublicUtilities/Watermanagement/importantdocuments.htm

References

AARC Consultants, LLC. (2020). *City of Fresno Department of Public Utilites Risk and Resilience Assessment for the America's Water Infrastructure Act 2018.* Fresno, California.

AARC Consultants, LLC. (2020). *City of Fresno Water Divsion All Hazards Emergency Response Plan.*

Attachment 1
Preliminary Annual Assessment Template

DWR ASSESSMENT TABLE TEMPLATE - EXAMPLE VALUES FOR 2021 SHOWN

City of Fresno
DWR Annual Water Supply and Demand Assessm
Supply and Demand Estimates

Current Year: <YEAR>
Updated: <DATE>

	Current Year	Following Year	
Demand Use Type	**2021**	**2022**	**Notes**
Single Family	60,666	61,272	1% annual increase from 2020
Multi-Family	19,030	19,221	1% annual increase from 2020
Commercial	17,141	17,312	1% annual increase from 2020
Industrial	5,786	5,844	1% annual increase from 2020
Landscape	9,583	8,680	1% annual increase from 2020; Reduced by increased recycled water use
Other	343	347	1% annual increase from 2020
Losses	9,664	9,760	1% annual increase from 2020
Recycled Water	1,912	2,911	Estimates per 2020 UWMP Table 7-4
M&I Demand Subtotal	**124,125**	**125,347**	
Operational Buffer (10%)	12,410	12,530	To account for supply and demand uncertainties
M&I Demand Total	**136,535**	**137,877**	
Groundwater Recharge	-	-	No recharge assumed due to low surface water supply availability
Total Demand	**136,535**	**137,877**	

Supply	**2021**	**2022**	
Groundwater, Sustainable Yield	73,062	73,644	Sustainable groundwater yield per 2020 UWMP Table 6-1
Groundwater, Allocated from Storage	-	-	Groundwater in storage built up over time from recharge and reduced pumping; Not used since supply is greater than demand
USBR Contract Allocation	17,612	19,025	Current Year: USBR Allocation = 20% plus 5,612 AF of carryover Following Year: Average of "Critical" year per 2020 UWMP Table 6-2
FID Contract Allocation	51,580	61,000	Current Year: FID Kings River Allocation = 26% Following Year: Average of "Critical" year per 2020 UWMP Table 6-3
Recycled Water, RWRF	1,802	2,801	Estimates per 2020 UWMP Table 6-6
Recycled Water, NFWRF	110	110	Estimates per 2020 UWMP Table 6-6
Total Supplies	**144,166**	**156,580**	

Supply vs. Demand	**2021**	**2022**
Supply minus Demand (AF)	**7,631**	**18,703**
Supply divided by Demand (%)	**106%**	**114%**

WATER SHORTAGE STAGE TEMPLATE - EXAMPLE VALUES FOR 2021 SHOWN

City of Fresno
DWR Annual Water Supply and Demand Assessment
Water Shortage Stage Comparison

Current Year: <YEAR>
Updated: <DATE>

2021 Water Supplies (AFY)

Supplies	Maximum Available Supplies	Projected Available Supplies
GW, Sustainable Yield	73,062	73,062
GW, from Storage	*Not Used*	
Surface Water	176,055	69,192
Recycled Water	1,912	1,912
Total	**251,029**	**144,166**

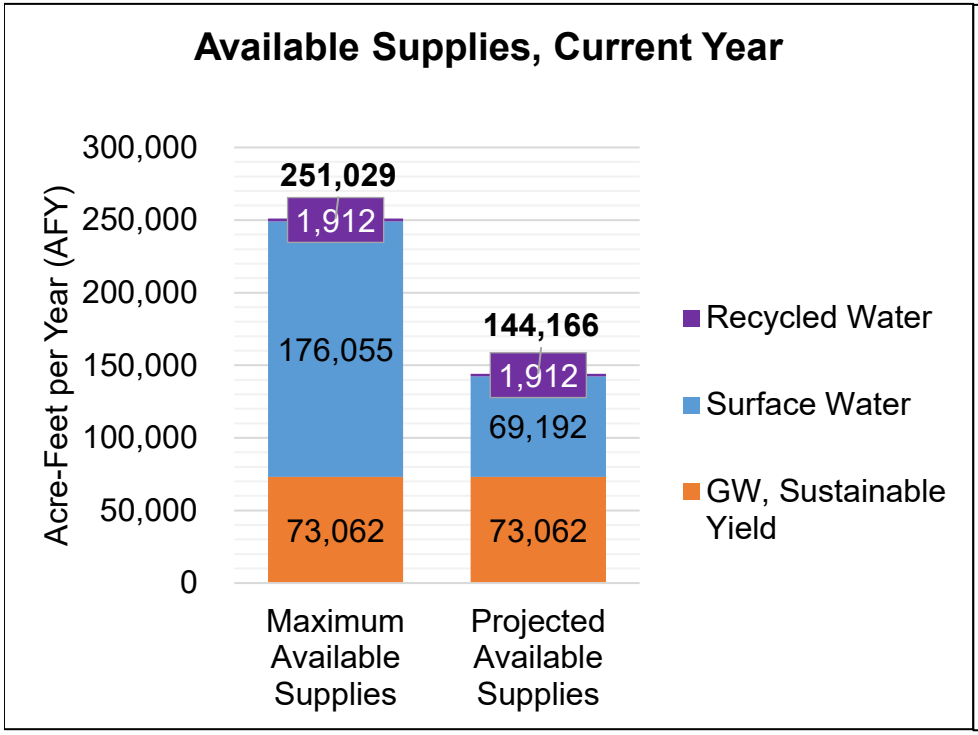
2021 Water Demands (AFY)

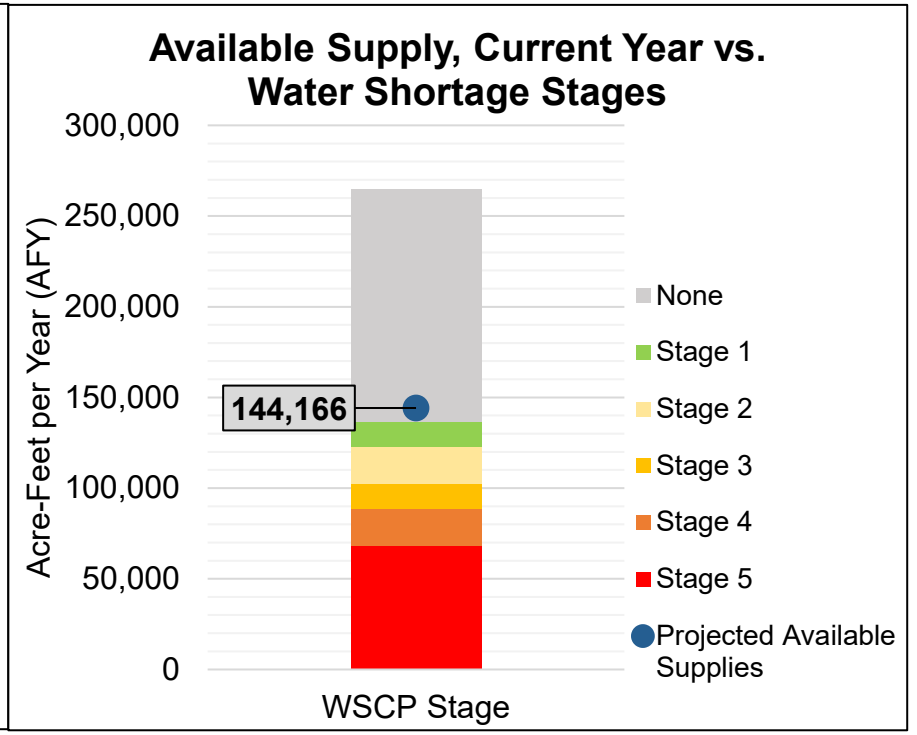
Demand Type	Estimated Demands
M&I	124,125
Buffer	12,410
Retail Subtotal	**136,535**
Recharge	0
Total	**136,535**

Water Shortage Stages

WSCP Stage	Reduction Upper End	Reduction Lower End	(AFY) Upper End	(AFY) Lower End
None				136,500
Stage 1	0%	10%	136,500	122,900
Stage 2	10%	25%	122,900	102,400
Stage 3	25%	35%	102,400	88,700
Stage 4	35%	50%	88,700	68,300
Stage 5		> 50%	68,300	

Note: Refer to seperate Supply and Demand projections table for assumptions.





Attachment 2
City of Fresno Municipal Code Chapter 6-520

SEC. 6-520. - WATER CONSERVATION.

(a) In the use of potable water supplied by the city, no customer shall do or permit any of the following:

(1) Use potable water to irrigate or water outdoor landscaping in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures,

(2) Keep, maintain, operate, or use any water connection, hose, faucet, hydrant, pipe, outlet, or plumbing fixture which is not tight and free from leakage,

(3) Willfully or negligently waste water,

(4) Flood any part of the premises of another,

(5) Sprinkle the premises of another so as to prevent the normal use thereof or unreasonably wet objects thereon which should not be subjected to a spray of water except as naturally caused by the elements or by action of the owner of the object,

(6) Sprinkle or irrigate any yard, ground, premise, or vegetation except as set forth in the City's Outdoor Water Use Schedule,

(i) Annual Exemptions. The following properties may submit an application for a one-year exemption to the Outdoor Water Use Schedule in effect at the time of the application:

a. Properties with multiple addresses, and

b. Properties with turfed or landscaped areas of two acres or larger, and

c. Properties without street addresses.

The owners of such properties shall submit a proposed modified Outdoor Water Use Schedule in writing to the Director or designee for approval or modification. The Director may approve a modified Outdoor Water Use Schedule for with more frequent watering or different watering days than allowed by the Outdoor Water Use Schedule in effect at the time the application for an exemption is submitted for consideration. If the Director determines the proposed exemption will adversely impact system water pressures in the service area, the proposed exemption will be denied. All Annual Exemptions approved by the Director shall automatically expire on December 31 of each year, and the property owners must re-apply for an exemption to the Outdoor Water Use Schedule.

(ii) Short-term Exemptions. The following properties may submit an application for an exemption from the Outdoor Water Use Schedule for a specific time period not to exceed one month.

a. Properties with new lawns not yet established.

b. Properties seeking to use water for a bona fide use, such as solar panel cleaning or other use necessary for health or preservation of property.

The owners of such properties shall submit a proposed modified Outdoor Water Use Schedule in writing to the Director or designee for approval or modification no less than 48 hours before the proposed non-compliant water usage. The Director may approve a modified Outdoor Water Use Schedule that may provide for more frequent outdoor water use or different outdoor water use days than allowed by the Outdoor Water Use Schedule in effect at the time the application for an exemption is submitted for consideration. If the Director determines the proposed exemption will adversely impact system water pressures in the service area, the proposed exemption will be denied. All Short-term Exemptions approved by the Director shall automatically expire on the date set forth on the Short-Term Exemption permit.

(7) Sprinkle or irrigate any yard, ground, premise, or vegetation unless the watering device used is controlled by an shut-off device, or a person is in immediate attendance of the hose or watering device,

(8) Wash any privately owned motor vehicle, trailer, or boat except from a bucket or in a commercial car wash, provided a hose equipped with a shut-off nozzle may be used for a quick rinse without causing water to flow onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots, or structures,

(9) Wash or rinse with a hose or watering device any sidewalk, driveway, parking area, tennis court, patio, or any other exterior paved area, except for public health and safety reasons at public gathering places, or

(10) Use potable water in a fountain or other decorative water feature, except where the water is part of a recirculating system.

(11) Irrigate ornamental turf on public street medians with potable water, except where:

(i) The turf serves a community or neighborhood function, including but not limited to, recreational uses and civic or community events;

(ii) The turf is irrigated incidentally by an irrigation system primarily intended to irrigate trees;

(iii) The turf is irrigated with recycled water.

This prohibition does not include trees and shrubs on public medians, which may be irrigated.

(12) Irrigate outdoor landscapes with potable water during and within 48 hours after measurable rainfall.

(13) Serve drinking water other than upon request in eating or drinking establishments, including but not limited to, restaurants, hotels, cafes, cafeterias, bars, or other public places where food or drink are served or purchased.

(14) Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development.

(15) Automatically change towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily. The hotel or motel shall prominently display notice of this option in each guestroom using clear and easily understood language.

(16) Drain swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer. Residents with private swimming pools shall file a written application for a permit with the City of Fresno Water Division at least 48 hours prior to draining the pool. Any customer whose swimming pool is drained by order of the Department of Health for failure to maintain it properly will also be issued a notice of violation of the City of Fresno Municipal Code. The draining of pools for reasons of health and safety hazards as determined by the City of Fresno Water Division and/or the Department of Health is permitted. The application shall include the results of a pool water test conducted by an independent testing organization which shows a cyanuric acid level above 100 parts per million, total dissolved solids over 2,500 parts per million, or calcium over 450 parts per million, or stating the nature and duration of repairs to be made and the date on which the pool will be drained.

(17) Fill newly constructed or refurbished swimming pools without a pool fill permit from the City of Fresno Water Division.

(18) Refill (top off) established swimming pools except during times when outdoor water use is allowed at the property address pursuant to the Outdoor Water Use Schedule.

(b) Notwithstanding the foregoing, drip irrigation of community and residential fruit and vegetable gardens and fruit tr permitted any day of the week; for this subsection, "drip irrigation system" means a non-spray, low-pressure, and lc volume irrigation system in good working order utilizing emission devices with a flow rate of less than four gallons p hour, designed to slowly apply small volumes of water at or near the root zone of plants, when used primarily for ir of fruit and vegetable gardens and fruit trees; should any city water customer be cited for excessive water use, the customer may contact the Water Division and request an exemption from the Outdoor Water Use Schedule for a hc community garden that is irrigated with a drip irrigation system. Upon being contacted, the Water Division will sche visit to the subject property to inspect the garden and the drip irrigation system used to irrigate the garden. The Wa Division shall grant an exemption for home or community garden with the following conditions:

(1) The property must limit water use to an amount equal to, or less than, the average monthly water use for the single-family residential customer class. The monthly average water use for the single-family residential customer class is printed on monthly utility bills issued by the City.

(2) The drip irrigation system must be in good working order with no leaks, line breaks, or other deficiencies that will contribute to water waste. Exemptions shall be withheld until corrective action is taken to address system deficiencies.

(3) The drip irrigation system must be used primarily for the home or community garden, and not for other landscape on the property- Exemptions shall be withheld until the drip irrigation system for the home or community garden can be isolated from other landscape on the property.

(4) No flood irrigation will be allowed with the drip irrigation system, and water must remain on the subject property with no runoff to sidewalks, driveways, pavements, or adjacent properties.

(5) The home and community garden exemption is provided exclusively for drip irrigation systems only, and will not be allowed for other types of irrigation systems.

(6) This exemption shall only apply to properties ¼ acre or smaller. For properties greater than ¼ acre, the property owner may apply to the Director or designee for an exemption.

(c) Lawn sprinkling systems shall be properly designed, installed, maintained, and operated to prevent waste of water.

(d) Repealed.

(e) The provisions of this section are conditions of service.

(1) Each incident of Excessive Use as defined in section 6-501, or use of water inconsistent with the provisions of this section, is an incident of water waste.

(2) If a customer has one or more incidents of water waste during a month, as observed by City staff or as recorded by the City's water meter reading system, the customer shall be issued a Notice of Water Waste and, if applicable, charged a fine as set forth in the Master Fee Schedule. Such fines shall be added to the customer's monthly utility bill and shall be due and payable with that utility bill and subject to the FMC 6-106, Late Payment of Municipal Service Bills.

(3) Incident counts for water waste shall be monitored, recorded, documented and enforced on a monthly basis during the calendar year for individual customers, and the incident counts shall be reset January 1 of each year.

(4) If a customer performs or permits incidents of water waste more than six consecutive months, the water service to the customer may be terminated unless in the opinion of the Director such termination would result in an unreasonable risk to the health and safety of persons. If water service is terminated for

successive incident of water waste, the water service may only be restored upon execution of an agreement with the customer to adhere to the conditions of service described in this section.

(5) If a customer objects to a fine imposed for an incident of water waste pursuant to this section, the following appeal process may be used.

Step 1.

(a) Within thirty days of issuance of the utility bill including the fine, the customer may contact the Water Conservation Program to appeal an incident of water waste resulting in a fine with the staff person who initiated the enforcement measure. The staff person shall gather the facts about the incident.

(b) The customer may provide staff with evidence there was no incident of water waste, or of a bona fide reason for the incident of water waste, including evidence of a water leak, or another reasonable justification for the water use, within ten business days of the customer's first communication with the Water Conservation Program regarding the alleged incident of water waste.

(c) Within ten business days of the initiation of an appeal, staff shall provide the customer with documentation demonstrating the incident of water waste, if applicable.

(d) The staff will provide the facts and evidence related to the appeal to the Water Conservation Program Supervisor, who will determine whether to rescind the enforcement measure. The Water Conservation Program Supervisor will provide a written decision to the customer within fifteen business days of the customer's appeal, or receiving any applicable evidence from the customer, whichever comes later.

Step 2. If the customer is not satisfied with the decision of the Water Conservation Program Supervisor, they may appeal to the Director or designee within ten business days of the date of the Water Conservation Program Supervisor's decision. The Director or designee shall review the appeal and any evidence the customer previously submitted, and provide a written decision within thirty days of receiving the appeal.

Step 3. If the customer is not satisfied with the decision of the Director of Public Utilities, the customer may appeal to the City's Administrative Hearing Officer in the manner provided in Chapter 1, Article 4 of this code. Such decision shall be final.

(Orig. Ord. 4481; Am. Ord. 6486, 1964; Am. Ord. 73-120, § 6, eff. 8-16-73; Am. Ord. 77-99, § 1, eff. 9-23-77; Am. Ord. 78-74, §§ 1, 2, eff. 5-26-78; Am. Ord. 80-115, § 149, eff. 8-8-80; Am. Ord. 89-48, §§ 1, 2, eff. 4-18-89; Am. Ord. 89-77, § 1, eff. 6-7-89; Am. Ord. 89-102, § 1, eff. 9-22-89; Am. Ord. 90-72, § 1, eff. 8-24-90; Am. Ord. 90-97, § 1, eff. 10-12-90; Am. Ord. 91-104, § 1, eff. 10-18-91; Am. Ord. 91-112, § 1, eff. 11-22-91; Am. Ord. 93-14, § 1, eff. 2-23-93; Am. Ord. 93-20, § 2, eff. 4-30-93; Am. Ord. 2015-13, § 1, eff. 5-21-15; Am. Ord. 2015-29, § 1, eff. 8-27-15; Am. Ord. 2017-56, § 3, eff. 11-19-17; Am. Ord. 2018-45, § 1, eff. 8-10-18; Am. Ord. 2019-011, § 3, eff. 5-31-19).

Editor's note— The provisions in subsection 6-520(e) regarding the enforcement program for incidents of water waste are effective January 1, 2018.

Attachment 3
Water Shortage Resolution

RESOLUTION NO. 2019-073

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO AMEND THE WATER SHORTAGE CONTINGENCY PLAN

WHEREAS, the Urban Water Management Planning Act requires the City of Fresno (City) to describe its water conservation measures within its Water Shortage Contingency Plan (WSCP);

WHEREAS, the City adopted its current WSCP on June 23, 2016, as part of the City's 2015 Urban Water Management Plan (UWMP);

WHEREAS, the City Council adopted amendments to the WSCP on October 12, 2017;

WHEREAS, in response to water conservation mandates from the State of California and to provide flexibility to its customers, the City has prepared further amendments to the WSCP to update water conservation requirements and watering restrictions in different water conservation stages in the City of Fresno.

NOW THEREFORE, BE IT RESOLVED by the Council of the City of Fresno as follows:

1. The City hereby adopts the amended Water Shortage Contingency Plan, as attached in Tables 1-3 of Exhibit A herein.

2. Resolution 2018-253 shall be repealed on the effective date of this Resolution.

* * * * * * * * * * * * * * *

Date Adopted: 4/11/2019
Date Approved: 4/16/2019
Effective Date: 4/16/2019

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, YVONNE SPENCE, MMC CRM, City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 11th day of April, 2019.

AYES : Arias, Bredefeld, Chavez, Esparza, Soria, Caprioglio
NOES : None
ABSENT : None
ABSTAIN : None

Mayor Approval: April 16th, 2019
Mayor Approval/No Return: N/A, 2019
Mayor Veto: N/A, 2019
Council Override Vote: N/A, 2019

YVONNE SPENCE, MMC CRM
City Clerk

By: Yvonne Spence
Deputy

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

By: Amanda Freeman 04/18/19
Amanda B Freeman Date
Senior Deputy City Attorney

Attachment:
Exhibit A – Revised Water Shortage Contingency Plan, Tables 1-3

EXHIBIT A

Revised Water Shortage Contingency Plan

Table 1: Stages of Water Shortage Contingency Plan (WSCP)

Stage	Percent Supply Reduction	Water Supply Condition
1	10%	Stage 1 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the second of two consecutive years, the volume of surface water available to the City through USBR and FID is projected to be less than the long-term average and the reduction in supply, averaged over the consecutive years, is equal to 10% or greater, or • Groundwater contamination conditions exists (DDW required the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 10% loss in water production capacity, or • Localized groundwater cones of depression develop exceeding historic low water levels and, to avoid possible litigation with responsible parties of point source contaminant plumes, the City must shut down existing wells that result in a 10% loss in groundwater production capacity, or • A combination of the above mentioned circumstances or a disaster reduced the City's overall water supply or production capabilities by 10% or more. • After having been in a Stage 2 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.
2	10 - 25%	Stage 2 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the third of three consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the three consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 25% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 25% of the long-term average, or • One-year change in average groundwater level in 30 key City wells exceeds 3 feet or two-year change in average groundwater level in 30 key City wells exceeds 6 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 25% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities

Stage	Percent Supply Reduction	Water Supply Condition
		by 25% or more. • After having been in a Stage 3 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point consistent with the above conditions for this stage.
3	25 to 35%	Stage 3 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the fourth of four consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the four consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 35% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 35% of the long-term average, or • One-year change in average groundwater level in 30 key City wells exceeds 5 feet or two-year change in average groundwater level in 30 key City wells exceeds 10 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 35% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 35% or more. • After having been in a Stage 4 classification, the following water year results in a declaration by the jurisdictional authority in determining entitlements for the respective surface water supply of normal or above normal water deliveries on the Friant-Kern system; or the original trigger for a previous higher stage classification has been rectified to a point that is consistent with the above conditions for this stage.

Stage	Percent Supply Reduction	Water Supply Condition
4	35 - 50%	Stage 4 of the Water Shortage Contingency Plan may be triggered by any of the following conditions: • In the fifth of five consecutive years, the projected volume of surface water available to the City through USBR or FID is less than the long term average and the reduction in supply, averaged over the five consecutive years equals 10% or greater, or • The volume of surface water available to the City through FID is reduced by 50% of the long-term average, or • The volume of surface water available to the City through USBR is reduced by 50% of the long-term average, or • One-year change in average groundwater level in 30 key wells exceeds 7.5 feet or two-year change in average groundwater level in 30 key City wells exceeds 12 feet and exceeds historic low groundwater levels, or • Groundwater contamination condition exists (DDW requires the City to shut down wells) or a large-scale infrastructure failure occurs that results in a 50% loss in water production capacity, or • A combination of the above mentioned circumstances or disaster reduces the City's overall water supply or production capabilities by 50% or more.

Table 2: Restrictions and Prohibitions on End Uses

(#)	Stage	Restrictions and Prohibitions	Additional Explanation or Reference	Penalty, Charge or Other Enforcement
a	1-4	Landscape – Limit landscape irrigation to specific times (Outdoor Water Use Schedule)	See Outdoor Water Use Schedule, Table 2a.	Yes See Table 3
b	1-3	Other	Prohibit car washing except with a bucket only (a hose equipped with a shut off nozzle may be used for a quick rinse)	Yes See Table 3
c	1-4	Other – Prohibit use of potable water for washing hard surfaces	Prohibit use of potable water to wash sidewalks, walkways, driveways, parking lots, open ground or other hard surfaced areas except where necessary for public health or safety	Yes See Table 3
d	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit irrigating outdoor landscapes with potable water during and within 48 hours after measurable rainfall	Yes See Table 3
e	1-4	Landscape – Prohibit certain types of landscape irrigation	Sprinkle or irrigate any yard, ground, premise, or vegetation unless the watering device used is controlled by an automatic shut-off device, or a person is in immediate attendance of the hose or watering device	Yes See Table 3
f	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit using potable water to irrigate or water outdoor landscaping in a manner that causes runoff such that water flows onto adjacent property, non-irrigated areas, private and public walkways, roadways, parking lots or structures	Yes See Table 3
g	1-4	Landscape – Prohibit certain types of landscape irrigation	Prohibit irrigation of ornamental turf on public street medians with potable water, except where the turf serves a community or neighborhood function, it's irrigated incidentally by an irrigation systems designed to irrigate trees, or the turf is irrigated with recycled water	Yes See Table 3

h	4	Other	Prohibit car washing	Yes See Table 3
i	1-4	Other – Restaurants may only serve water upon request	No restaurant, hotel, café, cafeteria, or other public place where food is sold is served or offered for sale, shall serve drinking water to any customer unless expressly requested	Yes See Table 3
j	1-4	Landscape – Prohibit certain types of landscape irrigation	Irrigate landscapes outside of newly constructed homes and buildings in a manner inconsistent with regulations or other requirements established by the California Building Standards Commission and the Department of Housing and Community Development	Yes See Table 3
k	1-4	Water Features – Restrict water use for decorative water features, such as fountains	Prohibit use of potable water to clean, fill or maintain decorative fountains, lakes, or ponds unless such water is reclaimed	Yes See Table 3
l	4	Other – Prohibit use of potable water for construction and dust control	Prohibit use of potable water for construction, compaction, dust control, street or parking lot sweeping, building wash down where non-potable or recycled water is sufficient	Yes See Table 3
m	1-4	Other – Prohibit automatic linen service in hotels and motels	Prohibit automatically changing towels and linens in hotels and motels daily. Operators of hotels and motels shall provide guests the option of choosing not to have towels and linens laundered daily	Yes See Table 3
n	4	Other	Prohibit use of potable water for sewer system maintenance or fire protection training without prior approval by the City Manager	No
o	4	Other – Customers must repair leaks, breaks, and malfunctions in a timely manner	Prohibit allowing potable water to escape from breaks within the customer's plumbing system for more than twenty-four (24) hours after the customer is notified or discovers the break	Yes See Table 3

p	4	Other – Prohibit vehicle washing except at facilities using recycled or recirculating water	Prohibit washings cars, boats, trailers, aircraft, or other vehicles except to wash such vehicles at commercial or fleet vehicle washing facilities using water recycling equipment	Yes See Table 3
q	1-4	Swimming Pools – Prohibit draining swimming pools more than once every three years	Prohibit draining swimming pools more than once every three years, except as necessary to complete structural repairs or to comply with public health standards, as determined by the County Health Officer	Yes See Table 3
r	1-4	Swimming Pools – Limit filling new or refurbished pools by requiring a pool fill permit	Prohibit filling new or refurbished swimming pools without obtaining a pool fill permit from the City	Yes See Table 3
s	1-4	Swimming Pools – limit filling (topping off) established pools to times and days permitted by the Outdoor Water Use Schedule	Prohibit filling (topping off) swimming pools during times when outdoor irrigation is allowed according to the Outdoor Water Use Schedule	Yes See Table 3
t	4	Pools and Spas – Require covers for pools and spas	Require covers for swimming pools when not in use	No
u	4	Other	Prohibit Use of Outdoor Misters	No

Table 2a: Outdoor Water Use Schedule

Stage	Summer (April 1 – October 31)	Summer Outdoor Water Use days	Winter (November 1 – March 31)	Winter Outdoor Water Use days	Outdoor Water Use Times
1	3 days/week recommended	Even addresses: Wednesday, Friday, Sunday Odd addresses: Tuesday, Thursday, Saturday	1 day/week recommended	Even addresses: Sunday Odd addresses: Saturday	Outdoor Water Use allowed 12:00 AM – 9:59 AM & 6:00 PM – 11:59 PM Outdoor Water Use is prohibited all days 10:00 AM – 6:00 PM
2	3 days/week	Even addresses: Wednesday, Friday, Sunday Odd addresses: Tuesday, Thursday, Saturday	1 day/week	Even addresses: Sunday Odd addresses: Saturday	
3	2 days/week	Even: Wednesday and Sunday Odd: Tuesday and Saturday	1 day/week	Even addresses: Sunday Odd addresses: Saturday	
4	1 day/week	Even addresses: Sunday Odd addresses: Saturday	No outdoor water use		

Table 3: Penalties for Incidents of Water Waste

Incident Month	Incident Fine	Enforcement Schedule
1	$0	The first month an incident of water waste is recorded during the calendar year, the City shall issue a Notice of Water Waste to the customer for the incident observed by City staff or as recorded directly by the City's water meter reading system.
2	$25	The second month an incident of water waste is recorded is recorded for a customer during the calendar year, the City shall assess a fine of $25 to the customer, and the fine shall be applied to the customer's monthly utility bill.
3	$50	The third month an incident of water waste is recorded for a customer during the calendar year, the City shall assess a fine of $50 to the customer, and the fine shall be applied to the customer's monthly utility bill.
4	$100	The fourth month an incident of water waste is recorded for a customer during the calendar year, the City shall assess a fine of $100 to the customer, and the fine shall be applied to the customer's monthly utility bill.
5 -12	$100	For the fifth month an incident of water waste is recorded during the calendar year, and every month thereafter for the remainder of the calendar year during which an incident of water waste is recorded, the City shall assess a fine of $100 to the customer, and the fine shall be applied to the customer's monthly utility bill.
After 6	N/A	If a customer has more than six consecutive months of documented water waste incidents, the water service to the customer may be restricted or terminated unless in the opinion of the Director such restriction or termination would result in an unreasonable risk to the health and safety of persons. If water service is terminated for excessive violations of the water waste provisions as defined herein, the water service may only be restored upon execution of an agreement with the customer to adhere to the conditions of service described in this section.

April 12, 2019

Council Adoption: 4/11/19
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR LEE BRAND

FROM: YVONNE SPENCE, MMC
City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of 4/11/19, Council adopted the attached Resolution No. 2019-073, entitled **Amending the City of Fresno Water Shortage Contingency Plan.** Item No. 3-B (3), File ID19-1472, by the following vote:

Ayes	:	Arias, Bredefeld, Caprioglio, Chavez, Esparza, Soria
Noes	:	None
Absent	:	None
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before April 22, 2019. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval

****

Thank you.

APPROVED/NO RETURN: _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____
Lee Brand, Mayor

Date: 4-16-19

COUNCIL OVERRIDE ACTION:

Date: _____

Ayes :
Noes :
Absent :
Abstain :

CITY OF FRESNO
CITY CLERK'S OFFICE
2019 APR 17 P 1:57

RECEIVED

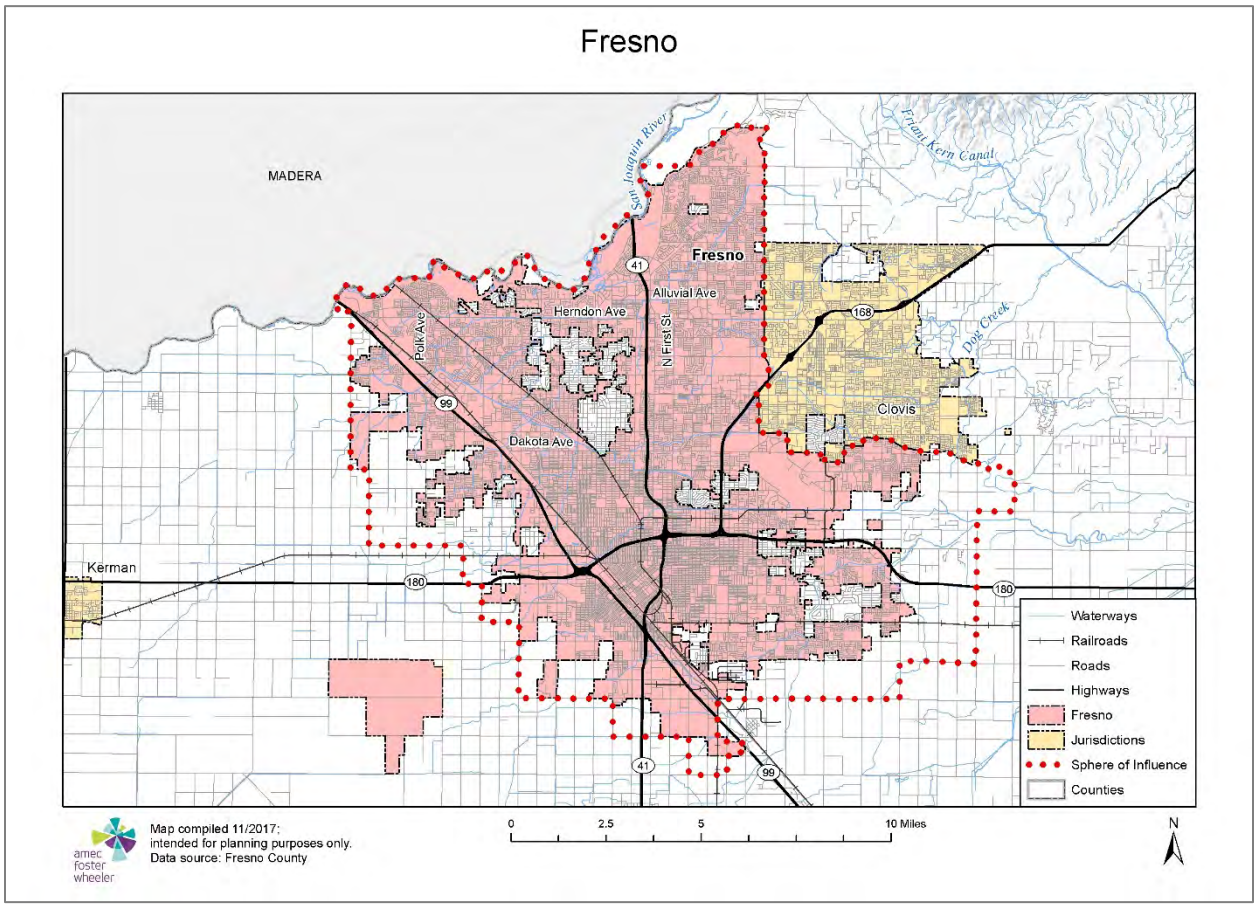
Attachment 4
Fresno County Multi-Jurisdictional Hazard Mitigation Plan, Annex E: City of Fresno

Reference the complete Fresno County Multi-Jurisdictional Hazard Mitigation Plan online:
https://www.fresno.gov/darm/wp-content/uploads/sites/10/2020/12/FresnoCountyHMPFinal.pdf

E.1 Community Profile

Figure E.1 displays a map and the location within Fresno County of the City of Fresno and its Sphere of Influence.

Figure E.1: The City of Fresno



E.1.1 Geography and Climate

The City of Fresno and its Sphere of Influence encompass a 100,400-acre area in central Fresno County. Over the past decade, the City has expanded into the northern, northwestern, and eastern reaches of its Sphere of Influence. Except for the deep channel of the San Joaquin River at the northern boundary of the City, Fresno's topography is generally level and slopes gently to the southwest. The upper San Joaquin River lies at the City's northerly boundary and has carved a deep channel, confining the river between steep bluffs that range from 20 to approximately 100 feet in height.

Fresno has a Mediterranean climate, averaging over 262 sunny days per year and little or no measurable precipitation from June through September. Annual rainfall typically totals 12-14 inches in episodic events lasting up to a few days at most. Fresno's prevailing winds are typically light and from the northwest.

Storms with strong weather disturbances (lightning and very agitated winds) may occur from autumn months through the spring, with the strength of the storm dependent upon temperature gradients between moving weather fronts.

Winter mornings in December and January approach freezing but only rarely reach as low as, or below, 32ºF; winter daytime high temperatures almost always approach or exceed 40ºF. Snowfall is an extremely rare and transient phenomenon; the last recorded snowfall in Fresno was ½ inch on December 20, 1998. The Tule fog, a thick ground fog that settles in the San Joaquin Valley from late fall through early spring, is the leading cause of weather-related accidents in California. In addition to causing visibility issues, "black ice" from precipitated fog may temporarily affect some roadways and bridges during the winter.

Summer daytime peak temperatures are high in Fresno. Some heat waves last over a week with daytime highs well over 100ºF and issuance of health advisories. Summer evenings provide for some cooling of 10-15ºF with the early morning daybreak hours cooling by 20-30ºF, depending on humidity (low humidity allows for more radiant cooling).

Geography and climate combine to create a general accumulation of air pollutants in the San Joaquin Valley (and in the City of Fresno) that occasionally result in unhealthy air quality conditions. Air quality problems are exacerbated by dust storms, human activities (e.g., vehicle emissions and fireplace and wood stove use), atmospheric photochemical processes, and forest fires from local and regional fires. The City has chronically failed to attain some of the national and state ambient air quality standards, but due to the efforts of the California Air Resources Board and the regional San Joaquin Valley Unified Air Pollution Control District, progress toward attainment of ozone (oxidant) and particulate matter standards is being made. Carbon monoxide standards were deemed to have been attained in the 1990s.

E.1.2 History

Development of what today is the City of Fresno began in 1871, when the Central Pacific Railroad chose the Fresno Station for its San Joaquin Valley rail line. The City soon became the County seat and the shipping and distribution hub for the region's agricultural industry. An economic boom across California in the 1880s helped transform Fresno from a village to a city, and helped drive its incorporation in 1885. Today, the City of Fresno is the center of trade, commerce, finance, and transportation for the San Joaquin Valley.

E.1.3 Economy

The most comprehensive economic data available for the City of Fresno comes from the U.S. Census Bureau by way of the American Community Survey (ACS). Select estimates of economic characteristics for the City of Fresno are shown in Table E.1.

Table E.1: City of Fresno's Economic Characteristics, 2015

Characteristic	City of Fresno
Families below Poverty Level	24.4%
All People below Poverty Level	29.8%
Median Family Income	$45,806
Median Household Income	$41,531
Per Capita Income	$19,465
Population in Labor Force	231,332
Population Employed*	198,113
Unemployment	14.3%

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/
*Excludes armed forces

Tables E.2 and E.3 show how the City of Fresno's labor force breaks down by occupation and industry based on 5-year estimates from the 2015 American Community Survey.

Table E.2: City of Fresno's Employment by Occupation, 2015

Occupation	# Employed	% Employed
Management, Business, Science and Arts Occupations	57,374	29.0
Management, Business, and Financial Occupations	*(20,767)*	*(10.5)*
Computer, Engineering, and Science Occupations	*(6,018)*	*(3.0)*
Education, Legal, Community Service, Arts, and Media Occupations	*(20,262)*	*(10.2)*
Healthcare Practitioner and Technical Occupations	*(10,327)*	*(5.2)*
Sales and Office Occupations	49,752	25.1
Service Occupations	41,528	21.0
Production, Transportation, and Material Moving Occupations	26,738	13.5
Natural Resources, Construction, and Maintenance Occupations	22,721	11.5
Total	**198,113**	**100.00**

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/

Table E.3: City of Fresno's Employment by Industry, 2015

Industry	# Employed	% Employed
Educational Services, and Health Care, and Social Assistance	48,557	24.5
Retail Trade	23,337	11.8
Arts, Entertainment, and Recreation, and Accommodation, and Food Services	20,643	10.4
Professional, Scientific, and Management, and Administrative and Waste Management Services	16,742	8.5
Manufacturing	14,869	7.5

Industry	# Employed	% Employed
Public Administration	12,030	6.1
Finance and Insurance, and Real Estate and Rental and Leasing	10,875	5.5
Other Services, Except Public Administration	10,710	5.4
Construction	10,586	5.3
Agriculture, Forestry, Fishing and Hunting, and Mining	10,446	5.3
Transportation and Warehousing, and Utilities	9,476	4.8
Wholesale Trade	7,158	3.6
Information	2,684	1.4
Total	**198,113**	**100.00**

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/

With the depressed real estate and construction market and economic recession toward the end of the 2000-2010 decade, unemployment rates increased to a peak of 18.0 percent in 2010. Since then, the unemployment rate has steadily decreased. The most recent annual data from the State of California Employment Development Department indicates that in 2016 there were 238,400 people in the City of Fresno labor force. Of these, 214,000 were employed; 24,400 were not. The unemployment rate was 10.2 percent.

E.1.4 Population

According to the California Department of Finance, Fresno's population was estimated to be 520,778 in 2016. Select demographic and social characteristics for the City from the U.S. Census Bureau's 2015 American Community Survey 5-year estimates are shown in Table E.4.

Table E.4: City of Fresno's Demographic and Social Characteristics, 2015*

Characteristic	City of Fresno
Gender/Age	
Male	49.2%
Female	50.8%
Median age	30.0
Under 5 years	8.9%
Under 18 years	29.5%
65 years and over	9.9%
Race/Ethnicity**	
White	52.2%
Asian	13.0%
Black or African American	7.9%
American Indian/Alaska Native	1.1%
Hispanic or Latino (of any race)	48.5%
Education	
High school graduate or higher	75.2%
Disability Status	
Population 5 years and over	11.75%

Source: U.S. Census Bureau American Community Survey 2011-2015 5-Year Estimates, www.census.gov/
*Based on a 2015 estimated population of 510,451
**Of the 95.4% reporting one race

For information about how some of these demographics affect social vulnerability and how they compare to other Fresno County jurisdictions, California, and the United States, see "Social Vulnerability" in Section 4.3.1 Fresno County Vulnerability and Assets at Risk of the main plan. A more in-depth look at the population of the City of Fresno, including the City's special needs populations, is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement).

E.2 Hazard Identification and Summary

The City of Fresno's planning team identified the hazards that affect the City and summarized their frequency of occurrence, spatial extent, potential magnitude, and significance specific to Fresno (see Table E.5). In the context of the plan's planning area, there are no hazards unique to Fresno.

Table E.5: City of Fresno—Hazard Summaries

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance
Agricultural Hazards	Limited	Highly Likely	Critical	Low
Avalanche	N/A	N/A	N/A	N/A
Dam Failure	Significant	Unlikely	Limited	Medium
Drought	Significant	Likely	Critical	High
Earthquake	Extensive	Occasional	Critical	Medium
Flood/Levee Failure	Significant	Occasional	Critical	High
Hazardous Materials Incident	Significant	Likely	Critical	High
Human Health Hazards:				
Epidemic/Pandemic	Extensive	Occasional	Critical	Medium
West Nile Virus	Limited	Highly Likely	Negligible	Low
Landslide	Limited	Unlikely	Negligible	Low
Severe Weather				
Extreme Cold/Freeze	Significant	Occasional	Negligible	Low
Extreme Heat	Extensive	Highly Likely	Limited	Medium
Fog	Extensive	Likely	Limited	Medium
Heavy Rain/Thunderstorm/ Hail/Lightning	Extensive	Highly Likely	Limited	Low
Tornado	Extensive	Occasional	Negligible	Low
Windstorm	Extensive	Likely	Limited	Medium
Winter Storm	Extensive	Highly Likely	Negligible	Low
Soil Hazards:				
Erosion	No Data	Likely	No Data	Low
Expansive Soils	No Data	Occasional	No Data	Low
Land Subsidence	Limited	Occasional	No Data	Low
Volcano	Extensive	Unlikely	Negligible	Low
Wildfire	Extensive	Highly Likely	Critical	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths

Probability of Future Occurrences Highly Likely: Near 100% chance of occurrence in next year, or happens every year. Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less. Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years. Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.	Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid **Significance** Low: minimal potential impact Medium: moderate potential impact High: widespread potential impact

E.3 Vulnerability Assessment

The intent of this section is to assess the City of Fresno's vulnerability separate from that of the planning area as a whole, which has already been assessed in Section 4.3 Vulnerability Assessment in the main plan. This vulnerability assessment analyzes the population, property, and other assets at risk to hazards ranked of medium or high significance that may vary from other parts of the planning area.

The information to support the hazard identification and risk assessment for this Annex was collected through a Data Collection Guide, which was distributed to each participating municipality or special district to complete during the original outreach process in 2009. Information collected was analyzed and summarized in order to identify and rank all the hazards that could impact anywhere within the County, as well as to rank the hazards and identify related vulnerabilities unique to each jurisdiction. In addition, the City of Fresno's HMPC team members were asked to validate the matrix that was originally scored in 2009 based on the experience and perspective of each planning team member relative to the City of Fresno.

Each participating jurisdiction was in support of the main hazard summary identified in the base plan (See Table 4.1). However, the hazard summary rankings for each jurisdictional annex may vary slightly due to specific hazard risk and vulnerabilities unique to that jurisdiction (See Table E.5). Identifying these differences helps the reader to differentiate the jurisdiction's risk and vulnerabilities from that of the overall County.

Note: The hazard "Significance" reflects overall ranking for each hazard, and is based on the City of Fresno's HMPC member input from the Data Collection Guide and the risk assessment developed during the planning process (see Chapter 4 of the base plan), which included a more detailed qualitative analysis with best available data.

The hazard summaries in Table E.5 reflect the hazards that could potentially affect the City. Those of Medium or High significance for the City of Fresno are identified below. The discussion of vulnerability for each of the following hazards is located in Section E.3.2 Estimating Potential

Losses. Based on this analysis, the priority hazards (High Significance) for mitigation include drought, flood/levee failure, and hazardous materials incidents.

- dam failure
- drought
- earthquake
- epidemic/pandemic
- extreme heat
- flood/levee failure
- fog
- hazardous materials incidents
- wildfire
- windstorm

Other Hazards

Hazards assigned a Significance rating of Low and which do not differ significantly from the County ranking (e.g., Low vs. High) are not addressed further in this plan, and are not assessed individually for specific vulnerabilities in this section. In the City of Fresno, those hazards ranked Low are as follows:

- agricultural hazards*
- human health hazards: West Nile Virus
- landslide
- severe weather: heavy rain/thunderstorm/hail/lightning, tornado
- soil hazards
- volcano
- extreme cold
- winter storm

Note on Agricultural Hazards*: Agricultural hazards are ranked Low in the City of Fresno than for the County overall (ranked High) because very little land in the City is used for agricultural purposes.

Additionally, the City's Committee members decided to rate several hazards as Not Applicable (N/A) to the planning area due to a lack of exposure, vulnerability, and no probability of occurrence. **Avalanche** is considered Not Applicable (N/A) to the City of Fresno.

E.3.1 Assets at Risk

This section considers Fresno's assets at risk, including values at risk; critical facilities and infrastructure; historic, cultural, and natural resources; economic assets; and growth and development trends.

Values at Risk

The following data on property exposure is derived from the Fresno County 2017 Parcel and Assessor data. This data should only be used as a guideline to overall values in the City as the

information has some limitations. The most significant limitation is created by Proposition 13. Instead of adjusting property values annually, the values are not adjusted or assessed at fair market value until a property transfer occurs. As a result, overall value information is likely low and does not reflect current market value of properties. It is also important to note that in the event of a disaster it is generally the value of the infrastructure or improvements to the land that is of concern or at risk. Generally, the land itself is not a loss. Table E.6 shows the 2017 values at risk broken down by property type for the City of Fresno.

Table E.6: 2017 Property Exposure for the City of Fresno by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Agricultural	76	53	$2,887,304	$2,887,304	$5,774,608
Commercial	6,110	24,004	$5,471,778,084	$5,471,778,084	$10,943,556,168
Exempt	1,012	3,881	$0	$0	$0
Industrial	2,575	5,630	$1,420,216,900	$2,130,325,350	$3,550,542,250
Multi-Residential	5,793	52,504	$2,416,885,833	$1,208,442,917	$3,625,328,750
Open Space	1	1	$150,882	$150,882	$301,764
Residential	113,468	117,771	$15,122,142,902	$7,561,071,451	$22,683,214,353
Unknown	2	2	$530,082	$530,082	$1,060,164
Total	**129,037**	**203,846**	**$24,434,591,987**	**$16,375,186,070**	**$40,809,778,057**

Source: Fresno County 2017 Parcel and Assessor data

Since the 2009 Plan, the City of Fresno has experienced notable increases in agricultural, commercial, and residential properties and property values at risk. Compared to improved values from the Fresno County Assessor's Office's 2007 Certified Roll Values, agricultural improved value has increased by 254.2 percent, commercial improved value has increased by 299.8 percent and total residential improved value has increased by 265.8 percent. Part of this dramatic increase in exposure of commercial and residential properties can be attributed to annexations of previously unincorporated County land that have occurred within the last decade.

Critical Facilities and Infrastructure

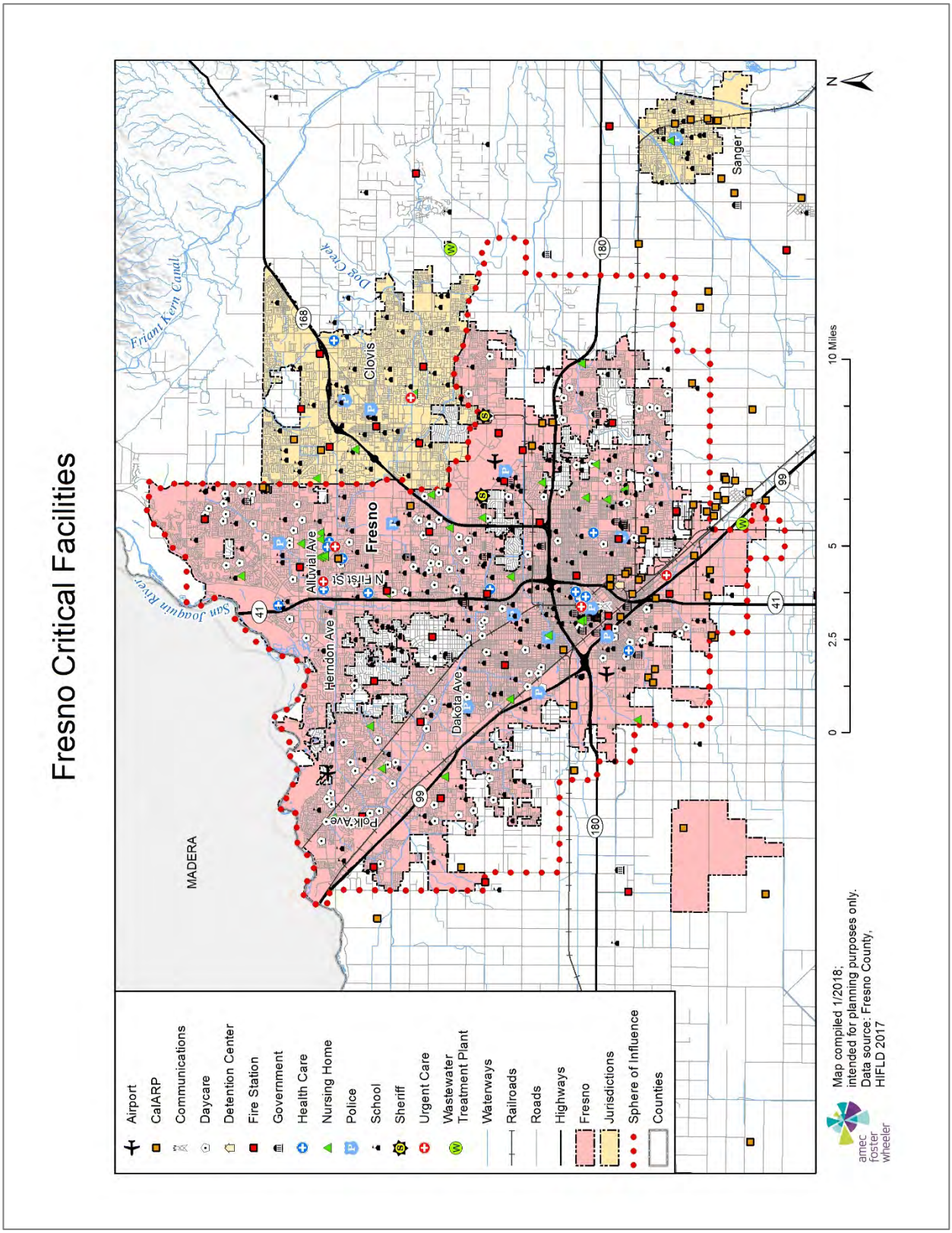
A critical facility may be defined as one that is essential in providing utility or direction either during the response to an emergency or during the recovery operation. An inventory of critical facilities in the City of Fresno from Fresno County GIS is provided in Table E.7 and mapped in Figure E.2.

Table E.7: City of Fresno's Critical Facilities

Critical Facility Type	Number
Airport	3
Behavioral Health	4
CalARP	28
Colleges & Universities	14
Communications	1
County Government	4
Courthouse	1
Daycare	155
Department of Agriculture	2
Department of Public Health	4
Department of Public Works	1
Department of Social Services	9
Detention Center	4
District Attorney	2
Fire Station	21
General Services	3
Health Care	12
Nursing Home	27
Police	10
School	183
Sheriff	3
Supplemental College	4
Urgent Care	4
Total	**499**

Source: Fresno County, HIFLD 2017

Figure E.2: City of Fresno's Critical Facilities



The list of specific critical facilities and community assets is maintained by the City of Fresno Police Department. The Fresno Urban Area Critical Infrastructure List is considered confidential and may be accessed through the Fresno Police Department Homeland Security Division.

Historic, Cultural, and Natural Resources

Historic and Cultural Sites

The Cultural Resource Facility located on the California State University, Bakersfield campus maintains a database, maps, and descriptive surveys of prehistoric sites in the Fresno area. Details of the locations are kept confidential due to the risk of theft or vandalism of artifacts. The general location of these sites is along the San Joaquin River and its bluffs, where permanent Native American settlements were established near a permanent water supply and seasonal salmon fishery.

The City of Fresno maintains a local official register of historic resources (available from the historic preservation officer in the City's Planning and Development Department). There are approximately 284 properties on the register. Twenty-one of the properties were demolished or destroyed by fire after being placed on the list, and three other properties have been relocated to sites outside the City of Fresno. The local register includes 31 properties that are on the National Register of Historic Places (see Table E.8).

Table E.8: City of Fresno's Properties on the National Register of Historic Places

Property Name	Address	Date Listed
Azteca Theater	836-840 F Street	4/21/2017
Bank of Italy	1015 Fulton Mall	10/29/1982
Brix, H. H., Mansion	2844 Fresno Street	9/15/1983
Einstein House	1600 M Street	1/31/1978
Forestiere Underground Gardens	5021 W. Shaw Avenue	10/28/1977
Fresno Bee Building	1555 Van Ness Avenue	11/1/1982
Fresno Brewing Company Office and Warehouse	100 M Street	1/5/1984
Fresno County Hall of Records	2281 Tulare Street	12/22/2011
Fresno Memorial Auditorium	2425 Fresno Street	5/10/1994
Fresno Republican Printery Building	2130 Kern Street	1/2/1979
Fresno Sanitary Landfill	West and Jensen Avenues	8/7/2001
Holy Trinity Armenian Apostolic Church	2226 Ventura Street	7/31/1986
Hotel Californian	851 Van Ness Avenue	4/21/2004
Kearney, M. Theo, Park and Mansion	7160 Kearney Boulevard	3/13/1975
Kindler, Paul, House	1520 E. Olive Avenue	10/29/1982
Maulbridge Apartments	2344 Tulare Street	5/6/1982
Meux House	1007 R Street	1/13/1975
Old Administration Building, Fresno City College	1101 University Avenue	5/1/1974
Old Fresno Water Tower	2444 Fresno Street	10/14/1971
Pantages, Alexander, Theater	1400 Fulton Street	2/23/1978
Physicians Building	2607 Fresno Street	11/20/1978

Property Name	Address	Date Listed
Rehorn House	1050 S Street	1/8/1982
Romain, Frank, House	2055 San Joaquin Street	1/11/1982
San Joaquin Light & Power Corporation Building	1401 Fulton Street	1/3/2006
Santa Fe Hotel	935 Santa Fe Avenue	3/14/1991
Santa Fe Passenger Depot	2650 Tulare Street	11/7/1976
Southern Pacific Passenger Depot	1033 H Street	3/21/1978
Tower Theatre	1201 N. Wishon Avenue	9/24/1992
Twining Laboratories	2527 Fresno Street	3/26/1991
Warehouse Row	722, 744, and 764 P Street	3/24/1978
YWCA Building	1660 M Street	9/21/1978

Source: National Register of Historic Places, www.nps.gov/nr/

Other historic resources in the City of Fresno include the following historic districts:

- The Porter Tract Historic District (45 homes)
- The Chandler Field/Fresno Municipal Airport Historic District (four historic structures)
- The Wilson Island Historic District (78 homes)
- The Huntington Boulevard Historic Districts (81 homes)

As comprehensive as the City's register may be, it does not include all properties in the City with potential historic or cultural significance. The list is continually being expanded as sites are discovered through routine analysis of proposed development areas and through proposed new listings of historic districts. The pool of potentially historic properties also changes through time, since federal law provides for a 50-year retrospective review, which now encompasses the post-World War II building boom era. Ten properties that were recommended for the City's register but were denied inclusion by the Fresno City Council are still recognized for their historic/cultural significance (heritage properties), which is taken into account when any actions are undertaken on them pursuant to provisions of the California Environmental Quality Act. (Three of these properties have been since been demolished.)

While a detailed assessment of seismic and flood risks for the listed properties in Fresno is currently beyond the available staff resources of the City's Historic Preservation Office, it can be generally assumed that most of the structures have not been seismically reinforced and that their masonry is vulnerable to strong ground shaking.

While many of the structures are in Fresno's old downtown and were built when this area was largely within the 100-year floodplain of the Fresno Stream Group, efforts by the Fresno Metropolitan Flood Control District in conjunction with the U.S. Army Corps of Engineers and the City of Fresno have provided for flood detention structures and ponding basins that have greatly reduced the size and extent of the floodplain in the downtown, helping to preserve these historic resources.

Natural Resource Areas

San Joaquin River Corridor

While the City maintains many community and neighborhood parks, its natural resources are primarily along the San Joaquin River. Owing to the year-round presence of water, the river bottom and bluffs host the richest aquatic and riparian forest biota in the City. It is in this area where migratory waterfowl and federally and state-listed endangered wildlife are most likely be encountered. These species include the valley elderberry longhorn beetle, the giant garter snake, and the American bald eagle (recently recommended for delisting from the National Endangered Species list).

Over past decades, land in the river corridor has been purchased and aggregated by state agencies (Department of Fish and Game, San Joaquin River Conservancy), by nonprofit groups (San Joaquin River Parkway Trust, Fresno Sportsmen's Club), and by the City and County (the City's Woodward Park and Milburn Unit, the County's Lost Lake Park). The ultimate goal of the San Joaquin River Conservancy Plan is to fashion a regional parkway with continuity of wildlife corridors and to manage it for joint recreational, habitat conservation, and floodplain protection uses.

Due to its location, this natural resource area is flood-prone. In some areas, this risk has been increased due to removal of massive amounts of sand and gravel (from mining), which lowered the ground surface over past decades. While the native riparian plants and animals have largely evolved with coping mechanisms for periodic severe flooding, any developed recreation facilities would be at risk. The face of the bluff is also very vulnerable to wildfire because of its vegetative overgrowth and nearly vertical slopes. Fire prevention efforts are difficult here because the soils are too unstable for vegetative removal projects or for irrigation that would keep the plants well-watered.

Vernal Pool Areas

In the northerly parts of the City, outside the river corridor, certain clay soils have the capacity to form impermeable hardpans and layers that do not allow rapid percolation of rainwater. During the rainy season, shallow vernal pools form that are populated by a host of specialized plants and animals. Many species associated with vernal pools are federally and state-listed species (e.g., the California tiger salamander, various types of fairy shrimp crustaceans, orcutt grass, button celery species, meadowfoam, and owl clover). Vernal pools are also heavily utilized by nonlisted species, such as migratory waterfowl, rodents, furbearing predators, and raptors that prey on other animals.

Wildfire is not considered a major risk to these natural communities, because they evolved with dry season fires as a common occurrence (the plants have very resistant seeds and the crustaceans and amphibians go into protected parts of their life cycles such as deep dormancy). Human encroachment through agriculture and land development is the greatest risk to vernal pool areas. If the clay layers are disrupted by "deep ripping" plowing, water cannot accumulate on the surface and the pools will not form. If the land is subjected to year-round irrigation, specially adapted

vernal pool species will be out-competed by other species. Conversion of land to urban development with structures, paving, lawns, pets, and people will destroy vernal pool natural communities.

Economic Assets

The City of Fresno's economic sector includes both private and public entities that have been compiled into clusters in order to identify key economic assets. These ten clusters, known as the Regional Job Initiative (RJI) clusters, are Advanced Manufacturing, Clean Energy, Construction, Food Processing, Healthcare, Info Processing (Call Centers, Logistics, and Distribution), Software Development, Tourism, and Water Technology. Among these clusters are major employers like Saint Agnes, Pelco, Gottschalks, and Ruiz Foods that both boost Fresno's economic growth and provide employment opportunities.

If a disaster struck the City, it could have a severe impact on Fresno's economic assets. Sectors of greatest concern include all the RJI clusters, but in particular Food Processing, which includes the agricultural industry, and Healthcare.

Growth and Development Trends

The City of Fresno is growing at a rapid pace. Its expansion from incorporation in 1885 to the present day (August 2017) is illustrated in Figure E.3. Even more growth is anticipated in the years to come, based on current trends.

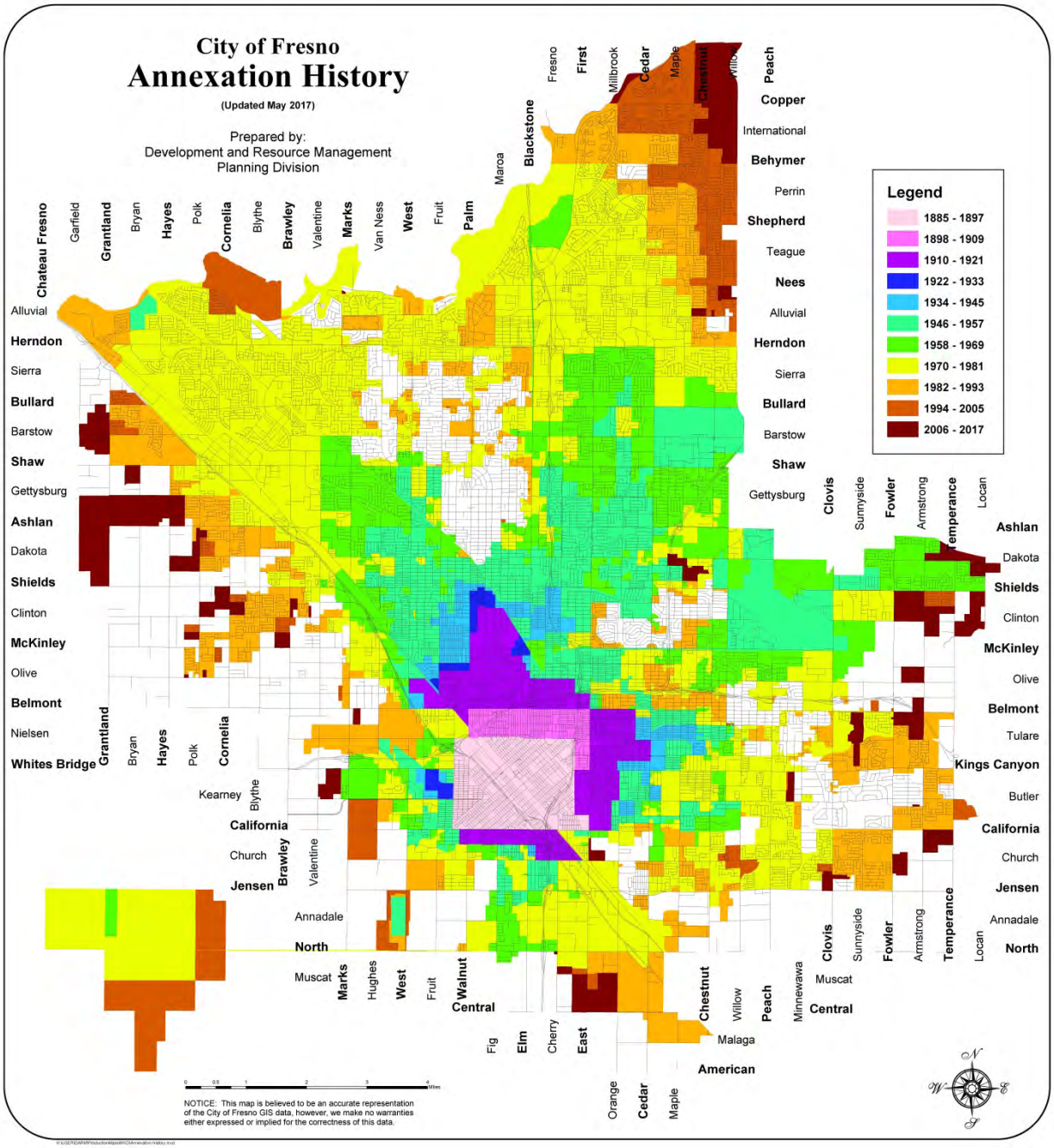
Table E.9 illustrates how the City has grown in terms of population and number of housing units between 2011 and 2017 alone.

Table E.9: City of Fresno's Change in Population and Housing Units, 2011-2017

2011 Population	2017 Population Estimate	Estimated Percent Change 2011-2017	2011 # of Housing Units	2017 Estimated # of Housing Units	Estimated Percent Change 2011-2017
498,664	525,832	+5,49	172,171	178,819	+3.86

Source: California Department of Finance, www.dof.ca.gov/Forecasting

Figure E.3: City of Fresno's Annexation History



Source: City of Fresno Development Department. This map is believed to be an accurate representation of the City of Fresno GIS data, however, we make no warranties either expressed or implied for the correctness of this data.

By December 31, 2035 (the "Horizon" year of the most recent Fresno General Plan), it is estimated that 771,000 people will reside in the Fresno Metropolitan Area (which would include County islands and areas inside the City's Sphere of Influence but not yet annexed). This figure of 771,000 would be 64 percent of the projected 2035 Fresno County population of 1,201,416 (State of California Department of Finance population projections).

As of August of 2017, the City of Fresno comprised 115.3 square miles of annexed (incorporated) land within its 161.8-square mile Sphere of Influence. Development had reached the natural and political northerly boundary of the City, the San Joaquin River, and began expanding to the west and southeast through conversion of rural residential and agricultural land. Within the Sphere of Influence, there continued to be "County islands" and partially urbanized fringe areas. An urban unification annexation program may reduce the numbers and sizes of these enclaves in the coming decade.

The Fresno General Plan made a concerted effort to revitalize the City's downtown by balancing new growth areas to geographically recenter the downtown. With construction of a major sewer trunk along the Grantland Avenue alignment and proposed construction of new wastewater and water treatment plants in the southeastern area, the City's future growth is expected to concentrate primarily to the west and southeast.

The Fresno Metropolitan Flood Control District (FMFCD) has commenced major flood control facility construction on Fancher Creek in the eastern portion of the City's Sphere of Influence. Since the Fresno General Plan was completed in December 2014, the FMFCD will compile technical studies and update its master service plan in conjunction with the City's land use plan for this new growth area.

The Fresno General Plan also directed that new development be more compact and that single-family residential densities be higher than the City's traditional 4± dwelling units/acre pattern for subdivisions. The recently adopted Fulton Corridor Specific Plan and Downtown Neighborhoods Community Plan and other plan amendments and projects in process (and proposed in the future) feature smaller lots, multi-story housing, multi-family units, and reduced setbacks.

Unless the cost of manufactured housing units would provide a substantial savings over site-built homes, it is not expected that the proportion of manufactured housing in the City of Fresno will greatly increase. It is possible that there will be some increase as producers of these units create models with appropriate roof pitches and other features to meet the City's design review standards.

More information about the City of Fresno's growth and current housing stock is available in the City of Fresno General Plan 2015-2023 Housing Element commissioned by the City of Fresno Development and Resource Management Department and prepared by MIG, Inc (available at www.fresno.gov/housingelement). More general information on growth and development in Fresno County as a whole can be found in "Growth and Development Trends" in Section 4.3.1 Fresno County Vulnerability and Assets at Risk of the main plan.

E.3.2 Estimating Potential Losses

Note: This section details vulnerability to specific hazards, where quantifiable, and/or where (through HMPC member input) it differs from that of the overall County.

Table E.6 above shows Fresno's exposure to hazards in terms of number and value of structures. Fresno County's parcel and assessor data was used to calculate the improved value of parcels. The most vulnerable structures are those in the floodplain (especially those that have been flooded in the past), unreinforced masonry buildings, and buildings built prior to the introduction of modern day building codes. No further information on vulnerable structures is available. Impacts of past events and vulnerability to specific hazards are further discussed below (see Section 4.1 Hazard Identification for more detailed information about these hazards and their impacts on Fresno County).

Agricultural Hazards

Agricultural hazards are ranked with a Low significance in the City of Fresno; lower than for the County overall (ranked High) because very little land in the City is used for agricultural purposes. Agricultural losses due to hazard events have greater economic impact on the small communities and rural areas of the County than on the City of Fresno. However, ornamental and garden plants in the City, and pets and incidental livestock kept within City limits, may become involved in any countywide responses to crop pests or infectious agents, because these urban plants and animals provide reservoirs for the diseases and crop pests that threaten the County's agriculture.

Dam Failure

The National Inventory of Dams lists five dams located in the City of Fresno, including the Redbank Creek Detention basin, Fancher Creek Detention, Friant Millerton Road Embankment A, Redbank, and Friant Dike 3.

Drought

Annual rainfall in the City of Fresno is typically 12-14 inches. This makes the region vulnerable to episodic drought and to chronic drawdown of aquifer levels (the U.S. Environmental Protection Agency has designated the groundwater below Fresno as a sole source aquifer). Water in this aquifer has historically flowed through permeable strata from north and northeast toward the south and west, but the aquifer has been so affected by drawdown that a "cone of depression" has been created, reversing the historic flow directions (the "groundwater gradient") in portions of west and south Fresno.

In the last 10 years the City of Fresno has made strides to reduce dependence on groundwater by setting a course to implement water plans, which include the Urban Water Management Plan, Recycled Water Waster Plan, and the recently adopted Water Capital Program. A surface water treatment plant is currently under construction in Southeast Fresno and should be completed by 2018. When operational, the plant will maximize use of Fresno's surface water allocations during

normal years and allow the City to reduce overuse of groundwater. Recycled water use will also grow in Fresno with the new recycled water mains now being constructed. The City has plans to use 25,000 acre-feet per year of recycled water for irrigating open spaces, parks, street medians and golf courses.

Earthquake

The seismic hazard in the City of Fresno is low relative to California coastal and mountain communities and is lower than in the Sierra and western areas of Fresno County. There are no known earthquake faults underlying Fresno, and the City has never been the epicenter of a known seismic event. However, Fresno is considered to have a moderate risk of earthquake damage due to the presence of major fault systems to the west, south, and east and due to Fresno's large population and number of buildings, critical facilities, and infrastructure and other development that could be vulnerable to more severe ground shaking.

Historically, Fresno has sustained very little damage from major earthquakes occurring on California's major faults: the Owens Valley earthquake of 1872 toppled an unreinforced masonry (brick) church steeple. More recent major earthquakes in the past four decades (with epicenters near Coalinga and the Bay Area) have resulted in perceptible tall building swaying in Fresno, minor injuries (attributable to shelved items falling), and slight damage (e.g., minor cracked plaster, etc.). To date, no soil liquefaction has been observed in Fresno from any seismic event.

The most serious impacts of an earthquake in Fresno would probably arise from damage to large dams in the Sierra Nevada on the upper reaches of the San Joaquin River very close to active Long Valley Caldera-related faults. Should either of the two most easterly (and largest) dams in this area be severely damaged or breached, the resulting sequential dam failures could cause floodwaters to overtop Friant Dam northeast of the City. While the dam failure inundation map for Friant shows that most of the flooded area would be expected in the northwest part of town (where the confining river bluffs are not as high), there are some residences and important infrastructure in the river channel itself that would be inundated and gravely damaged (or destroyed), including highway bridges and the inlet of the Friant-Kern Canal, which supplies Bureau of Reclamation surface water to the Fresno area and to other communities in the southern San Joaquin Valley.

Epidemic/Pandemic

Fresno's population includes many residents who have limited access to health care, with causes related to low household income levels, lack of insurance coverage, a limited number of primary health care facilities and acute care beds, a low ratio of public health and medical professionals to population, and language barriers. Highly communicable diseases tend to affect a large percentage of the City, perhaps due to large household size and the mobility of the population. If a highly communicable disease outbreak occurred that caused serious or life-threatening illness for most infected persons, health care and other public service systems would experience disruption or breakdown and would require outside intervention with resources from other communities, the state, or the federal government.

Extreme Cold/Freeze

Freeze events occur occasionally in Fresno, but impacts are greater to the agriculture industry in the County than to the City. In January 2007, overnight minimum temperatures fell below freezing between January 6 and 10. The event led to a presidential disaster declaration due to the estimated $710 million in agricultural damage in the Central and South Valley. The 2007 event occurred in another eight-year interval after the devastating citrus freezes of 1998 and 1990. The event caused frozen pipes in Fresno but little other property damage. The City also has a plan for freezing temperature events and opens warming centers. These centers are primarily geared toward the homeless population.

Extreme Heat

Fresno uses a local version of the California State Plan for Extreme Heat. This plan was used during the extreme heat event during the summer of 2006 and worked well. The City operates cooling centers, which are primarily geared toward the homeless. Public notification for extreme heat events is conducted through the Public Affairs office in coordination with Fresno County.

Expansive Soils

These types of soils occur in northern Fresno in the far northeastern portions of its Sphere of Influence (in the "Copper River" area). Expansive clay soils can cause cavitation over time and require special construction standards for foundations.

Flood

As noted in the preceding section, there is some flood risk to the City from San Joaquin River major dam failure inundation, but the more common flood risk, repetitively experienced in Fresno, is that of shallow "sheet" flooding from major precipitation events. Except for the San Joaquin River, streams in the Fresno-Clovis Metropolitan Area originate in the Sierra foothills to the east and extend into the valley floor west of State Route 99 by way of dual-use irrigation and storm runoff channels and disperse into numerous smaller irrigation canals. Overflow from these canals and urban stormwater from intense precipitation events is sent back to the San Joaquin River or to farmland southwest of Fresno via spillway channels.

In the City of Fresno, these canals and channels are under control of the Fresno Irrigation District, an independent public agency, but their use during storm events is shared by another independent district, the Fresno Metropolitan Flood Control District (FMFCD). The FMFCD was created to develop flood control facilities to prevent further repetitive losses created by the Fresno Stream Group and to provide an urban drainage network. This District is responsible for administering a Storm Drainage and Flood Control Master Plan. The City's municipal code supports these efforts by including a Drainage Fee Ordinance to ensure that grading and development comply with the FMFCD's Master Plan and standards and provide proportionate shares of storm drain and ponding basin infrastructure.

The City of Fresno's Floodplain Ordinance further coordinates and supports FMFCD efforts. This ordinance and the Fresno General Plan Safety Element policies require conformance to FEMA floodplain management policies and to those of California's Central Valley Flood Prevention Board (which regulates the designated floodway along the San Joaquin River channel). Still, in areas not completely developed to urban standards, areas where the urban drainage network is not yet completed, and in some County "island" areas (land within the City that the County has authority over), stormwater drainage facilities may not prevent localized shallow flooding during intense runoff events.

According to FEMA's 2016 Flood Insurance Study (FIS), the following major canals and ditches run through the City:

- **Central Canal** flows southwest through the southeastern part of the City of Fresno.
- **Dry Creek Canal** begins at the confluence of Mill Ditch and Herndon Canal, just downstream of North Millbrook Avenue, and flows southwest through the southwestern portion of the City.
- **Fancher Creek Canal** flows southwest along the eastern corporate limits of the City of Fresno and joins Central Canal at the southeast corner of the City.
- **Herndon Canal** begins at the confluence of Mill Ditch and Dry Creek Canal. It flows west through the center of the City of Fresno, then flows northwest through the northwestern part of the City.
- **Mill Ditch** flows west along East McKinley Avenue to its confluence with Herndon and Dry Creek Canals.

The FIS details the City of Fresno's flood history as follows:

In February 1884, flood flows from streams of the Fresno-Clovis group inundated the business section of the City of Fresno. Frequent flooding was a problem in the City throughout the 1880. Suburban areas of the City were flooded in spring 1920; the downtown area was inundated in 1923; flooding occurred in the Fig Garden area in 1936; and parts of the City, especially in the northeast section, were flooded in March 1938. Since the 1938 flood, which had an estimated discharge of 2,700 cubic feet per second (cfs) on Dry Creek at the Big Dry Creek Dam site, high flows occurred on that stream in December 1955 (3,800 cfs), January 1969 (5,700 cfs), and February 1969 (4,500 cfs). During December 1955, approximately 500 acres of agricultural and suburban land were flooded by overflow from irrigation canals, and damage, mostly to public facilities, totaled approximately $50,000. The largest and most damaging flood period was January and February 1969, when the combined discharges of Dry, Dog, Redbank, Fancher, and Mud Creeks flooded an estimated 14,500 acres and caused almost $4.7 million in damage. Most of the flooding was in the eastern and northeastern parts of the City. It occurred because many of the streams in the Fresno-Clovis group discharged floodwater into various irrigation canals, causing them to overflow.

Values at Risk

Following the methodology described in Section 4.3.2 Vulnerability of Fresno County to Specific Hazards, a flood map for the City of Fresno was created (see Figure E.4). Tables E.10 and E.11 summarize the values at risk in the City's 100-year and 500-year floodplain, respectively. These tables also detail loss estimates for each flood.

Figure E.4: City of Fresno's 100- and 500-Year Floodplains

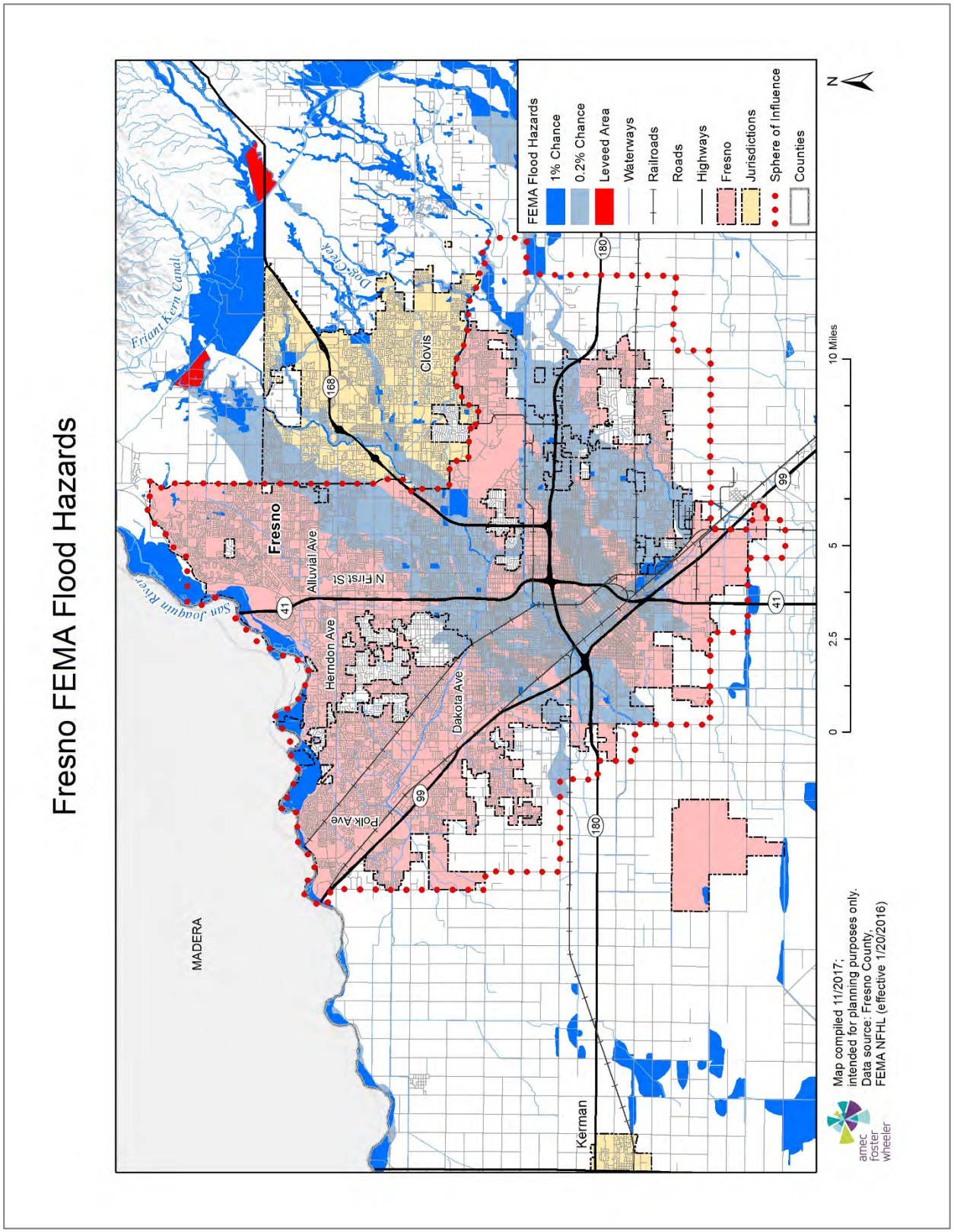


Table E.10: City of Fresno's FEMA 1% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	1	0	$60,933	$60,933	$121,866	$30,467
Commercial	23	210	$6,222,246	$6,222,246	$12,444,492	$3,111,123
Exempt	29	35	$0	$0	$0	$0
Industrial	70	107	$30,681,072	$46,021,608	$76,702,680	$19,175,670
Multi-Residential	11	84	$2,529,983	$1,264,992	$3,794,975	$948,744
Residential	97	120	$23,269,875	$11,634,938	$34,904,813	$8,726,203
Total	**231**	**556**	**$62,764,109**	**$65,204,716**	**$127,968,825**	**$31,992,206**

Sources: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

Table E.11: City of Fresno's FEMA 0.2% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	29	29	$746,974	$746,974	$1,493,948	$373,487
Commercial	2,814	9,030	$1,574,492,657	$1,574,492,657	$3,148,985,314	$787,246,329
Exempt	381	1,404	$0	$0	$0	$0
Industrial	745	1,435	$309,126,790	$463,690,185	$772,816,975	$193,204,244
Multi-Residential	2,299	20,013	$797,001,401	$398,500,701	$1,195,502,102	$298,875,525
Residential	31,581	32,817	$2,677,387,750	$2,677,387,750	$5,354,775,500	$1,338,693,875
Total	**37,849**	**64,728**	**$5,358,755,572**	**$5,114,818,267**	**$10,473,573,839**	**$2,618,393,460**

Sources: Fresno County 2017 Parcel and Assessor data; FEMA 2009 FIRM

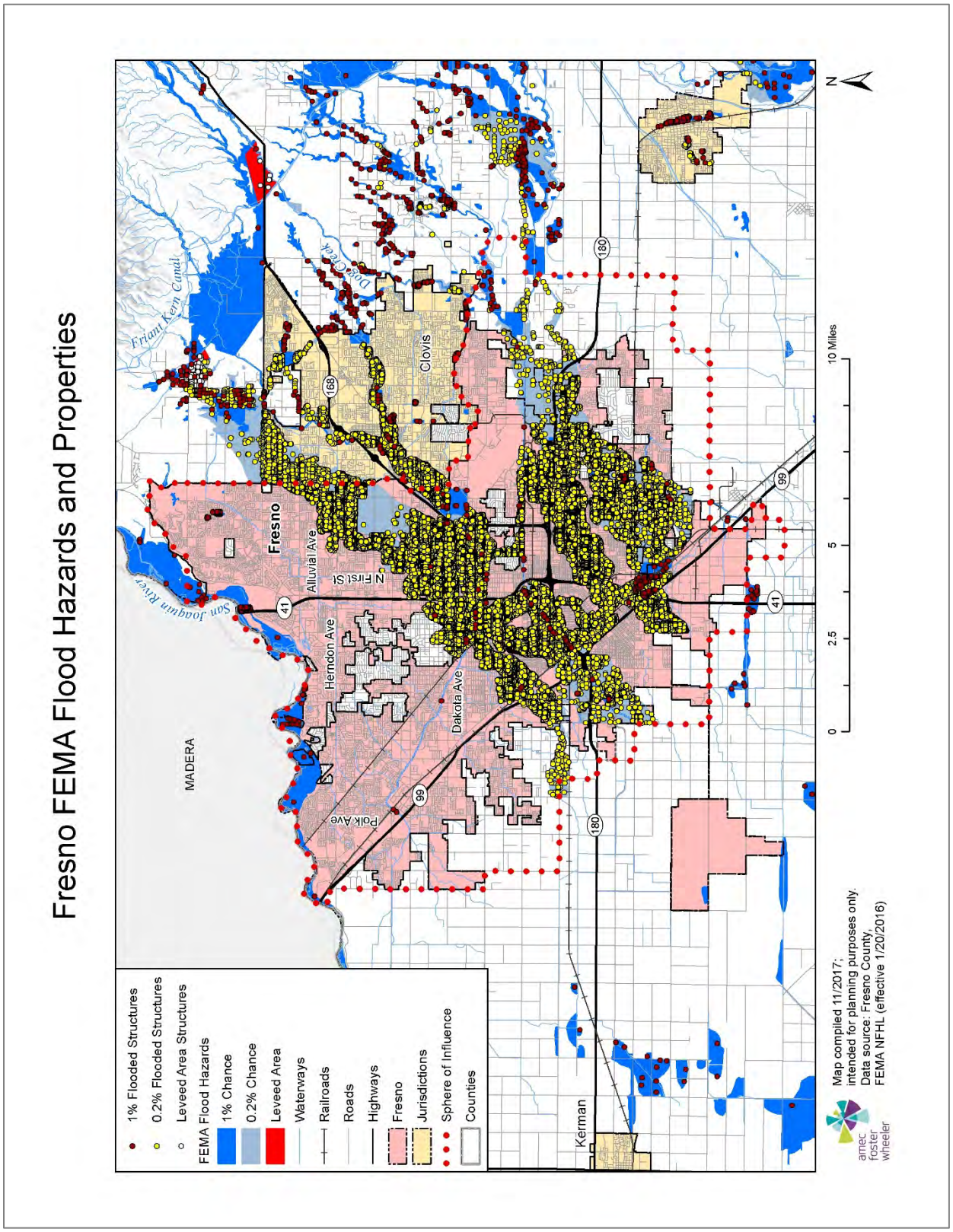
Based on this analysis, the City of Fresno has significant assets at risk to the 100-year and greater floods. There are 231 improved parcels within the 100-year floodplain for a total value of roughly $128 million, including building and content value. An additional 37,849 improved parcels valued at roughly $10.5 billion fall within the 500-year floodplain.

Applying the 25 percent damage factor as described in Section 4.3.2, there is a 1 percent chance in any given year of a 100-year flood causing roughly $32.0 million in damage in the City of Fresno and a 0.2 percent chance in any given year of a 500-year flood causing roughly $2.65 billion in damage (combined damage from both floods).

Properties at risk to flooding are shown in relation to the mapped floodplains in Figure E.5.

Limitations: This model may include structures in the floodplains that are elevated at or above the level of the base-flood elevation, which will likely mitigate flood damage. Also, the assessed values are well below the actual market values. Thus, the actual value of assets at risk may be significantly higher than those included herein.

Figure E.5: City of Fresno's Properties at Risk in the 100- and 500-Year Floodplains



In addition to the 100-year and 500-year floodplains mapped by FEMA, the California Department of Water Resources maintains Best Available Maps (BAM) which include the floodplains in the Sacramento and San Joaquin River Basins, based on a study performed in 2002 by the U.S. Army Corps of Engineers (USACE). Though limited to the San Joaquin River as a flood source and thus not as comprehensive as the FEMA FIRM, the USACE study shows additional differentiation in flood risk by modeling the 200-year floodplain (the flood with a 0.5 percent annual chance of occurring). Table E.12 summarizes the values at risk by property type within the 200-year floodplain and loss estimates to the 200-year storm using the same methodology described above.

Table E.12: City of Fresno's FEMA 0.5% Annual Chance Flood Hazard by Property Type

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value	Loss Estimate
Agricultural	1	0	$60,933	$60,933	$121,866	$30,467
Commercial	3	139	$4,322,495	$4,322,495	$8,644,990	$2,161,248
Exempt	5	5	$0	$0	$0	$0
Residential	18	19	$12,103,507	$6,051,754	$18,155,261	$4,538,815
Total	**27**	**163**	**$16,486,935**	**$10,435,182**	**$26,922,117**	**$6,730,529**

Sources: Fresno County 2017 Parcel and Assessor data; CA DWR BAM; USACE

Based on this analysis, there are 27 parcels within the 200-year floodplain valued at nearly $10.5 million. Applying the 25 percent damage factor, there is a 0.5 percent annual chance of a 200-year flood causing $6.73 million in damage in the City of Fresno.

Insurance Coverage, Claims Paid, and Repetitive Losses

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. In addition to providing insurance for properties at risk of flooding, the program collects and publishes statistics on flood-related losses in participating jurisdictions.

NFIP insurance data for the City of Fresno indicates that as of March 30, 2017, there were 323 flood insurance policies in force in the City with $99,316,700 in coverage. This coverage represents a decline of nearly 200 policies over the last decade. Of the 323 policies, 277 were residential (267 for single-family homes) and 46 were nonresidential. 56 of the policies were in A zones (including A01-30, AE, AO, and AH), and the remaining 267 policies were in B, C, and X zones. Policies in B, C, and X zones have increased slightly over the past decade, while policies in the 100-year floodplain have dramatically declined.

There have been 81 historical claims for flood losses totaling $765,183; 73 were for residential properties; 37 were in A zones and 36 were in B, C, or X zones; and 54 were pre-FIRM structures (17 of the 19 post-FIRM structures with reported losses were in a B, C, or X zone). According to the FEMA Community Information System accessed 9/17/2018 there was one Repetitive Loss and no Severe Repetitive Loss properties located in the jurisdiction.

Population at Risk

Using parcel data from the County, the digital flood insurance rate map, population at risk was calculated for the 100-year and 500-year floods based on the number of residential properties at risk and the U.S. Census Bureau 2016 estimate for the average number of persons per household (3.17). The following are at risk to flooding in the City of Fresno:

- 100-year flood—342 people
- 500-year flood—107,400 people
- **Total flood**—107,742 people

Critical Facilities at Risk

Critical facilities are those community components that are most needed to withstand the impacts of disaster as previously described. Table E.13 lists the critical facilities in the City's 100- and 500-year floodplains.

Table E.13: Critical Facilities in the 100- and 500-Year Floodplains: City of Fresno

Critical Facility Type	100-Year Floodplain	500-Year Floodplain
Airport	-	1
Behavioral Health	-	1
CalARP	1	12
Colleges & Universities	-	5
Communications	-	1
County Government	-	2
Daycare	-	52
Department of Agriculture	-	2
Department of Public Health	-	2
Department of Social Services	-	6
District Attorney	-	1
Fire Station	-	7
General Services	-	3
Health Care	-	1
Nursing Home	-	12
Police	-	5
School	-	68
Urgent Care	-	2
Total	**1**	**183**

Source: Fresno County, HIFLD 2017

Hazardous Materials Incident

The following are the primary concerns for the City of Fresno related to hazardous materials release:

- Train derailments

- Kinder-Morgan pipeline
- Chevron petroleum pipelines
- Storage facilities

There are 28 CalARP hazardous materials facilities located in the City of Fresno. As detailed in Table E.14, there are 62 critical facilities located within a half mile of a CalARP facility.

Table E.14: Critical Facilities within ½ mile of CalARP Facility: City of Fresno

Critical Facility Type	Count
Colleges & Universities	1
Communications	1
County Government	4
Courthouse	1
Daycare	11
Department of Public Health	2
Department of Social Services	4
Detention Center	4
District Attorney	2
Fire Station	4
Health Care	3
Nursing Home	4
Police	1
School	17
Sheriff	1
Supplemental College	1
Urgent Care	1
Total	**62**

Source: Fresno County, HIFLD 2017

For more information on this hazard please refer to the main plan, Section 4.

Severe Weather: Fog

The risk and vulnerability factors for fog in the City is not unique from the County at large. Please refer to the main plan's discussion of the fog hazard in section 4.

Severe Weather: Windstorm

Fresno's prevailing winds are typically light and from the northwest. High wind conditions are occasionally created by strong weather fronts. Occasionally, there are funnel clouds of low intensity. Past structural damage has been light, infrequent, and very limited in geographic extent. Injuries have been extremely rare. Most of this damage has occurred secondary to large trees being blown over. The City's design wind load, the level of wind force that new structures are required to be engineered to withstand, is 70 mph.

Soil Hazards: Land Subsidence

Despite long-term over-drafting of groundwater that has lowered the static water table under Fresno by as much as 100 feet over the past century, ground level subsidence has not been noted in the vicinity of the City (this is probably due to the geologic strata underlying the City, which features layers of clay and hardpan interleaved with sand and gravel layers).

Wildfire

Similar to many areas of the County, Fresno has high temperatures in the summer with low rainfall creating fire hazard conditions. There is some wildfire risk in the San Joaquin River Bluff area in northern Fresno due to vegetation and steep slopes.

Following the methodology described in Section 4.3.2 Vulnerability of Fresno County to Specific Hazards, a wildfire map for the City of Fresno was created (see Figure E.6). An analysis was performed using GIS software to determine where populations, values at risk, and critical facilities are located within wildfire threat zones. Table E.15 shows the values at risk in the moderate wildfire threat zone (there are no values at risk in the high or very high threat zones). There are not any critical facilities in wildfire threat zones in the City of Fresno.

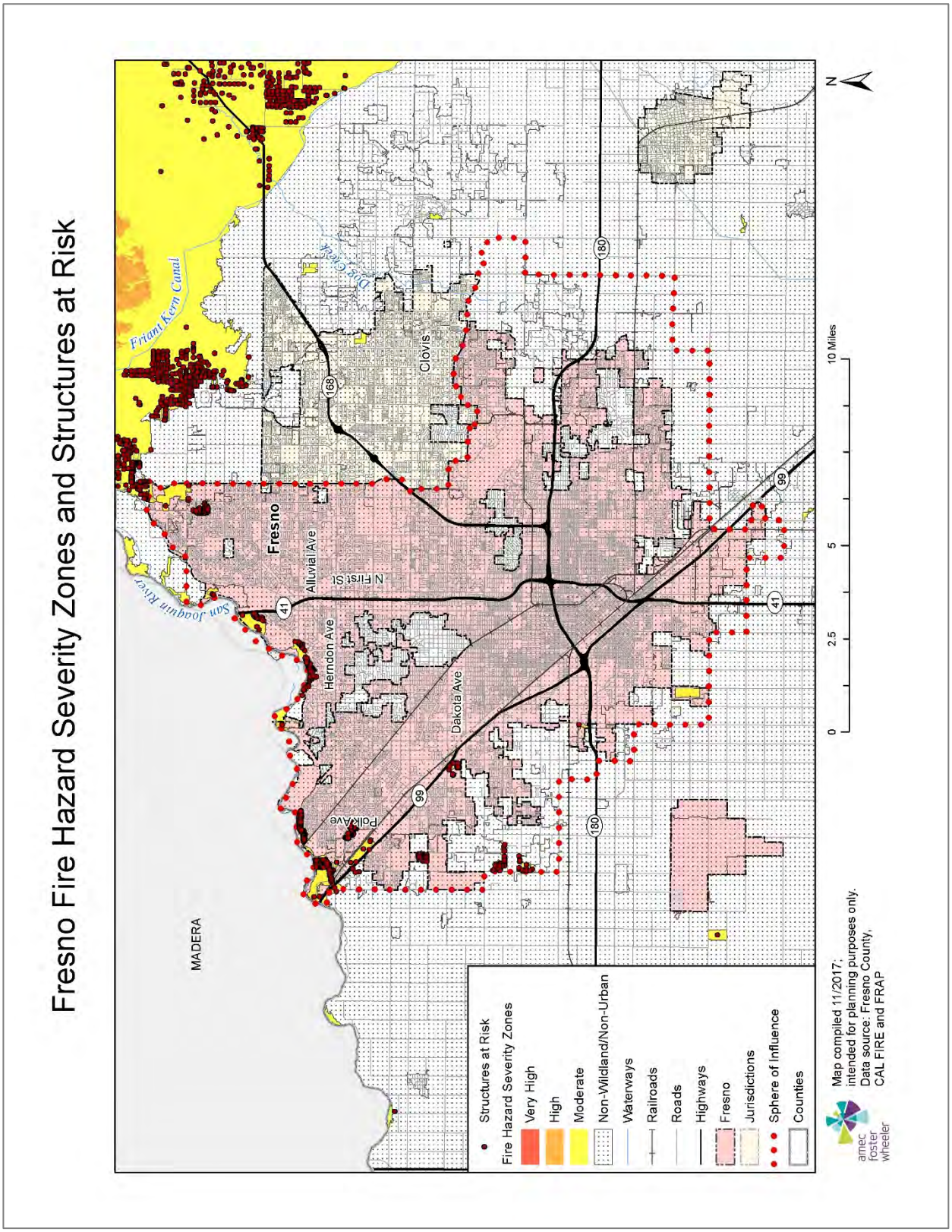
Table E.15: Values at Risk to Wildfire (Moderate Threat) in the City of Fresno

Property Type	Parcel Count	Building Count	Improved Value	Content Value	Total Value
Agricultural	1	0	$60,933	$60,933	$121,866
Commercial	13	36	$24,379,836	$24,379,836	$48,759,672
Exempt	12	13	$0	$0	$0
Industrial	4	4	$2,105,480	$3,158,220	$5,263,700
Multi-Residential	1	16	$255,200	$127,600	$382,800
Residential	772	779	$180,172,709	$90,086,355	$270,259,064
Total	**803**	**848**	**$206,974,158**	**$117,812,944**	**$324,787,102**

Sources: Fresno County 2017 Parcel and Assessor data

Based on this analysis, the City of Fresno's moderate wildfire threat affects 2,450 people and 803 improved parcels valued at roughly $324,787,102. Almost all of the parcels at risk are in the San Joaquin River corridor, where development is very restricted due to flood risk and bluff instability. Other parcels are in industrial areas along the western edge of the City, where the City's weed abatement ordinances (requiring vegetation control by April) would reduce the wildfire risk.

Figure E.6: City of Fresno's Wildfire Threat



E.4 Capability Assessment

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This capabilities assessment is divided into five sections: regulatory mitigation capabilities, administrative and technical mitigation capabilities, fiscal mitigation capabilities, mitigation outreach and partnerships, and other mitigation efforts.

To develop this capability assessment, the jurisdictional planning representatives used a matrix of common mitigation activities to inventory which of these policies or programs were in place. The team then supplemented this inventory by reviewing additional existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses.

During the plan update process, this inventory was reviewed by the jurisdictional planning representatives and Amec Foster Wheeler consultant team staff to update information where applicable and note ways in which these capabilities have improved or expanded. Additionally, in summarizing current capabilities and identifying gaps, the jurisdictional planning representatives also considered their ability to expand or improve upon existing policies and programs as potential new mitigation strategies. The City of Fresno's updated capabilities are summarized below.

E.4.1 Regulatory Mitigation Capabilities

Table E.16 lists regulatory mitigation capabilities, including planning and land management tools, typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in Fresno.

Table E.16: City of Fresno's Regulatory Mitigation Capabilities

Regulatory Tool	Yes/No	Comments
General Plan	Yes	The Fresno General Plan has a Noise and Safety Element with policies for wildland fire hazards, seismic/geologic hazards, storm drainage and flood control, hazardous materials, airport safety, and emergency response
Zoning Ordinance	Yes	Fresno Municipal Code Chapter 15; Zoning Ordinance has requirements related to health and safety (e.g., dwelling unit density controls, building setbacks for fire protection, masonry walls along major streets)
Subdivision Ordinance	Yes	Fresno Municipal Code Chapter 15 requires multiple points of access for ingress/egress, fire protection provisions, etc.
Development Permit (formerly Site Plan Review) requirements	Yes	Required for all nonresidential development projects and multi-family projects over two units; required for duplexes in some zone districts; plot plan review required for even single-family residential construction
Growth Management Ordinance	Yes	Fresno Municipal Code Chapter 12 provides for extension of urban infrastructure and services including sewer treatment, water supply, and fire protection
Floodplain Ordinance	Yes	Fresno Municipal Code Chapter 13 (local building codes) includes the Flood Damage Prevention Ordinance
Other special purpose ordinance (stormwater, water conservation, wildfire)	Yes	- Within the Zoning Ordinance, there is a Bluff Preservation Overlay district with requirements for soil stability analysis and setbacks from the San Joaquin bluff edge

Regulatory Tool	Yes/No	Comments
		- Pretreatment Ordinance and environmental control program for wastewater system to prevent and abate any hazardous material releases
Building Code	Yes	Version: 2016 California Building Code with a few City modifications: fire sprinkler ordinance, swimming pool ordinance, and security ordinance
Fire Department ISO Rating	Yes	Rating: 3
Erosion or Sediment Control Program	Yes	The Bluff Preservation Ordinance, as well as grading plan review and stormwater pollution prevention plans, which are required for all development projects through project conditions and CEQA review
Stormwater Management Program	Yes	In conjunction with Cal-EPA, Regional Water Quality Control Board, and Fresno Metropolitan Flood Control District
Capital Improvements Plan	Yes	Public Works Department and Department of Public Utilities formulate and administer these plans
Economic Development Plan	Yes	Fresno Redevelopment Agency and Economic Development Division of the Planning and Development Department
Local Emergency Operations Plan	Yes	Ratified by City Council in 2005 and last updated in 2015
Flood Insurance Study or other engineering study for streams	Yes	FEMA Flood Insurance Study, 2005

Fresno General Plan (Adopted December 18, 2014)

The Fresno General Plan is a blueprint of how the City anticipates directing and managing growth while minimizing potential impacts for existing and future generations. It provides long-range planning strategies for the continued development, enhancement, and revitalization of the Fresno Metropolitan Area. The plan goals are the guiding principles and provide the framework for the objectives and policies that can be found in the plan elements. The following general plan goals directly or indirectly mitigate hazards identified in this plan:

- **Goal 9**—Promote a city of healthy communities and improve quality of life in established neighborhoods.
  - *Emphasize supporting established neighborhoods in Fresno with safe, well maintained, and accessible streets, public utilities, education and job training, proximity to jobs, retail services, health care, affordable housing, youth development opportunities, open space and parks, transportation options, and opportunities for home grown businesses.*
- **Goal 12**— Resolve existing public infrastructure and service deficiencies, make full use of existing infrastructure, and invest in improvements to increase competitiveness and promote economic growth.
  - *Emphasize the fair and necessary costs of maintaining sustainable water, sewer, streets, and other public infrastructure and service systems in rates, fees, financing and public investments to implement the General Plan. Adequately address accumulated deferred maintenance, aging infrastructure, risks to service continuity, desired standards of service to meet quality-of-life goals, and required infrastructure to support growth, economic competitiveness and business development.*
- **Goal 16**— Protect and improve public health and safety.

Some of the elements of the General Plan also contain objectives and policies relevant to protecting human health and safety (e.g., supporting objectives and policies in the Public Utilities and Services Element direct that amendments to construction and fire codes to reduce the level of risk to life and property from fire commensurate with the City's fire suppression capabilities and that fire and police services be provided). Because the Noise and Safety Element is the portion of the General Plan most relevant to hazard mitigation, select objectives and policies are extracted and included below.

The Noise and Safety Element

The Noise and Safety Element seeks to reduce deaths, injuries, illnesses, damage to property, and economic and social dislocation that could result from hazards. Of specific relevance to this plan, it addresses seismic and geologic conditions, flooding, hazardous materials, and emergency response.

Seismic and Geologic Hazards

NS-2. Objective: Minimize risks of property damage and personal injury posed by geologic and seismic risks.
NS-2-a. Policy: Seismic Protection. Ensure seismic protection is incorporated into new and existing construction, consistent with the Fresno Municipal Code.
NS-2-b. Policy: Soil Analysis Requirement. Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.
NS-2-c. Policy: Landfill Areas. Require proposed land uses on or near landfill areas to be designed and maintained to comply with California Code of Regulations, Title 27, Section 21190, Post Closure Land Use.
NS-2-d. Policy: Bluff Preservation Overlay Zone. Per the requirements of the Bluff Preservation Overlay Zone District and Policy POSS-7-f (Chapter 5, Parks and Open Space), the following standards shall be applicable for property located within the Bluff Preservation zone: • Require proposed development within 300 feet of the toe of the San Joaquin River bluffs to undertake an engineering soils investigation and evaluation report that demonstrates that the site is sufficiently stable to support the proposed development, or provide mitigations to provide sufficient stability; and • Establish a minimum setback of 30 feet from the San Joaquin River bluff edge for all buildings, structures, decks, pools and spas (which may be above or below grade), fencing, lighting, steps, etc. o An applicant may request to reduce the minimum setback to 20 feet from the bluff edge if it can be demonstrated, to the satisfaction of the City's Building Official and the Planning Director, that the proposed building, structure, deck, pool and/or spas (which may be above or below grade), fencing, steps, etc., will meet the objectives of the Bluff Preservation Overlay Ordinance. In no case shall the setback be reduced to less than 20 feet.

Flooding Hazards

NS-3. Objective: Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.
NS-3-a. Policy: Stormwater Drainage and Flood Control Master Plan. Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.

NS-3-b. Policy: Curb and Gutter Installation. Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.
NS-3-c. Policy: Dual Use Facilities. Support multiple uses of flood control and drainage facilities as follows: • Use, wherever practical, FMFCD facilities for groundwater management and recharge; and • Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.
NS-3-d. Policy: Landscaped Buffer. City will support the development of FMFCD ponding basins including the landscaping and irrigation for the top one third of the side sloped areas consistent with the FMFCD Basin Design Criteria.
NS-3-e. Policy: Pollutants. Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.
NS-3-f. Policy: Flooding Emergency Response Plans. Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin river bottom.
NS-3-g. Policy: Essential Facilities Siting Outside of Floodplains. Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.
NS-3-h. Policy: Runoff Controls. Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed the capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.
NS-3-i. Policy: New Development Must Mitigate Impact. Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project. *Commentary: The City recognizes the expertise and significant role of the FMFCD, and will give the highest deference to its recommendations for mitigation measures, consistent with applicable law.*
NS-3-j. Policy: National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements. Review NFIP maps periodically to determine if areas subject to flooding have been added or removed and make adjustments to the Land Use Diagram Figure LU-1.
NS-3-k. Policy: 100-Year Floodplain Policy. Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.
NS-3-l. Policy: 200-Year Floodplain Protection. Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin river bottom.
NS-3-m. Policy: Flood Risk Public Awareness. Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.
NS-3-n. Policy: Precipitation Changes. Work with FMFCD to evaluate the planned and existing stormwater conveyance system in light of possible changes to precipitation patterns in the future.

Hazardous Materials

NS-4. Objective: Minimize the risk of loss of life, injury, serious illness, and damage to property resulting from the use, transport, treatment, and disposal of hazardous materials and hazardous wastes.
NS-4-a. Policy: Processing and Storage. Require safe processing and storage of hazardous materials, consistent with the California Building Code and the Uniform Fire Code, as adopted by the City.
NS-4-b. Policy: Coordination. Maintain a close liaison with the Fresno County Environmental Health Department, Cal-EPA Division of Toxics, and the State Office of Emergency Services to assist in developing and maintaining

hazardous material business plans, inventory statements, risk management prevention plans, and contingency/emergency response action plans.
NS-4-c. Policy: Soil and Groundwater Contamination Reports. Require an investigation of potential soil or groundwater contamination whenever justified by past site uses. Require appropriate mitigation as a condition of project approval in the event soil or groundwater contamination is identified or could be encountered during site development.
NS-4-d. Policy: Site Identification. Continue to aid federal, State, and County agencies in the identification and mapping of waste disposal sites (including abandoned waste sites), and to assist in the survey of the kinds, amounts, and locations of hazardous wastes.
NS-4-e. Policy: Compliance with County Program. Require that the production, use, storage, disposal, and transport of hazardous materials conform to the standards and procedures established by the County Division of Environmental Health. Require compliance with the County's Hazardous Waste Generator Program, including the submittal and implementation of a Hazardous Materials Business Plan, when applicable.
NS-4-f. Policy: Hazardous Materials Facilities. Require facilities that handle hazardous materials or hazardous wastes to be designed, constructed, and operated in accordance with applicable hazardous materials and waste management laws and regulations.
NS-4-g. Policy: Hazmat Response. Include policies and procedures appropriate to hazardous materials in the City's disaster and emergency response preparedness and planning, coordinating with implementation of Fresno County's Hazardous Materials Incident Response Plan.
NS-4-h. Policy: Household Collection. Continue to support and assist with Fresno County's special household hazardous waste collection activities, to reduce the amount of this material being improperly discarded.
NS-4-i. Policy: Public Information. Continue to assist in providing information to the public on hazardous materials.

Emergency Response

NS-6. Objective: Foster an efficient and coordinated response to emergencies and natural disasters.
NS-6-a. Policy: County Multi-Jurisdiction Hazard Mitigation Plan. Adopt and implement the Fresno County Multi-Jurisdiction Hazard Mitigation Plan and City of Fresno Local Hazard Mitigation Plan Annex. *Commentary: The federal Disaster Mitigation Act of 2000 requires that cities, counties, and special districts have a Local Hazard Mitigation Plan to be eligible to receive FEMA hazard mitigation funds. Cities and counties can adopt and use all or part of a regional multi-jurisdictional plan, such as the one prepared by Fresno County, in lieu of preparing all or part of a Local Hazard Mitigation Plan.*
NS-6-b. Policy: Disaster Response Coordination. Maintain coordination with other local, State, and Federal agencies to provide coordinated disaster response.
NS-6-c. Policy: Emergency Operations Plan. Update the City's Emergency Operations Plan periodically, using a whole community approach which integrates considerations for People with access and functional needs in all aspects of planning.
NS-6-d. Policy: Evacuation Planning. Maintain an emergency evacuation plan in consultation with the Police and Fire Departments and other emergency service providers, which shows potential evacuation routes and a list of emergency shelters to be used in case of catastrophic emergencies. Commentary: The evacuation plan will be flexible in order to consider many scenarios and multiple modes of transportation beyond private automobiles. It will provide special provisions for disadvantaged populations, such as those with physical disabilities or those with low or very low incomes, and for areas with fewer resources through neighborhood emergency preparedness programs.
NS-6-e. Policy: Critical Use Facilities. Ensure critical use facilities (e.g. City Hall, police and fire stations, schools, hospitals, public assembly facilities, transportation services) and other structures that are important to protecting health and safety in the community remain operational during an emergency. • Site and design these facilities to minimize their exposure and susceptibility to flooding, seismic and geological effects, fire, and explosions. • Work with the owners and operators of critical use facilities to ensure they can provide alternate sources of electricity, water, and sewerage in the event that regular utilities are interrupted in a disaster.
NS-6-f. Policy: Emergency Vehicle Access. Require adequate access for emergency vehicles in all new development, including adequate widths, turning radii, hard standing areas, and vertical clearance.

NS-6-g. Policy: Emergency Preparedness Public Awareness Programs. Continue to conduct programs to inform the general public, including people with access and functional needs, of the City's emergency preparedness and disaster response procedures.

Fresno Flood Plain Ordinance

The City of Fresno's Flood Plain Ordinance was revised in the late 1990s and formally adopted by the Fresno City Council on September 20, 2005. (In late 2007, the Fresno Municipal Code was republished with its chapters somewhat reorganized. There was no change in the text of the Flood Plain Ordinance at that time, but due to the reorganization of its content, its most recent adoption effective date is January 17, 2008.) The Fresno Flood Plain Ordinance is Article 6 of Chapter 11 of the Fresno Municipal Code.

The purpose of this ordinance is to promote the public health, safety, and general welfare and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

- Protect human life and health;
- Minimize expenditure of public money for costly flood control projects;
- Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
- Minimize prolonged business interruptions;
- Minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in areas of special flood hazard;
- Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future blighted areas caused by flood damage;
- Ensure that potential buyers are notified that property is in an area of flood hazard; and
- Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

In order to accomplish its purposes, the ordinance includes the following methods and provisions:

- Restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or flood heights or velocities
- Require that uses vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction
- Control filling, grading, dredging, and other development which may increase flood damage
- Prevent or regulate the construction of flood barriers which will unnaturally divert flood water or which may increase flood hazards in other areas
- Control the alteration of natural flood plains, stream channels, and natural protective barriers, which help accommodate or channel floodwaters

This ordinance applies to all areas of special flood hazards within the jurisdiction of the City as identified by FEMA's Flood Insurance Study for Fresno County, California and incorporated areas dated September 30, 2005, with accompanying Flood Insurance Rate Maps, and all subsequent amendments and/or revisions. It appoints the building official to administer, implement, and enforce the ordinance by granting or denying development permits in accord with its provisions.

This ordinance includes the following standards of construction related to special flood hazard areas:

- Anchoring
- Construction materials and methods
- Elevation and floodproofing
- Residential construction
- Nonresidential construction
- Flood venting
- Standards for utilities
- Standards for subdivisions
- Standards for manufactured homes
- Standards for recreational vehicles
- Floodways
- Standards for storage of materials and equipment

In conjunction with Fresno's Drainage Fee Ordinance (Fresno Municipal Code Chapter 12, Article 19), which requires local grading and development to conform to the Fresno Metropolitan Flood Control District Master Drainage Plan and to provide proportionate shares of drainage infrastructure, the Fresno Flood Plain Ordinance and its preceding Flood Damage Prevention Ordinance have reduced flood damage losses in the City.

National Flood Insurance Program/Community Rating System

The City of Fresno joined the National Flood Insurance Program (NFIP) on December 1, 1982. It has been a member of the Community Rating System (CRS) since October 1, 1992. The City's Floodplain Administrator duties are assigned to the building official. The Building and Safety Division of the Planning and Development Department works to improve the City's CRS rating, which determines the price paid for flood insurance policies issued in the jurisdiction. The rating is based on detailed biannual audits conducted by FEMA and/or a designee agency (currently, the California Department of Water Resources). The primary means of improving and maintaining a good CRS rating is through administration of the Fresno Flood Plain Ordinance. As part of its efforts to improve its community rating, the City of Fresno has hosted periodic FEMA Region IX NFIP/CRS training.

The City's current CRS rating from October 2016 is Class 8, which reflects the loss of two class levels in the most recent audit.

San Joaquin River Bluff Preservation Ordinance, 1980

After an interagency San Joaquin River Reconnaissance Plan was completed in the late 1970s, the City of Fresno adopted the San Joaquin River Bluff Specific Plan to preserve this important open space and habitat feature and to safeguard the bluff face, which is the most unstable geologic feature in the City. The San Joaquin River Bluff Specific Plan was later subsumed by the 1988 Bullard Community Plan, which carried forward protective policies for this area of Fresno.

The regulation of land use, development, and grading in this portion of Fresno is ongoing pursuant to the Bluff Preservation Ordinance. This ordinance, part of the City's zoning regulations, delineates an overlay zone district along the river bluff (the Bluff Preservation Overlay District), established allowable and prohibited land uses, and set forth conditions and requirements for using or modifying property in the district. The regulations of the district are deemed to be necessary for the preservation of the special qualities of the bluffs and for the protection of the health, safety, and general welfare of owners and users of property in the area.

The Bluff Preservation Ordinance is administered by the Fresno Development and Resource Management Department through its special permit process and grading plan checks. Anyone applying for a building permit is required to submit a site plan review with accompanying soil investigation and evaluation report (prepared by an appropriately licensed professional engineer or registered geologist). The Department's Code Enforcement Division also conducts periodic surveillance of bluff properties for grading and construction done without permits and institutes abatement actions when these conditions are discovered.

Hazardous Material Incident Safeguards

The Fresno Fire Department works with Fresno County Environmental Health to review hazardous material business plans that detail flammable, explosive, toxic, and otherwise hazardous materials used by businesses in the City. The Fire Department has its own permitting requirement for liquid and gaseous fuel tanks to ensure that they are installed and maintained safely. The City's Hazardous Materials Response Unit (housed in a City fire station) maintains the capability to quickly characterize material releases and spills, to evaluate risks to life and property, and to implement appropriate controls and evacuation measures.

Fire Prevention Policy

The City of Fresno has some of the most progressive and effective fire prevention policies and regulations in the nation relating to water supply (fire flow) required for development, ingress and egress from developed buildings and subdivisions, on-site automatic fire suppression systems (sprinkler and on-site private hydrants), building addressing to facilitate rapid emergency response, marking of unsafe buildings (those older structures with hazardous conditions or a lack of water supply), and instant aid/mutual aid with adjacent fire departments belonging to Fresno County special districts and the City of Clovis.

In addition to its extensive network of well-trained and well-equipped firefighting stations, the Fresno Fire Department has a Fire Prevention Bureau, under supervision of the City's fire marshal, to administer regulations adopted and referenced by the Fresno Municipal Code Chapter 6, Article 5 relating to fire prevention. The Fire Prevention Bureau carries out these responsibilities by conducting routine inspections of all public and commercial buildings, performing detailed development permit and construction plan checks, and investigating arson.

Another component of the City's overall fire protection program is the administration of its public nuisance ordinances to require properties to be kept clean and free of flammable debris and to annually abate weeds and overgrown vegetation before these materials can dry out in the spring to pose a wildfire hazard (Fresno Municipal Code Chapter 10, Article 6 relating to public nuisance abatement). The Planning and Development Department Code Enforcement Division and Department of Public Utilities Community Sanitation Division coordinate their efforts to enforce the nuisance abatement regulations and provide cleanup services when property owners do not take care of matters themselves.

City of Fresno Emergency Operations Plan, 2015, Updated 2015

The City of Fresno Emergency Operations Plan (EOP) addresses the planned response to extraordinary emergency situations associated with natural disasters, technological incidents, excessive heat/cold, power outages, and national security emergencies in or affecting the City of Fresno. The Plan, which was updated in 2015, does the following:

- Establishes the emergency management organization required to mitigate any significant emergency or disaster affecting the City of Fresno.
- Identifies the policies, responsibilities, and procedures required to protect the health and safety of City communities, public and private property, and the environment from natural or technological disasters.
- Establishes the operational concepts and procedures associated with initial response operations to emergencies, the extended response operations, and the recovery process.

The EOP is designed to establish the framework for implementation of the California Standardized Emergency Management System/National Incident Management System for the City of Fresno, which is located within the California Governor's Office of Emergency Services' Mutual Aid Region V. It is intended to facilitate multi-agency and multi-jurisdictional coordination, particularly between the City of Fresno and the Fresno County Operational Area, including special districts and state agencies, in emergency operations. This plan will be used in conjunction with the Fresno County EOP and the State of California Emergency Plan. The plan is designed to guide the reader or user through each phase of an emergency: preparedness, response, recovery, and mitigation.

Other Plans and Policies

Other hazard mitigation-related policies and plans in place in and observed by the City of Fresno include the following:

- California Code of Regulations Title 23 administrative law for development and use of land in designated floodway areas along the San Joaquin River administered by the Central Valley Flood Protection Board, staffed by the California Department of Water Resources.
- Standards for constructing and maintaining drainage basins and ponds to prevent mosquito breeding and to provide for mosquito control district access for inspection and abatement activities (jointly promulgated by the Planning and Development Department and Public Works Department in fall of 2005).
- Dam failure inundation plans prepared and administered by the U.S. Bureau of Reclamation, the U.S. Army Corps of Engineers, Fresno Metropolitan Flood Control District, Southern California Edison, and Pacific Gas and Electric Company.
- The California Environmental Quality Act, overseen by the Fresno City Attorney's Office and administered by several City departments, requires consideration of health and safety impacts as they may relate to projects, which are defined as any action that may result in a change in the physical environment and that would include public facilities, and private development, and even adoption/amendment of land use plans and ordinances. An analysis of every project is conducted by the appropriate City department (the Development and Resource Management Department does the bulk of these analyses). Inquiries regarding project sites and features are distributed to departments and outside agencies that may have knowledge of, or which may regulate, aspects of the proposed project. The information obtained from these requests for comment and from other staff research is compiled into an informational document for decision-makers and the public. The information is also used to develop a list of mitigation actions to reduce or abate potential adverse impacts of the project. For those projects which may involve federal funds or require federal approvals, a parallel National Environmental Policy Act assessment is also prepared by the City.
- The Development and Resource Management Department administers regulations in the California Building Code and in Uniform Electrical, Plumbing, and Mechanical Codes as those codes are modified through adoption by the state and City. Plan check and inspection activities of the Department ensure structural soundness and compliance with seismic and other regulations.

E.4.2 Administrative/Technical Mitigation Capabilities

Table E.17 identifies the personnel responsible for activities related to mitigation and loss prevention in Fresno.

Table E.17: City of Fresno's Administrative and Technical Mitigation Capabilities

Personnel Resources	Yes/No	Department/Position
Planner/engineer with knowledge of land development/land management practices	Yes	Planning and Development Department (planners), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Engineer/professional trained in construction practices related to buildings and/or infrastructure	Yes	Planning and Development Department (engineers), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Planner/engineer/scientist with an understanding of natural hazards	Yes	Planning and Development Department (planners and engineers), Department of Public Utilities (engineers), Public Works Department (engineers), Fresno Metropolitan Flood Control District (engineers)
Personnel skilled in GIS	Yes	Planning and Development Department, Department of Public Utilities, Public Works Department, Information Services Department
Full time building official	Yes	Planning and Development Department
Floodplain administrator	Yes	Planning and Development Department
Emergency manager	Yes	Fresno Fire Department
Grant writer	Yes	Planning and Development Department, Police Department, Public Works Department, Fire Department
Other personnel	Yes	California registered geologist (Department of Public Utilities), California registered environmental health specialist (Planning and Development Department), licensed water and wastewater treatment operators
Warning systems/services (Reverse 9-11, outdoor warning signals)	Yes	State Emergency Alert System is coordinated by emergency management team through the National Weather Service
Other	Yes	Emergency notification of San Joaquin River bottom residents in conjunction with the U.S. Bureau of Reclamation and Fresno County

E.4.3 Fiscal Mitigation Capabilities

Table E.18 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table E.18: City of Fresno's Fiscal Mitigation Capabilities

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Community Development Block Grants	Yes	Geographically restricted to designated portions of Fresno based on area income
Capital improvements project funding	Yes	Budgeted out of utility fees and often related to issuance of bonds; City also obtains grants, shares of state gas tax and sales taxes, ballot measure tax revenue, etc.
Authority to levy taxes for specific purposes	Yes	Subject to California Proposition 218 restrictions on new and increased assessments
Authority to levy fees and fines, and to recover costs through lien processes, for nuisance abatement	Yes	Subject to an appeal process that involves administrative law judges retained by the City
Fees for water, sewer, gas, or electric services	Yes	Water, sewer, solid waste, code enforcement (cleanup)

Financial Resources	Accessible/Eligible to Use (Yes/No)	Comments
Impact fees for new development	Yes	Master Fee Schedule as originally chartered under the City's Urban Growth Management Ordinance
Incur debt through general obligation bonds	Yes	Would need vote of the taxpayers to enact.
Incur debt through special tax bonds	Yes	Special Assessment Districts that issue debt and incur the debt but the City only administers
Incur debt through private activities	Yes	The City has the capability of doing them and have in the past
Withhold spending or public infrastructure investment in hazard prone areas	Yes	The Department of Public Utilities retains jurisdiction over water and sewer services and determines its appropriate service areas with risk to facilities being one of the factors leading to a decision not to extend services to River bottom properties

E.4.4 Mitigation Outreach and Partnerships

The Fresno Department of Public Utilities, in conjunction with other agencies, provides water conservation and stormwater quality protection public information programs. The Fire Department provides personal preparedness outreach for heat and freeze emergencies and shelter-in-place information for hazardous materials emergencies. Additionally, the City has developed public service announcements for smoke detector battery life, canal safety, and fireworks safety.

The City's Joint Information System disseminates information in Spanish, and the City can obtain translation services for other languages when necessary. A Joint Information Center plan is an annex to the City of Fresno Emergency Operations Plan and provides comprehensive guidance for early warning notification in all languages and specifically the Americans with Disabilities Act (ADA) community.

Preparedness Exercises afford the opportunity to include the City of Fresno ADA Committee. Members of the committee and volunteers from the ADA community role play for realistic first responder training.

E.4.5 Other Mitigation Efforts

- The City is a certified StormReady community through the National Weather Service.
- The Fire Department, Police Department, and Solid Waste Division are nationally accredited.
- The City has installed security systems for the wastewater treatment facility and for its surface water treatment plant. Generators are installed in critical groundwater pumping stations and these facilities are secured.

E.4.6 Opportunities for Enhancement

Based on the capabilities assessment, the City of Fresno has several existing mechanisms in place that already help to mitigate hazards. In addition to these existing capabilities, there are also opportunities for the City to expand or improve on these policies and programs to further protect

the community. Future improvements may include providing training for staff members related to hazards or hazard mitigation grant funding in partnership with the County and Cal OES. Additional training opportunities will help to inform City staff members on how best to integrate hazard information and mitigation projects into their departments. Continuing to train City staff on mitigation and the hazards that pose a risk to the City of Fresno will lead to more informed staff members who can better communicate this information to the public. In addition, the City could work to improve the CRS rating through additional floodplain management program enhancements. This could further lower the cost of flood insurance for residents.

E.5 Mitigation Strategy

E.5.1 Mitigation Goals and Objectives

The City of Fresno adopts the hazard mitigation goals and objectives developed by the HMPC and described in Chapter 5 Mitigation Strategy.

Incorporation into Existing Planning Mechanisms

The information contained within this plan, including results from the Vulnerability Assessment, and the Mitigation Strategy will be used by the City to help inform updates and the development of local plans, programs and policies. The Public Works Department may utilize the hazard information when implementing Capital Improvement projects and the Planning and Development Department may utilize the hazard information when reviewing a site plan or other type of development applications. The City will also incorporate this LHMP into the Safety Element of their General Plan, as recommended by Assembly Bill (AB) 2140.

As noted in Chapter 7 Plan Implementation, the HMPC representatives from Fresno will report on efforts to integrate the hazard mitigation plan into local plans, programs and policies and will report on these efforts at the annual HMPC plan review meeting.

Continued Compliance with the National Flood Insurance Program

In addition to the mitigation actions identified herein the City will continue to comply with the National Flood Insurance Program as specified in General Plan Policy NS-3-j: *"National Flood Insurance Program. Continue to participate in the National Flood Insurance Program (NFIP) by ensuring compliance with applicable requirements."*

E.5.2 Completed 2009 Mitigation Actions

The City of Fresno did not complete any of the mitigation actions identified in the 2009 plan. However, implementation is in progress for several of these actions and will be continued as part of the mitigation strategy for this plan update.

E.5.3 Mitigation Actions

The planning team for the City of Fresno identified and prioritized the following mitigation actions based on the risk assessment. Background information as well as information on how each action will be implemented and administered, such as ideas for implementation, responsible office, partners, potential funding, estimated cost, and schedule are also included.

In addition to implementing the mitigation actions below the City of Fresno will be participating in the county-wide, multi-jurisdictional action of developing and conducting a multi-hazard seasonal public awareness program. The county-wide project will be led by the County in

partnership with all municipalities and special districts. The City agrees to help disseminate information on hazards provided by the County. More information on the action can be found in the base plan Chapter 5 Mitigation Strategy (see Section 5.3.3 Multi-Jurisdictional Mitigation Actions, Action #1. Develop and Conduct a Multi-Hazard Seasonal Public Awareness Program).

1. Establish Post-Disaster Action Plan for City Continuity of Operations Plan

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: Establish a post-disaster action plan to be part of the City of Fresno Continuity of Operations Plan (COOP) that will include the following elements:

- Procedures for public information
- Post-disaster damage assessment
- Grant writing
- Code enforcement
- Redundant operations

The plan will also include annexes from local businesses and large employers to improve economic and employment recovery. The plan will also identify a mechanism for the City to help businesses without COOPs develop a COOP to be incorporated, as an annex, into the City's Emergency Operations Plan.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: $150,000

Potential Funding: Local funds, grants

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-planning. A City COOP and local business COOPs will reduce the impact of a disaster to the local economy and employment.

Schedule: Long term

Status: 2009 project, implementation in progress

2. Improve the City's Capabilities for Sheltering Animals in a Disaster

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: During a disaster, not only do people need to be rescued, but their pets do also. Hurricane Katrina showed the nation that shelters do not typically allow pets, so pets may be left behind when their owners evacuate. The care of the animals left behind falls to local animal shelters. Currently, the SPCA Animal Shelter does not have the supplies to handle a large scale animal emergency. The City has approximately 18,000 licensed dogs. If a disaster occurred, they would only be able to house a small percentage of them. Overcrowding of animals usually causes diseases and loss of animal life. Purchasing new cages would alleviate some of the overcrowding created by a disaster.

Other Alternatives: Ask other agencies for supplies, if they have them available.

Responsible Office: City of Fresno Emergency Preparedness Officer

Priority (High, Medium, Low): High

Cost Estimate: $50,000

Potential Funding: General fund

Benefits (Avoided Losses): This will cut down on the spread of disease and animal loss during an emergency or disaster.

Schedule: Short term

Status: 2009 project, implementation in progress

3. Train and Certify City Inspectors to Conduct Post-Disaster Damage Assessment

Hazard(s) Addressed: Multi-Hazard: dam failure, earthquake, flood, severe weather, wildfire, hazardous materials

Issue/Background: City inspectors play a vital role in post-disaster building assessment and damage assessment. Pre-training and certification is vital in response and recovery to reduce loss of life, relocate populations, and ensure the rebuilding of local economies.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): High

Cost Estimate: $250,000

Potential Funding: Grants

Benefits (Avoided Losses): This will improve response/recovery during an event through pre-training and certification of individuals responsible for performing assessment of structures and facilities impacted by disasters. Certification will also allow qualified staff to mobilize with the State of California Office of Emergency Services (Region 5) Urban Search and Rescue Task Force.

Schedule: Long term

Status: 2009 project, implementation not yet started

4. Implement a Flood Awareness Program for the Public

Hazard(s) Addressed: Flood

Issue/Background: The City needs a program to educate flood-prone property owners along the San Joaquin River and in frequent annual flooding areas about the flood threat and how best to prepare, mitigate, and insure their properties.

Other Alternatives: No action

Responsible Office: City of Fresno Emergency Preparedness Officer and Planning and Development Department

Priority (High, Medium, Low): Medium

Cost Estimate: $15,000/year

Potential Funding: General fund, grants

Benefits (Avoided Losses): This will prevent the loss of human life and economic and property losses.

Schedule: Long term

Status: 2009 project, implementation not yet started

5. Southwest Fresno – Recycled Water Distribution System Construction

Hazard(s) Addressed: Drought

Issue/Background: In 2009, the State of California adopted a recycled water policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and an additional 300,000 acre-feet per year by 2030. The Recycled Water Master Plan prepared by the City of Fresno, Department of Public Utilities (DPU), identifies opportunities to assist with compliance of this law by reducing groundwater pumping and replacing groundwater with recycled water for non-potable purposes (i.e. outdoor irrigation, dust control, fountains, etc.). On April 11, 2013, the Council adopted the Recycled Water Master Plan and associated environmental documents.

In 2017, the DPU commissioned a 5 MGD Tertiary Treatment Facility at the Fresno-Clovis Regional Wastewater Treatment Facility. DPU is currently constructing a Recycled Water Distribution System in Southwest Fresno to deliver recycled water to parks, cemeteries, schools, agricultural uses, etc., to offset potable water irrigation demands. This will help mitigate drought by enabling the use of recycled water for certain uses instead of tapping potable water supplies.

Other Alternatives: DPU has a Water Shortage Contingency Plan (WSCP) which was updated in the City of Fresno's 2015 Urban Water Management Plan to manage water shortages including drought conditions. The WSCP consists of four stages allowing the City to ultimately reduce its water demand to a level commensurate with the water supplies available to a maximum reduction of 50 percent.

Responsible Office: City of Fresno Department of Public Utilities

Priority (High, Medium, Low): High

Cost Estimate: $75,000,000

Potential Funding: California State Water Resources Control Board – Clean Water State Revolving Fund

Benefits (Avoided Losses): Reduced ground water pumping by using recycled water for non-potable purposes.

Schedule: Ongoing with completion in 2019

Status: New project

6. Sustainable Groundwater Management Act Compliance including Groundwater Sustainability Planning and Implementation

Hazard(s) Addressed: Drought

Issue/Background: The Kings subbasin underlays the City of Fresno and like many groundwater basins throughout the State, this subbasin is in overdraft condition with underground aquifers adversely impacted by overuse. Such impacts include significant decline in water storage and water levels, degradation of water quality, and land subsidence resulting in the permanent loss of storage capacity. The Sustainable Groundwater Management Act (SGMA) provides for the establishment of local Groundwater Sustainability Agencies (GSAs) to manage groundwater sustainability within groundwater subbasins defined by the California Department of Water Resources (DWR). The City of Fresno has become a joint power authority of the North Kings Groundwater Sustainability Agency, other members of the Agency include the County of Fresno, City of Kerman, City of Clovis, Biola Community Services District, Garfield Water District and International Water District. As a member of the North Kings GSA, the City of Fresno is required to participate in the development and implementation, no later than January 31, 2020, of a

Groundwater Sustainability Plan (GSP) to ensure a sustainable yield of groundwater, without causing undesirable results. Failure to comply with that requirement could result in the State asserting its power to manage local groundwater resources. Participation in the North Kings GSA and the implementation of a GSP will allow the City to maintain sustainable groundwater supplies while providing insurance against periods of long-term drought, a high significance hazard for the City of Fresno.

Other Alternatives: None, compliance required by law, failure to meet requirements will result in State intervention and oversight.

Responsible Office: City Engineer and North Kings GSA

Priority (High, Medium, Low): High

Cost Estimate: Varies by GSA for preparation of the required GSP. Further expenses are anticipated to be accrued for the planning and construction of groundwater recharge projects.

Potential Funding: Property owner assessments along with grant funding opportunities from the State.

Benefits (Avoided Losses): Preparation and implementation of the GSP by the respective GSAs will result in the management of groundwater in a manner that is sustainable and avoids undesirable results as defined by the California State Department of Water Resources.

Schedule: GSAs must complete and submit the required GSP to DWR by January 31, 2020, which is to be fully implemented and result in sustainability of the groundwater basin, with no undesirable effects, by the year 2040.

Status: New project in 2018

Attachment 5
Notice of Public Hearing

Notice of Public Hearing

City of Fresno

Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or Peter.Maraccini@Fresno.gov.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street

Bldg. A, Fresno, CA 93706, or by emailing at Peter.Maraccini@Fresno.gov. All written comments must be received no later than July 14, 2021, at 11:59 P.M.

Attachment 6
Resolution Approving the WSCP

RESOLUTION NO. 2021-197

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 WATER SHORTAGE CONTINGENCY PLAN AND AUTHORIZE THE CITY MANAGER TO DECLARE THE APPROPRIATE WATER CONSERVATION STAGES AND IMPLEMENT THE ASSOCIATED SHORTAGE RESPONSE ACTIONS

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, Water Code Section 10632 requires every urban water supplier to prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its UWMP; and

WHEREAS, the WSCP details intended City actions to respond to water shortages; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared a WSCP that complies with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 WSCP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library,

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 WSCP would be held in Council Chambers at which time public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 WSCP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Water Shortage Contingency Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Water Shortage Contingency Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

3. The City Manager, or designee, is hereby authorized to declare the appropriate Water Conservation Stages outlined in the 2020 Water Shortage Contingency Plan and implement the associated shortage response actions specified for the appropriate Water Conservation Stage in the Water Shortage Contingency Plan.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-197, entitled ***RESOLUTION – **Adopting 2020 Water Shortage Contingency Plan and authorizing the City Manager to declare the appropriate water conservation stages and implement the associated shortage response actions (Subject to Mayor's veto).** Item 10:05 A.M. (4), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

RECEIVED
2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

K

Outreach Events

2015 Outreach Events		
Date	Name of Event	Description
Jan	"Creating a Water-wise Landscape: Seven Steps to Follow our Climate"	Landscape Workshop by Susan Stiltz as SPEAKER for City employees at City Hall 2600 Fresno St 93721.Distribute literature E. Social media: sent email with flier to City employees. Contact: Melany Felton. LITERATURE
Jan	Fresno Chinese New Year Parade	Outreach booth providing water saving info & rebate information
March	Spring Festival - Clovis Botanical Garden	Outreach booth providing water saving info & rebate information
April	Home Depot - Riverpark Kid's Day Spring Event	Hands on activity for kids, drought tolerant plants planting, literature for adults
April	America's Party for the Planet	Outreach booth providing water saving info & rebate information
April	Sequoia Middle School Outdoor Club	Outreach booth providing water saving info & rebate information
May	Spring Fling - Master Gardener	Provided literature for event held at Garden of the Sun
May	Madden Library Water-wise Plant Exchange event	Water wise garden speaker, materials handed out
May	Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
June	Kids Water Camp	Large one day event, hands on activites, educational for kids 3rd grade (all elementary schools invited to participate)
July	Fresno Home Remodeling & Decorating Show	Fresno Fairgrounds 3 day event. Outreach booth with visual displays & information
Sept	Carnaval Children's Festival	Mosqueda Center Outreach booth, providing water saving information & rebates
Sept	Fresno State partnership	Susan Hawksworth extended education. Began planning for Feb classes with landscape specialists
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information
Nov	Fresno Fall Improvement Show	Inspiration Park Grand opening
Nov	Inspiration Park Grand opening	Outreach booth providing water saving info & rebate information

2016 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days

March	Spring Into Your Garden	Outreach booth providing water saving info & rebate information. Visual displays
April	Water Planet Day	Outreach booth providing water saving info & rebate information. Visual displays
April	8th Annual Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Dec	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Orchard St. & Grant Ave

2017 Outreach Events		
Jan	Hmong New Year	Outreach booth providing water saving info & rebate information. Hmong translator & printed materials in Hmong
Feb	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Hildago Elementary 3550 E Thomas 93702
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
March	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Leavenworth Elementary School, 4420 E Thomas

April	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Webster Elementary School, 2600 E Tyler 93701
April	9th Annual Water-Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
April	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
May	Fresno Neighborhood Revitalization	Work with FNR team to reach customers in lower income areas about City services. Slater Elementary school 4472 N Emerson 93705
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Make A Difference Day @ Chukchansi Park	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2018 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event
March	Spring Into Your Garden Festival	Outreach booth providing water saving info & rebate information. Visual displays
April	10th Annual Water Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days

Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual Display
Sept	Central California Women's Conference	Outreach booth providing water saving info & rebate information. Visual Display
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual Display
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2019 Outreach Events		
March	Fresno Home & Garden Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event
March	Spring Into Your Garden Festival	Outreach booth providing water saving info & rebate information. Visual displays
April	Outreach booth @ Manchester Mall	Outreach booth providing water saving info & rebate information. Visual displays
April	Party for the Planet @ Chaffee Zoo	Outreach booth providing water saving info & rebate information. Visual displays
May	Senior Spring Fling @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
May	11th Annual Water Wise Plant Exchange	Large community event collaborating with several agencies to share water-wise plants & information, hands on activities
July	Fresno Remodeling & Decorating Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 days
Sept	Carnaval @ Mosqueda Community Center	Outreach booth providing water saving info & rebate information. Visual displays
Oct	Clovis Botanical Plant Sale & Fair	Outreach booth providing water saving info & rebate information. Visual displays
Nov	Fresno Fall Home Improvement Show	Outreach booth providing water saving info & rebate information. Visual displays. 3 day event

2020 Outreach Events
All Outreach Suspended

L

Notification Letters

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Shay Bakman
Bakman Water Company
PO Box 7965
Fresno, CA 93747

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Bakman:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Scott Redelfs
City of Clovis Public Utilities
155 N. Sunnyside Ave
Clovis, CA 93611

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Redelfs:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Bill Stretch
Fresno Irrigation District
2907 South Maple Ave
Fresno, CA 93725

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Stretch:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Peter Sanchez
Fresno Metropolitan Flood Control District
5469 East Olive Ave
Fresno, CA 93727

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Sanchez:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Steven White
Fresno County Public Works
2220 Tulare St, 6th Floor
Fresno, CA 93721

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. White:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Jason Phillips
Friant Water Authority
4969 E. McKinley Ave, Suite 201
Fresno, CA 93727

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Phillips:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Nick Keller
Garfield Water District
PO Box 337
Clovis, CA 93613

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Keller:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
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Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Moises Ortiz
Malaga County Water District
3580 South Frank Street
Fresno, CA 93725-2511

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Ortiz:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Kassy D. Chauhan, PE
North Kings Groundwater Sustainability Agency
2907 S. Maple Avenue
Fresno, CA 93725

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mrs. Chauhan:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of FRESNO

Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Jason Franklin
Pinedale County Water District
480 West Birch Ave
Pinedale, CA 93650

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Franklin:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

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Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

City of
FRESNO
Department of Public Utilities

Utilities Planning & Engineering
2101 G Street, Bldg. A
Fresno, California 93706
559-621-8600 – FAX 559-498-4126
www.fresno.gov

March 16, 2021

ELECTRONIC MAIL and sent USPS

Michael P. Jackson, PE
United States Bureau of Reclamation South-Central California Area Office
1243 N Street
Fresno, CA 93721-1813

SUBJECT: NOTICE OF PREPARATION FOR CITY OF FRESNO 2020 URBAN WATER MANAGEMENT PLAN AND WATER SHORTAGE CONTINGENCY PLAN

Dear Mr. Jackson:

In accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656), the City of Fresno (City) is required to update its Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP) to meet the California Department of Water Resources (DWR) requirements for a 2020 UWMP and WSCP.

We invite your agency's participation in the City's preparation of the 2020 UWMP and WSCP. A draft of the updated 2020 UWMP will be made available for public review and a public hearing will be scheduled for mid-June 2021 to hear public comments, discuss and consider adoption of the 2020 UWMP and WSCP. The City will notify you when the draft documents are released and of the date, time, and location of the subsequent public hearing.

Until that time, if you would like more information regarding the City's 2020 UWMP and WSCP, please contact Mr. Peter Maraccini by telephone at 559-621-1603 or by email at Peter.Maraccini@Fresno.gov.

Sincerely,

Brock D. Buche, PE, PLS
Assistant Director

Notice of Public Hearing

City of Fresno

Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

The City of Fresno (City) will hold a public hearing at 10:05 A.M. on Thursday, July 15, 2021, at the City Council Chambers at the City Hall located at 2600 Fresno Street to receive public comments on the City's Draft 2020 Urban Water Management Plan (2020 UWMP), the City's Draft 2020 Water Shortage Contingency Plan (2020 WSCP), and a Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" (Addendum). The Draft 2020 UWMP addresses current and projected water supply availability and reliability and provides a comparison with current and projected water demands through the year 2045. The Draft 2020 WSCP details the City's potential actions in response to a severe water shortage or water supply emergency. Sections 1.3, 1.4, 1.5, and 1.8 of the Draft 2020 WSCP were revised from a version of the document that was previously released on Monday, July 28, 2021. The Draft Addendum discusses the City's reduced reliance on the Sacramento-San Joaquin River Delta surface water.

Interested citizens are invited to make public comments on the three documents at the public hearing. Services of an interpreter and additional accommodations such as assistive listening devices can be made available. Requests for accommodations should be made more than five working days but no later than 48 hours prior to the scheduled hearing. Please contact Mr. Peter Maraccini at 559-621-1603 or Peter.Maraccini@Fresno.gov.

The three documents will be made available for public review starting July 1, 2021. Physical copies of the three documents can be found at the following Fresno County Libraries: Central Library (2420 Mariposa St.), Woodward Park Regional Library (944 E Perrin Ave.), Betty Rodriguez Regional Library (3040 N Cedar Ave.), and Sunnyside Regional Library (5566 E Kings Canyon Rd.). Electronic copies of the three documents are available online at https://www.fresno.gov/publicutilities/about-dpu/plans-reports-resources/. Documents can be provided in alternate formats upon request.

Comments may be submitted by calling Utilities Planning & Engineering at 559-621-1603, by writing to Mr. Peter Maraccini, Utilities Planning & Engineering Division, 2101 G Street Bldg. A, Fresno, CA 93706, or by emailing at Peter.Maraccini@Fresno.gov. All written comments must be received no later than July 14, 2021, at 11:59 P.M.

McClatchy

Beaufort Gazette
Belleville News-Democrat
Bellingham Herald
Bradenton Herald
Centre Daily Times
Charlotte Observer
Columbus Ledger-Enquirer
Fresno Bee
The Herald - Rock Hill
Herald Sun - Durham
Idaho Statesman
Island Packet
Kansas City Star
Lexington Herald-Leader
Merced Sun-Star
Miami Herald
el Nuevo Herald - Miami
Modesto Bee
Raleigh News & Observer
The Olympian
Sacramento Bee
Fort Worth Star-Telegram
The State - Columbia
Sun Herald - Biloxi
Sun News - Myrtle Beach
The News Tribune Tacoma
The Telegraph - Macon
San Luis Obispo Tribune
Tri-City Herald
Wichita Eagle

AFFIDAVIT OF PUBLICATION

Account #	Order Number	Identification	Order PO	Amount	Cols	Depth
59161	92995	Print Legal Ad - IPL0030763		$861.84	2	5.31

Attention: City of

City of Fresno Dept. Public Utilities
2101 G Street Bldg A
Fresno, CA 93706

PUBLIC NOTICE

Notice of Public Hearing

City of Fresno
Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

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IPL0030763
Jul 1 2021

COUNTY OF DALLAS
STATE OF TEXAS

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.
The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 28, 1994, Action No. 520058-9.
The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

No. of Insertions: 1

Beginning Issue of: 07/01/2021

Ending Issue of: 07/01/2021

Isabel Capps

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: 07/01/2021

Amanda Grisham

Notary Public in and for the state of Texas, residing in Dallas County

AMANDA DAWN GRISHAM
My Notary ID # 132031326
Expires May 30, 2023

Extra charge for lost or duplicate affidavits.
Legal document please do not destroy!

McClatchy

Beaufort Gazette
Belleville News-Democrat
Bellingham Herald
Bradenton Herald
Centre Daily Times
Charlotte Observer
Columbus Ledger-Enquirer
Fresno Bee
The Herald - Rock Hill
Herald Sun - Durham
Idaho Statesman
Island Packet
Kansas City Star
Lexington Herald-Leader
Merced Sun-Star
Miami Herald
el Nuevo Herald - Miami
Modesto Bee
Raleigh News & Observer
The Olympian
Sacramento Bee
Fort Worth Star-Telegram
The State - Columbia
Sun Herald - Biloxi
Sun News - Myrtle Beach
The News Tribune Tacoma
The Telegraph - Macon
San Luis Obispo Tribune
Tri-City Herald
Wichita Eagle

AFFIDAVIT OF PUBLICATION

Account #	Order Number	Identification	Order PO	Amount	Cols	Depth
59161	95606	Print Legal Ad - IPL0031437		$861.84	2	53 L

Attention: City of

City of Fresno Dept. Public Utilities
2101 G Street Bldg A
Fresno, CA 93706

PUBLIC NOTICE

Notice of Public Hearing

City of Fresno
Draft 2020 Urban Water Management Plan,

Draft 2020 Water Shortage Contingency Plan, &

Draft Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed"

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IPL0031437
Jul 8 2021

COUNTY OF DALLAS
STATE OF TEXAS

The undersigned states:

McClatchy Newspapers in and on all dates herein stated was a corporation, and the owner and publisher of The Fresno Bee.
The Fresno Bee is a daily newspaper of general circulation now published, and on all-the-dates herein stated was published in the City of Fresno, County of Fresno, and has been adjudged a newspaper of general circulation by the Superior Court of the County of Fresno, State of California, under the date of November 28, 1994, Action No. 520058-9.
The undersigned is and on all dates herein mentioned was a citizen of the United States, over the age of twenty-one years, and is the principal clerk of the printer and publisher of said newspaper; and that the notice, a copy of which is hereto annexed, marked Exhibit A, hereby made a part hereof, was published in The Fresno Bee in each issue thereof (in type not smaller than nonpareil), on the following dates.

No. of Insertions: 1

Beginning Issue of: 07/08/2021

Ending Issue of: 07/08/2021

Isabel Capps

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Dated: 07/08/2021

Amanda Grisham

Notary Public in and for the state of Texas, residing in Dallas County

AMANDA DAWN GRISHAM
My Notary ID # 132031326
Expires May 30, 2023

Extra charge for lost or duplicate affidavits.
Legal document please do not destroy!

M

Adopting Resolutions

RESOLUTION NO. 2021-196

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 URBAN WATER MANAGEMENT PLAN

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, the City adopted its current UWMP on June 23, 2016; and

WHEREAS, the requirements of an UWMP are to generally: (1) assess current and projected water supplies, (2) evaluate water demand and customer types, (3) evaluate reliability of water supplies, (4) compare demand and supply projections for a 20-year period, and (5) detail response actions in the event of a water shortage; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared the UWMP to comply with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 UWMP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library, Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 UWMP would be held in Council Chambers at which public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 UWMP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Urban Water Management Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-196, entitled ***RESOLUTION – Adopting 2020 Urban Water Management Plan (Subject to Mayor's veto). Item 10:05 A.M. (3), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes :
Noes :
Absent :
Abstain :

RECEIVED
2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

RESOLUTION NO. 2021-197

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT THE 2020 WATER SHORTAGE CONTINGENCY PLAN AND AUTHORIZE THE CITY MANAGER TO DECLARE THE APPROPRIATE WATER CONSERVATION STAGES AND IMPLEMENT THE ASSOCIATED SHORTAGE RESPONSE ACTIONS

WHEREAS, the Urban Water Management Planning Act, codified at California Water Code Sections 10610, et seq., requires every urban water supplier to prepare and adopt an Urban Water Management Plan (UWMP) and update said plan at least once every five years; and

WHEREAS, Water Code Section 10632 requires every urban water supplier to prepare and adopt a Water Shortage Contingency Plan (WSCP) as part of its UWMP; and

WHEREAS, the WSCP details intended City actions to respond to water shortages; and

WHEREAS, as an urban water supplier, the City of Fresno has prepared a WSCP that complies with the requirements of the Urban Water Management Planning Act; and

WHEREAS, the City consulted with, and requested comments from, regional water related agencies such as the County of Fresno, Fresno Irrigation District, the City of Clovis, etc., as required by Water Code Section 10641; and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft 2020 WSCP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library,

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021, and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft 2020 WSCP would be held in Council Chambers at which time public comment on the plan would be received, as required by Water Code Section 10642; and

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the 2020 WSCP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts the 2020 Water Shortage Contingency Plan.

2. The City Manager, or designee, is hereby authorized and directed to file the City of Fresno 2020 Water Shortage Contingency Plan with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

3. The City Manager, or designee, is hereby authorized to declare the appropriate Water Conservation Stages outlined in the 2020 Water Shortage Contingency Plan and implement the associated shortage response actions specified for the appropriate Water Conservation Stage in the Water Shortage Contingency Plan.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-197, entitled ***RESOLUTION – **Adopting 2020 Water Shortage Contingency Plan and authorizing the City Manager to declare the appropriate water conservation stages and implement the associated shortage response actions (Subject to Mayor's veto).** Item 10:05 A.M. (4), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

Please indicate either your formal approval or veto by completing the following sections and executing and dating your action. Please file the completed memo with the Clerk's office on or before July 29, 2021. In computing the ten day period required by Charter, the first day has been excluded and the tenth day has been included unless the 10th day is a Saturday, Sunday, or holiday, in which case it has also been excluded. Failure to file this memo with the Clerk's office within the required time limit shall constitute approval of the ordinance, resolution or action, and it shall take effect without the Mayor's signed approval.

APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes	:	
Noes	:	
Absent	:	
Abstain	:	

RECEIVED
2021 JUL 19 P 4:52
CITY OF FRESNO
CITY CLERK'S OFFICE

RESOLUTION NO. 2021-198

A RESOLUTION OF THE COUNCIL OF THE CITY OF FRESNO, CALIFORNIA, TO ADOPT APPENDIX L - ADDENDUM TO THE CITY OF FRESNO'S 2015 URBAN WATER MANAGEMENT PLAN

WHEREAS, the City of Fresno (City) contracts with the United States Bureau of Reclamation (USBR) Central Valley Project (CVP) Friant Division for an annual supply of 60,000 acre-feet of Class 1 surface water; and,

WHEREAS, the CVP was developed through an agreement with the Exchange Contractors that have historic pre-1914 San Joaquin River water rights; and,

WHEREAS, the Exchange Contractors receive water from the Sacramento-San Joaquin River Delta (Delta) in exchange for the CVP Friant Division water; and,

WHEREAS, during times of severe drought when the Exchange Contractors don't receive their full allocations from the Delta, the Exchange Contractors can call on their historic pre-1914 San Joaquin River water rights to fulfill their allocations, which reduces CVP Friant Division allocations to the City; and,

WHEREAS, due to the indirect connection of the City's Class 1 surface water allocation from the CVP Friant Division to the Exchange Contractors allocation from the Delta, the City is required to demonstrate consistency with the Delta Plan established via the Sacramento-San Joaquin Delta Reform Act of 2009; and,

WHEREAS, Delta Plan Policy WR P1 requires urban water suppliers to demonstrate reduced Delta reliance in the 2015 and 2020 Urban Water Management Plans (UWMPs); and,

WHEREAS, the City's 2015 UWMP did not include information regarding Delta

Date Adopted: 07/15/2021
Date Approved: 07/19/2021
Effective Date: 07/19/2021

Plan Policy WR P1, Reduce Reliance on the Delta Through Improved Regional Water Self -Reliance; and

WHEREAS, the City prepared the 2015 UWMP following the Department of Water Resources (DWR) UWMP Guidebook 2015, which made such reporting optional; and,

WHEREAS, the DWR UWMP Guidebook 2020 instructs urban water suppliers to amend 2015 UWMP with reporting on reduced Delta reliance if not already included; and,

WHEREAS, the City has prepared Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" that follows the instructions of the DWR UWMP Guidebook 2020, fulfills the requirements of the Delta Plan Policy WR P1, and complies with the requirements of the Urban Water Management Planning Act; and,

WHEREAS, the City desires to amend its 2015 UWMP to incorporate Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed;" and

WHEREAS, prior to the public hearing on July 15, 2021, the City made the draft Appendix L – Addendum to the 2015 UWMP available for public inspection and placed copies for public review at the following Fresno County Libraries: Central Library, Woodward Park Regional Library, Betty Rodriguez Regional Library, and Sunnyside Regional Library, as well as making electronic copies available to agencies and the public, as required by Water Code Section 10642; and

WHEREAS, on July 1, 2021 and July 8, 2021, respectively, the City published notices on the City Clerk's website and in the Fresno Bee that on July 15, 2021 at 10:05 a.m. a public hearing regarding the draft Appendix L – Addendum to the 2015 UWMP would be held in Council Chambers at which time public comment on the draft Addendum would be received, as required by Water Code Section 10642; and,

WHEREAS, on July 15, 2021, at 10:05 a.m. the public hearing was conducted in Council Chambers at which the public was provided the opportunity to comment on the draft Appendix L Addendum to the 2015 UWMP.

NOW, THEREFORE, BE IT RESOLVED BY THE Council of the City of Fresno as follows:

1. The City hereby adopts Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed."

2. The City Manager, or designee, is hereby authorized and directed to file Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan, "Quantifying Regional Self Reliance and Reduced Reliance on Water Supplies from the Delta Watershed" with the California Department of Water Resources, the California State Library, and the County of Fresno within 30 days after adoption.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, BRIANA PARRA, Interim City Clerk of the City of Fresno, certify that the foregoing resolution was adopted by the Council of the City of Fresno, at a regular meeting held on the 15th day of July, 2021.

AYES :Arias, Esparza, Karbassi, Maxwell, Chavez
NOES :None
ABSENT :Bredefeld, Soria
ABSTAIN :None

Mayor Approval: July 19th, 2021
Mayor Approval/No Return: N/A, 2021
Mayor Veto: N/A, 2021
Council Override Veto: N/A, 2021

BRIANA PARRA, CMC
Interim City Clerk

BY: Briana Parra 7/20/2021
Deputy Date

APPROVED AS TO FORM:
DOUGLAS T. SLOAN
City Attorney

BY: 7/20/21
Jennifer M. Quintanilla Date
Senior Deputy

July 19, 2021

Council Adoption: 07/15/2021
Mayor Approval:
Mayor Veto:
Override Request:

TO: MAYOR JERRY DYER

FROM BRIANA PARRA, CMC
Interim City Clerk

SUBJECT: TRANSMITTAL OF COUNCIL ACTION FOR APPROVAL OR VETO

At the City Council meeting of July 15, 2021, Council adopted the attached Resolution No. 2021-198, entitled ***RESOLUTION – Adopting Appendix L – Addendum to the City of Fresno's 2015 Urban Water Management Plan (Subject to Mayor's veto). Item 10:05 A.M. (5), File ID21-22925, by the following vote:

Ayes	:	Arias, Esparza, Karbassi, Maxwell, Chavez
Noes	:	None
Absent	:	Bredefeld, Soria
Abstain	:	None

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APPROVED / **NO RETURN:** _____

VETOED for the following reasons: (Written objections are required by Charter; attach additional sheets if necessary.)

_____

_____

_____ Date: 7/19/2021

Jerry Dyer, Mayor

COUNCIL OVERRIDE ACTION: Date: _____

Ayes :
Noes :
Absent :
Abstain :

RECEIVED
CITY OF FRESNO
CITY CLERK'S OFFICE
2021 JUL 19 P 4:52

Southeast Development Area (SEDA)
Specific Plan
Recycled Water Technical Study

April 26th, 2023

Prepared for:

City of FRESNO

City of Fresno, California

Prepared by:

Blair, Church & Flynn
CONSULTING ENGINEERS

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CHAPTER 1
INTRODUCTION

1.1 Project Description and Background

The City of Fresno (City) is preparing a Specific Plan and Program Environmental Impact Report (PEIR) for the Southeast Development Area (SEDA). The SEDA Specific Plan Area (Plan Area), previously known as the Southeast Growth Area (SEGA), is an approximately 9,000-acre area in the southeast portion of the City that is formally designated as a growth area in the City of Fresno General Plan (General Plan). The Plan Area is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jenson and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west; see Figure 1.1 for the Plan Area's location.

SEDA was approved for incorporation into the City by the Local Agency Formation Commission (LAFCo) in 2006, with a number of qualifying provisions, of which included the preparation of a Specific Plan and associated environmental documents before the land could be annexed to the City. Located in Growth Area II, SEDA was planned for development after other infill initiatives from the City's other planning efforts. This is reflected in the City's General Plan buildout conditions, which included only one-third of SEDA's residential capacity (approximately 15,000 dwelling units of a total 45,0000 capacity) to accommodate Fresno's 2035 projected population; it was assumed that the remaining 30,000 units would not be developed until after 2035.

The proposed project is a Specific Plan for SEDA that would accommodate for increased density and accelerated housing production throughout the Plan Area. As part of the City's General Plan, SEDA was designated with specific land use categories matching those of other areas within the City, and only considered one-third of the Plan Area's residential capacity. The Specific Plan presents alternative land use categories for the Plan Area, and seeks to propose how the Plan Area will develop over time to complete buildout conditions with these newly-defined land use categories and to full capacity.

As part of the Specific Plan process, a PEIR needs to be developed to evaluate the impacts associated with the proposed improvements to the Plan Area, and what, if any, mitigation measures are necessary to account for such impacts. This technical report will focus on the impacts of the SEDA Specific Plan on recycled water supply, infrastructure, and demand for incorporation into the PEIR.

1.2 Summary of Analysis

The City's General Plan assigned various land use categories to each parcel located within the SEDA Specific Plan Area. Each land use category has a set of characteristics assigned to it with respect to a specific utility demand. The SEDA Specific Plan proposes new land use categories for each parcel within the Plan Area, which changes the demand of each user type for each distinct utility. The change in categories will result in modified areas for each type, leading to changes in the demand of each utility.

Typical infrastructure analysis for the Plan Area involves utilizing the land use data from the General Plan to determine a utility demand/production rate, and comparing the results to similarly calculated demand/production rates determined from the revised land use categories proposed in the Specific Plan. This comparison is then used in conjunction with existing and proposed infrastructure in the Plan Area to determine if further analysis and improvements are necessary to meet this future demand.

Recycled water is not yet utilized in the Plan Area. It has been assumed that all land use classifications will utilize domestic water for recycled water-approved uses (e.g. irrigation) until a source is readily available, at which time the City will need to update their Recycled Water Planning Documents, including the Recycled Water Master Plan (December 2010). This technical report will discuss the potential uses of recycled water in the Plan Area, as well as establish the possible improvements as indicated in the Recycled Water planning documents; the proposed SEDA Specific Plan offers an opportunity to integrate recycled water use into the associated improvements with buildout of the City's recycled water system. For uses in which recycled water is allowed, the domestic water distribution system should be installed with materials that meet recycled water regulations to promote optimum utilization of recycled water within the Plan Area once a source is available.

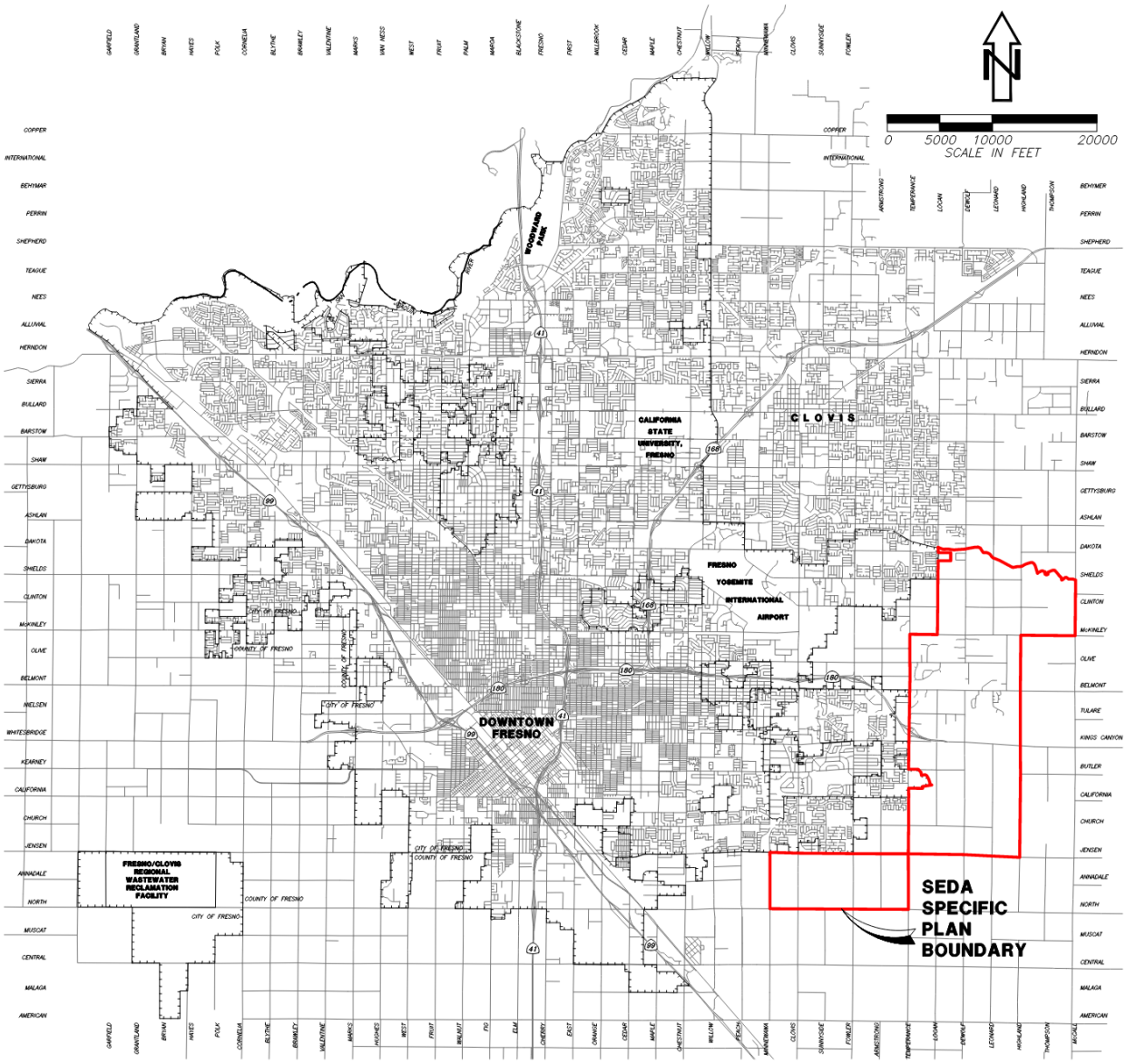


Figure 1.1 SEDA Specific Plan Location

CHAPTER 2
REGULATORY FRAMEWORK

2.1 General

The State of California promulgates and enforces statutes and regulations for the use of recycled water. The City of Fresno has established a Recycled Water Ordinance, as well as Rules and Regulations of Recycled Water Use. All recycled water use must comply with the requirements of the State and City statutes, rules and regulations, and ordinances, in addition to all federally established regulations. Many agencies also reference other helpful resources such as the American Water Works Association (AWWA) publications, "Guidelines for the On-site Retrofit of Facilities Using Disinfected Tertiary Recycled water," "Guidelines for Distribution of Non-Potable Water," "Planning for the Distribution of Reclaimed Water," and California WateReuse publication "Recycled Water Urban Irrigation User's Manual" for the installation and use of recycled water irrigation systems. Major regulatory documents that detail requirements for recycled water systems also include Title 17, "Public Health," and Title 22, "Social Security," of the California Code of Regulations (CCR).

There are a number of federal, state, and local regulations that encourage and direct the use of recycled water. Several regulations related to water conservation are discussed in this section due to their proximity to recycled water, in that recycled water can be used as a viable option in many instances to help conserve and reduce dependance on potable water. The use of recycled water can also affect surface and groundwater quality, and thus a number of regulatory policies/documents are discussed in the following sections to support proper management of the City's recycled water system.

2.2 Federal Regulations

Federal Safe Drinking Water Act[1]

The Federal Safe Drinking Water Act (SDWA) was established to protect the quality of drinking water in the United States. This law focuses on all waters actually or potentially designed for drinking, whether from above- or below-ground sources. The SDWA authorizes the Environmental Protection Agency (EPA) to establish national health-based minimum standards for drinking water to protect the public from naturally-occurring and man-made contaminants that may be found in drinking water. These standards, known as the National Primary Drinking Water Regulations, set enforceable maximum contaminant levels for specific contaminants in drinking water, as well as required methods of treatment to remove said contaminants. The SDWA applies to all public water systems in the United States, except for private wells serving less than 25 people. State drinking water programs provide direct oversight of these water systems to ensure compliance with the SDWA; in California's case, the Division of Drinking Water (DDW) within the State Water Resources Control Board (SWRCB) regulates public water systems.

2.3 State Regulations

California Porter-Cologne Water Quality Control Act[2]

The Porter-Cologne Water Quality Control Act is the principal law governing water quality in California, for both above- and below-ground supplies. This act designated the SWRCB as the

[1] Federal Safe Drinking Water Act, 42 U.S.C. §300f et seq. (1974).
[2] California Porter-Cologne Water Quality Act, California Water Code Div. 7 §13000 et seq. (1969)

statewide water quality planning agency, and gave authority to nine Regional Water Quality Control Boards (RWQCB) to oversee water quality on a day-to-day basis at both the local and regional levels. RWQCBs develop Regional Water Quality Plans (Basin Plans), regulate all pollutant or nuisance discharges that may affect either surface water or groundwater, and implement said water quality plans. The Central Valley RWQCB oversees the Fresno area.

California Urban Water Management Planning Act

The Urban Water Management Planning Act updated the California Water Code (§10610-10656 and 10608) to include a requirement that all urban water suppliers within California prepare and adopt an Urban Water Management Plan (UWMP) and update it every five years. This applies to suppliers that provide either 3,000 acre-feet of water annually, or who serve more than 3,000 customers. UWMPs support suppliers' long-term resource planning to ensure that adequate water supplies are available to meet existing and future water demands. The Act is intended to encourage and support water conservation efforts, and ensure efficient use of available water supplies. UWMPs must assess the reliability of water sources over a 20-year planning time period, describe demand management measures and water shortage contingency plans, planning for single and multiple dry water years, and discuss the use and planned use of recycled water.

Senate Bills 610 and 221[3]

Senate Bill (SB) 610 and SB 221 amended state law in 2002 to ensure better coordination between local water supply and land use decisions, and to confirm that there is an adequate water supply for new developments. These two companion measures require authorities to demonstrate that adequate and reliable 20-year water supplies are available for any new development, as well as existing water users. SB 610 requires the preparation of UWMPs and Water Supply Assessments (WSA) for larger development projects or land use plans that are subject to California Environmental Quality Act (CEQA) provisions. SB 221 covers approvals of subdivision maps with more than 500 units, and prohibits a land use agency from approving a subdivision map of more than 500 units without a letter of verification that sufficient and reliable water is available.

Sustainable Groundwater Management Act of 2014 (SGMA)[4]

The Sustainable Groundwater Management Act (SGMA) includes a three-bill legislative package composed of Assembly Bill (AB) 1739, SB 1168, and SB 1319. SGMA requires local agencies to form Groundwater Sustainability Agencies (GSAs) for high and medium priority basins, and develop and implement Groundwater Sustainability Plans (GSPs) to avoid and mitigate overdraft of groundwater within 20 years. SGMA places the authority of groundwater management with local agencies; it establishes a definition of sustainable groundwater management, establishes a framework for local agencies to develop plans and implement strategies to sustainably manage groundwater resources, prioritizes basins with the greatest problems, and sets a 20-year timeline for implementation.

State Updated Model Water Efficient Landscape Ordinance (AB 1881) (2015)[5]

The Model Water Efficient Landscape Ordinance (MWELO) is a state regulation designed to prevent water from being wasted on irrigated landscapes. Created in 1993, the MWELO was updated in 2015 by Executive Order EO B-29-15. Land use authorities (Cities and Counties) must ensure MWELO compliance on development projects with landscaped areas of 500 square feet or more. This applies to residential, commercial, industrial and institutional projects that require a permit, plan check, or design review. The California DWR provides technical assistance in helping

[3] SB 610 Water Supply Planning, Chapter 643, Statutes of 2001, Costa; SB 221 Land Use: Water Supplies, Chapter 642, Statutes of 2001, Kuehl.
[4] Sustainable Groundwater Management Act (SGMA), California Water Code Div. 6, Part 2.74 §10720-10737.8 (2014).
[5] Model Water Efficient Landscape Ordinance (MWELO), Title 23 CCR, Div. 2, Chap. 2.7 §490 et seq.

Land Use Authorities adhere to the ordinance. The Fresno Municipal Code includes local ordinances that are required to reduce water consumption and conserve water.

State Mandated Water Reductions[6]

On January 18, 2022, as a result of drought conditions in California, the California SWRCB adopted Emergency Regulation Requirements for water conservation. The Governor previously urged Californians to reduce water usage in 2021 by 15%, however actual reduction was only about 6%. Thus, the SWRCB has enacted emergency regulations that will remain in effect for one year unless the SWRCB acts to end, modify, or readopt it. These regulations were readopted in December 2022 for another year. The regulations prohibit certain wasteful water use practices statewide, and encourage Californians to monitor their water usage more closely. Emergency Regulation Requirements prohibit using potable water for:

- Outdoor watering that lets water run onto sidewalks and other areas (except incidental runoff)
- Washing vehicles without an automatic shutoff nozzle
- Washing hard surfaces, like driveways and sidewalks, that don't absorb water
- Street cleaning or construction site preparation
- Filling decorative fountains, lakes, or ponds
- Outdoor watering within 48 hours after it rains at least 1/4 inch of rainfall
- Watering ornamental turf on public medians

An additional emergency water conservation regulation was enacted in June 2022 that prohibits the use of potable water to water decorative grass in commercial, industrial, and institutional areas including common areas of homeowners' associations.[7] The regulation also requires urban water suppliers to implement all demand-reduction actions under "Level 2" of their Water Shortage Contingency Plans, which are actions meant to address a 10% to 20% water shortage. Additionally, urban water suppliers are required to fast-track their submissions of supply and demand assessments to plan for potential extended dry conditions. "Level 2" actions vary for each water supplier, but often include things like increasing communication about the importance of water conservation, limiting outdoor irrigation to certain days or hours, increasing patrolling to identify water waste, and enforcing water-use prohibitions.

CALGreen Building Code[8]

The California Building Standards Commission adopted the nation's first green building standards in 2008. The standards code (Part 11, Title 24 CCR, known as "CALGreen") was adopted to apply to the planning, design, operation, construction, use, and occupancy of every newly constructed building or structure, unless otherwise indicated in the CCR, throughout California. CALGreen established planning and design standards for sustainable site development including water conservation. CALGreen provisions became effective on January 1, 2011. The purpose of the CALGreen provisions is to improve public health, safety, and general welfare by enhancing the design and construction of buildings through the use of concepts having reduced negative impact or positive environmental impact and encouraging sustainable construction practices.

California Plumbing Code[9]

The California Plumbing Code (Part 5, Title 24 CCR) serves to prevent disorder in the industry and to consolidate plumbing codes utilized by local jurisdictions to reduce confusion and conflicts

[6] State Water Resources Control Board Resolution No. 2022-0002, "To Adopt an Emergency Regulation to Supplement Voluntary Water Conservation," 2022.
[7] State Water Resources Control Board Resolution No. 2022-0018, "To Adopt an Emergency Regulation to Reduce Water Demand and Improve Water Conservation." 2022.
[8] California Green Building Standards Code (CALGreen), Title 24 CCR Part 11.
[9] California Plumbing Code, Title 24 CCR Part 5.

among varying practices. The Plumbing Code covers water fixtures, potable and non-potable water systems, and recycled water systems, among other topics. Recycled water supply and distribution facilities shall comply with all applicable provisions of the current edition of the California Plumbing Code.

State Water Resources Control Board Water Quality Control Policy for Recycled Water[10]

The SWRCB adopted their Water Quality Control Policy for Recycled Water on December 11, 2018, and it became effective on April 8, 2019. The policy was adopted to encourage the safe use of recycled water from wastewater sources that implement state and federal water quality laws and protects public health and the environment. It is designed to provide direction to the State and regional water quality control boards when issuing permits for recycled water projects; it describes the circumstances under which permittees may enroll under statewide water reclamation requirements for recycled water use or choose an alternate permitting mechanism. The intent of the policy is to expedite the permitting of recycled water projects in a manner that implements state and federal water quality laws while allowing the regional water boards to focus their resources on projects that require substantial regulatory review due to unique site-specific conditions.

Title 22, California Code of Regulations

Title 22 "Social Security," of the California Code of Regulations (CCR) contains a number of requirements and regulations for the production, distribution, and use of recycled water. Recycled water intended for non-potable reuse can be used in many ways depending on the level of treatment. Such uses include irrigation (parks, schools, roadway medians, etc.), cooling, impoundments, toilets, industrial processes, decorative fountains, structural firefighting, commercial laundries, etc. Areas that utilize recycled water must meet certain use area requirements included in Title 22, including proper marking of recycled water improvements and appropriate cross-connection facilities. Title 22 also includes provisions for dual use sites, and required reporting and monitoring for all use cases. Any sites utilizing recycled water are required to meet all regulations and requirements of Title 22 of the CCR.

2.4 Local Regulations

Fresno General Plan[11]

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of recycled water service and facilities (Table 2.1):

Table 2.1 City of Fresno General Plan Objectives and Policies Relevant to Recycled Water Supply

Objective/Policy Number	Objective/Policy Text
Policy PU-7-d	**Wastewater Recycling.** Pursue the development of a recycled water system and the expansion of beneficial wastewater recycling opportunities, including a timely technical, practicable, and institutional evaluation of treatment, facility siting, and water exchange elements.
Policy RC-6-d	**Recycled Water.** Prepare, adopt, and implement a City of Fresno Recycled Water Master Plan

[10] "Water Quality Control Policy for Recycled Water," State Water Resources Control Board California Environmental Protection Agency. Adopted December 11, 2018. Effective April 8, 2019.
[11] City of Fresno, "Fresno General Plan," December 18, 2014.

Objective/Policy Number	Objective/Policy Text
Objective PU-8	Manage and develop the City's water facilities on a strategic timeline basis that recognizes the long life cycle of the assets and the duration of the resources, to ensure a safe, economical, and reliable water supply for existing customers and planned urban development and economic diversification.
Policy PU-8-a	**Forecast Need.** Use available and innovative tools, such as computerized flow modeling to determine system capacity, as necessary to forecast demand on water production and distribution systems by urban development, and to determine appropriate facility needs.
Policy PU-8-c	**Conditions of Approval.** Set appropriate conditions of approval for each new development proposal to ensure that the necessary potable water production and supply facilities and water resources are in place prior to occupancy.
Policy PU-8-g	**Review Project Impact on Supply.** Mitigate the effects of development and capital improvement projects on the long-range water budget to ensure an adequate water supply for current and future uses.

Fresno Municipal Code – Model Water Efficient Landscape Ordinance (MWELO)

As stated, MWELO requires local agencies to implement water efficiency measures as part of its review of landscaping plans. Local agencies can either adopt the MWELO or incorporate provisions of the ordinance into its own code requirements for landscaping. Section 11 of Chapter 11, "Building Permits and Regulations," and Section 23 of Chapter 15, "Citywide Development Code," of the City Municipal Code, include requirements for landscape design and incorporates the requirements of the California MWELO, among other state codes and regulations.

City of Fresno Recycled Water Ordinance[12]

The City adopted a Recycled Water Ordinance concurrently with its Recycled Water Master Plan to require the use of recycled water by existing and future potential users in areas where recycled water is available. It regulates the use and distribution of recycled water in a manner that complies with any and all applicable federal, state, and local standards.

City of Fresno Rules and Regulations of Recycled Water Use[13]

The City published the Rules and Regulations of Recycled Water Use to govern the design, construction, and use of recycled water within the City. The Rules and Regulations aim to provide customers with the necessary information needed to comply with relevant codes, laws, statutes, and regulations concerning the use of recycled water. The Rules and Regulations are prepared and administered by the Department of Public Utilities Wastewater Management Division, and apply to all customers and distributors of recycled water.

City of Fresno Metropolitan Water Resources Management Plan – Phase 2 Development and Evaluation of Future Water Supply Plan (January 2011)[14]

The City of Fresno's Metropolitan Water Resources Management Plan (Metro Plan) was prepared to document the existing conditions of the City's water system, and facilitate future water resources decisions and facilities improvements. Phase 1 consists of a baseline system characterization, Phase 2 consists of the development and evaluation of future water supplies, and Phase 3 consists of implementation of the management plan. Chapter 7 of Phase 2 discusses

[12] Bill No. B-18, Ordinance No. 2021-026 "An Ordinance of the City of Fresno, California, Amending Chapter 6, Article 9, of the Fresno Municipal Code, the Recycled Water Ordinance." Adopted 06/17/2021. Approved 06/21/2021. Effective 07/22/2021.
[13] City of Fresno Department of Public Utilities, "Rules and Regulations of Recycled Water Use."
[14] City of Fresno, "Metropolitan Water Resources Management Plan, Phase 2 Development and Evaluation of Future Water Supply Plan," January 2011.

the City's anticipated future use of recycled water, and includes a list of proposed objectives, goals, and policies related to recycled water, including the following:

Recycled Water Objectives

- Increase the use of recycled water to help offset existing/future potable water demands; and
- Maximize the use of available recycled water recharge exchange supply from the FID Agreement.

Recycled Water Goals

- Provide 25,000 af/yr of recycled water by 2025 for landscape irrigation and other non-potable water uses to offset potable water demands.

Recycled Water Policies

- Require new developments City-wide to install "purple pipe" for recycled water use on parks, common areas, roadway medians, etc.;
- Look for opportunities to install purple pipe near existing landscaped area (e.g., parks, sports fields) (i.e., "piggyback" on other pipeline installation/replacement projects);
- Work with FID and/or others to develop an agreement to better use the percolated treated effluent from the wastewater treatment plant;
- Further develop partnerships with FID, Clovis, and others to maximize available water resources;
- Allow new development to create "new" supplies by participation in the implementation of recycled water facilities and projects;
- Adopt and implement the Recycled Water Master Plan; and
- Provide additional staff and program-specific financial resources required to implement, manage and maintain the recycled water use program.

At the time of preparation of this study, an update to the Metro Plan is being developed by the City. This update is revising the proposed improvements to the City's future recycled water infrastructure, including that for the SEDA Specific Plan Area.

<u>City of Fresno Standard Specifications and Plans</u>

The City maintains its own set of standard Specifications and Plans to be followed when designing and constructing City projects. Those related to the supply, distribution and use of recycled water include, but are not limited to:

- Standard Specifications
  - Section 33 – Recycled Water Facilities Design Criteria
  - Section 34 – Recycled Water Facilities
- Standard Plans
  - Plans RW-1 through RW-26

CHAPTER 3
EXISTING CONDITIONS

3.1 Plan Area Recycled Water Infrastructure

Recycled water, an important water source for the City of Fresno in conserving potable water supplies, is not yet utilized in the Plan Area. However, there are existing recycled water facilities throughout the City that would contribute to the future delivery of recycled water to the Plan Area.

3.2 City Of Fresno Recycled Water Infrastructure

3.2.1 Recycled Water Sources

There are a number of facilities that the City owns, operates, and utilizes for the collection and treatment of wastewater and distribution of recycled water. See Figure 3.1 for the locations of the following facilities.

Fresno-Clovis Regional Wastewater Reclamation Facility

In partnership with the City of Clovis, the City of Fresno owns and operates the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) located near the intersection of Jensen and Cornelia Avenues in southwest Fresno. The RWRF receives and treats the majority of domestic, commercial, and industrial wastewater generated within the Cities of Fresno and Clovis, as well as some unincorporated areas of Fresno County. The RWRF is currently operated by the City, who holds responsibility for ensuring regulatory compliance with Waste Discharge Requirements (WDRs), and the Central Valley RWQCB Order No. 5-01-254, "Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County."

The RWRF has a rated capacity of 88 million gallons per day (MGD), but the average annual flow is approximately 80 MGD[15]. The RWRF produces undisinfected secondary-treated wastewater and disinfected tertiary-treated wastewater. The undisinfected secondary-treated wastewater is disposed into on-site disposal ponds and conveyed to farmers for restricted irrigation of non-food crops on agricultural land on surrounding properties. The disinfected tertiary-treated wastewater is delivered through a network of pipelines to various recycled water use areas around the City, mainly for irrigation of landscaping at sites including but not limited to parks, median landscape strips, and cemeteries. The RWRF also owns and operates a number of reclamation wells that extract water from on-site percolation ponds, and discharges that water into Fresno Irrigation District (FID) canals for irrigation use of farmland downstream of the RWRF.

North Fresno Wastewater Reclamation Facility

The City owns and operates the North Fresno Wastewater Reclamation Facility (NFWRF) located in northeast Fresno on the north side of Copper Avenue between Cedar and Maple Avenues. This facility receives and treats wastewater generated within a small area of the City generally bound by Copper, Friant, and Willow Avenues, including wastewater generated from Copper River Ranch. The NFWRF is a tertiary level treatment facility, and the treated wastewater is mainly used for irrigation of the Copper River Country Club and Golf Course. The permitted capacity of the plant is 0.71 MGD average monthly flow and 1.07 MGD maximum daily flow[16].

[15] "Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF)." https://www.fresno.gov/publicutilities/facilities-infrastructure/fresno-clovis-regional-wastewater-reclamation-facility-rwrf/.
[16] "North Fresno Wastewater Treatment Facility (NFWTF)." https://www.fresno.gov/publicutilities/facilities-infrastructure/north-fresno-wastewater-treatment-facility-nfwtf/.

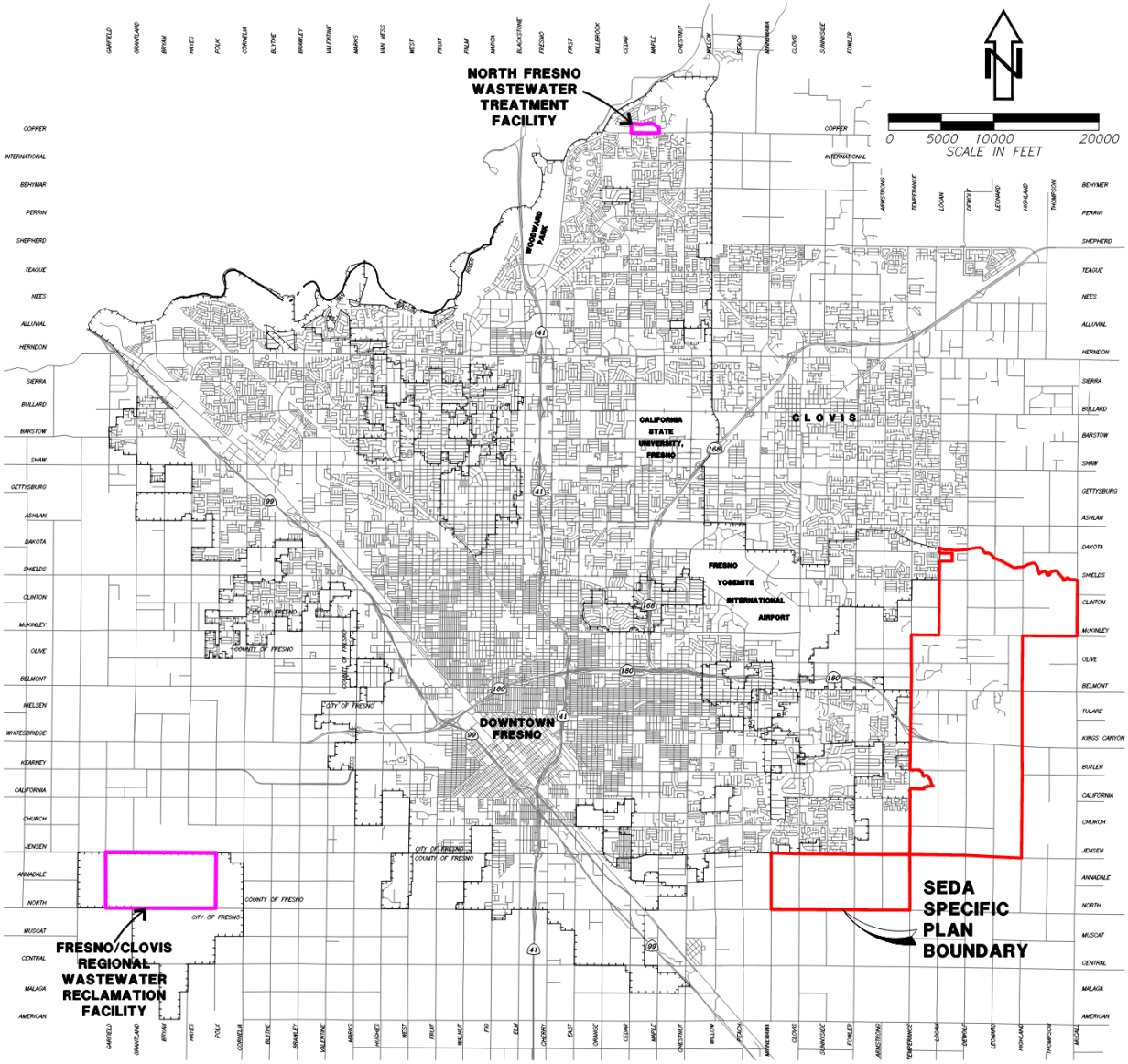


Figure 3.1 City of Fresno Existing Recycled Water Sources

3.2.2 Recycled Water Infrastructure

Since the adoption of the City's Recycled Water Master Plan in 2010, a number of recycled water facilities have been constructed and are currently in service throughout the Fresno area. As mentioned in Section 3.2.1, the Fresno-Clovis RWRF has been upgraded to produce disinfected tertiary-treated wastewater. Thus, segments of the recycled water distribution system outlined in the Recycled Water Master Plan have been designed and constructed over the last several years, mainly within the Southwest Quadrant of the distribution system, as well as some small portions of the Northeast and Northwest systems. Pipeline sizes range from 6 inches to 54 inches with several users actively utilizing recycled water for irrigation. Figure 3.2 shows an overview of the existing recycled water distribution system.

These existing facilities represent a portion of the future recycled water system; Chapter 4 will discuss the proposed master plan facilities, and how they may affect recycled water availability in the Plan Area. Recycled water is not yet utilized in the Plan Area, and the implications of this will be expanded upon in later chapters of this report.

3.2.3 Agency Use of Recycled Water

Fresno Irrigation District (FID)

There are extraction wells on-site at the Fresno-Clovis RWRF that extract percolated groundwater and deliver this water to FID through their own facilities for irrigation within FID's service area. This is completed via an agreement between the City and FID for the exchange of water. In 1974, the City and FID entered an agreement to establish this system of on-site extraction wells at the RWRF for groundwater reclamation and piping to convey this groundwater to FID facilities for irrigation. The extracted groundwater is discharged into FID canals during growing season, and often blended with other surface waters to be used for agricultural irrigation on the western side of FID's service area. The agreement stipulates the following:

- The City must discharge a minimum of 100,000 ac-ft of extracted groundwater to FID during any ten-year period.
- The City may discharge a maximum of 30,000 ac-ft of extracted groundwater to FID in any given year.
- For every ac-ft of extracted groundwater the City discharges to FID, the City is entitled to receive 0.46 ac-ft of surface water from FID.
- Any increase in the discharge of extracted groundwater to FID beyond that stipulated in the 1974 agreement is subject to FID approval.
- The City cannot extract groundwater from beneath the RWRF in volumes that will cause the groundwater level to drop below levels observed in the previous year.

The City also entered a separate cooperative agreement with FID in 1976 to use FID's distribution system to satisfy their respective water rights, and to work together to protect and preserve the groundwater basin. It also stipulates that the City will retain treated effluent within the boundaries of FID unless written approval to do otherwise is obtained. The City currently owns, operates and maintains the facilities that extract and deliver the water to the FID system up to the point of delivery, and FID owns, operates and maintains all parts of their delivery system beyond the point of delivery.

The Recycled Water Master Plan recommends expansion of the agricultural exchange via increased delivery of extracted groundwater and/or the addition of delivery of tertiary-treated recycled water to expand the agricultural exchange limit beyond the currently established limit of 30,000 AFY. To do so, the original agreements with FID would need to be modified, and additional infrastructure to accommodate increased volumes of extracted groundwater would need to be constructed.

Increased demand of recycled water for the Plan Area may affect the amount of groundwater that can be delivered to the FID, and thus these agreements and facilities will need to be revisited and revised as necessary upon further development of the Plan Area.

Fresno Metropolitan Flood Control District (FMFCD)

The Recycled Water Master Plan recommends implementing Groundwater Replenishment Reuse Projects (GRRPs) in the southwest, northwest, and southeast portions of the City. The Recycled Water Master Plan identifies a number of potential GRRP sites that are generally located near FMFCD basins; this is because storm runoff or surface water in the FMFCD system could be used for groundwater recharge on its own, or be used as diluent water for GRRPs if tertiary-treated recycled water is used. If development of GRRPs affects FMFCD basins or facilities, the City would need to enter into agreements with FMFCD. This will need to be done if GRRPs are planned in the Plan Area further into development.

3.2.4 Recycled Water Use and Demand

The primary use of recycled water in Fresno is irrigation. The undisinfected secondary treated wastewater produced by the Fresno-Clovis RWRF is used to irrigate non-food crops in the areas adjacent to the facility and is discharged to on-site basins for percolation to the aquifer and subsequent extraction for use by FID customers for irrigation. The disinfected tertiary treated wastewater produced by the RWRF is used to irrigate landscape for users served by the City's recycled water distribution system. The disinfected tertiary treated wastewater produced by the NFWRF is used to irrigate the nearby Copper River golf course.

Recycled water use has varied over the last few years due to fluctuations in recycled water use and the number of customers utilizing recycled water services. Per the 2020 UWMP, total recycled water use in 2020 was 4,757 AF (3,845 AF of undisinfected secondary treated wastewater for non-food crop irrigation, 858 AF of disinfected tertiary treated wastewater from the Fresno-Clovis RWRF, and 54 AF of disinfected tertiary treated wastewater from the NFWRF), with an average from 2015 to 2020 of 6,568 AFY.[17]

Undisinfected secondary treated wastewater reuse is projected to continue to be used to irrigate non-food crops adjacent to the RWRF for the foreseeable future. It is predicted that disinfected tertiary treated wastewater use will increase as the City's recycled water distribution system continues to be built out and the number of customers increases. The use of recycled water for the Copper River golf course is assumed to remain constant through buildout of the City's General Plan. Per the 2020 UWMP, recycled water use is projected to be 14,220 AFY in any given year from 2025 through buildout of the City's General Plan, comprised of 7,900 AF of secondary undisinfected recycled water for use as agricultural irrigation, and 6,320 AF of tertiary treated recycled water to be used for landscape irrigation and limited agricultural irrigation (5,800 AF for landscape irrigation excluding golf courses, 410 AF for limited agricultural irrigation, and 110 AF for golf course irrigation).[18] As noted in the UWMP, recycled water for agricultural irrigation does not offset the City's potable water demands, and as such, is excluded from projected recycled water. Thus, the total projected recycled water available to offset potable water demands is 5,910 AF (5,800 AF for landscape irrigation excluding golf courses, and 110 AF for golf course irrigation).

[17] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.
[18] Water Systems Consulting, Inc. 2021. City of Fresno Urban Water Management Plan. July.

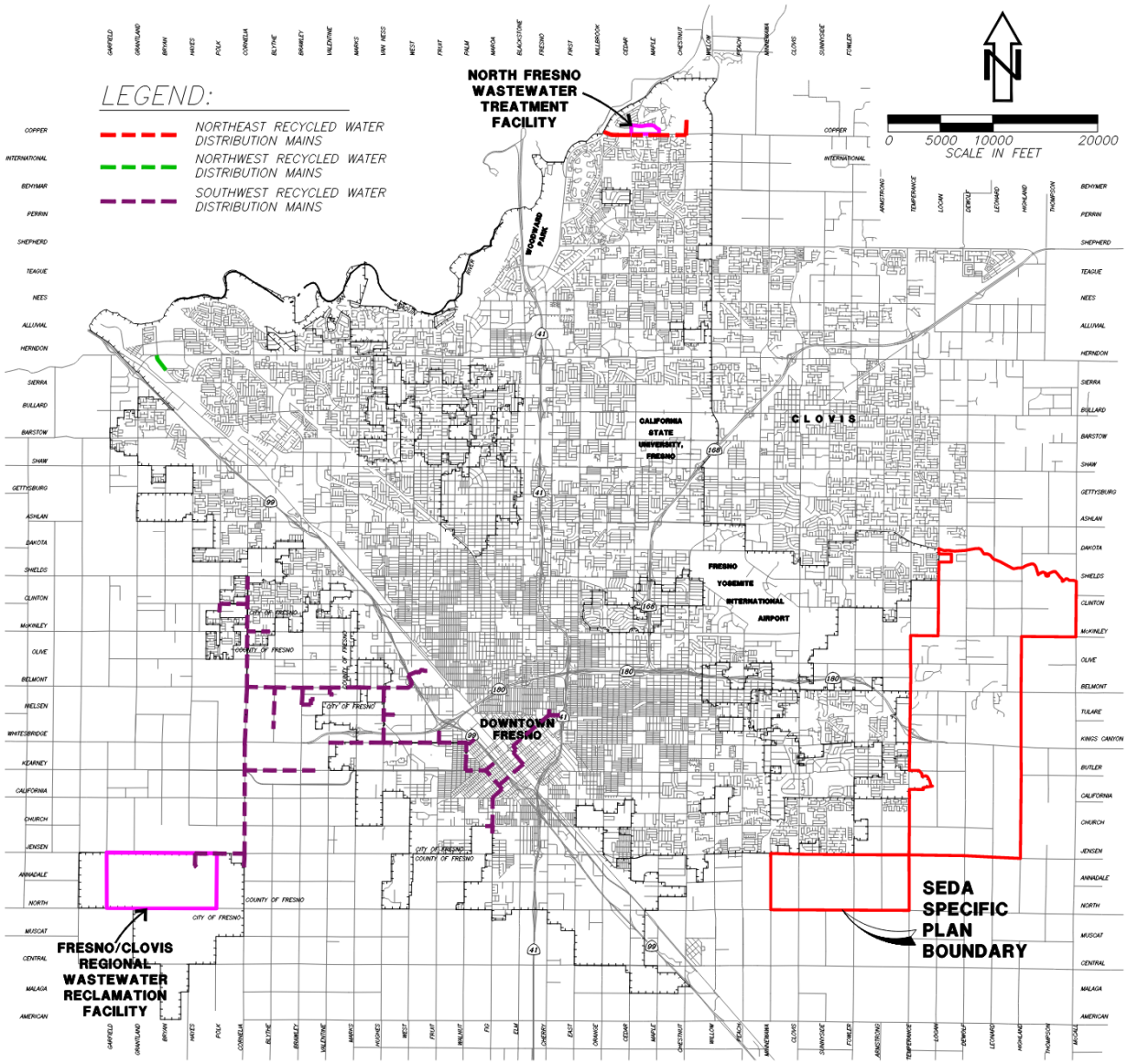


Figure 3.2 Existing Recycled Water Distribution System

CHAPTER 4
FUTURE RECYCLED WATER INFRASTRUCTURE

4.1 General

The City's General Plan examines the benefits of utilizing recycled water throughout the City, and discusses the proposed recycled water distribution system as a whole. The Recycled Water Master Plan (December 2010) and the subsequent Engineering Report (September 2015) discuss specific proposed infrastructure for the City's recycled water distribution system.

4.2 General Plan Improvements

The General Plan states that recycled water can afford the City a significant level of resource and financial savings when used for non-potable purposes. These include agricultural and landscaping irrigation, industrial processes, toilet flushing, and replenishing ground water basins (i.e. ground water recharge). The wastewater collected throughout the City can be treated and utilized for any one of the previously established uses.

At the time of the adoption of the General Plan, little of the recycled water distribution system had been designed or constructed, and recycled water being produced was only to an undisinfected secondary treatment level. Thus, a majority of the recycled water produced by the RWRF was limited in use to the irrigation of non-food agricultural land in proximity to the facility, and percolation into the aquifer through storage ponds and the eventual pumping and use by FID as irrigation water via FID facilities. The NFWRF was also in operation and supplied irrigation water to the Copper River Development.

The General Plan states that the City did not have the infrastructure in place to route recycled water from the RWRF to existing or new developments, and thus the Recycled Water Master Plan would need to be developed to recommend specific improvements to establish such a distribution system.

4.3 Master Plan Improvements

Recycled Water Master Plan (December 2010)

The Recycled Water Master Plan included in Appendix B, discusses various alternatives for the City's recycled water distribution system, and divides the system into four quadrants – Northeast, Northwest, Southeast, and Southwest. The Recycled Water Master Plan specifically discusses SEDA (referred to as SEGA), in terms of proposed recycled water supply for the Plan Area. The Recycled Water Master Plan proposes to construct a satellite recycled water facility (scalping plant) within SEDA, with two possible locations having been considered through various studies. The Master Planned capacity would be either 12 or 15 MGD. However, the evaluation of recycled water uses within SEDA was not covered in the Recycled Water Master Plan since it was believed that SEDA growth would be much slower than envisioned in the General Plan, and thus the capacity of a future recycled water facility was unknown.

The Recycled Water Master Plan focuses on four potential use categories for recycled water: urban reuse (including irrigation and industrial use), agricultural reuse, groundwater recharge, and fisheries enhancement.

- Urban reuse includes irrigation of landscaping at sites such as school yards, parks, cemeteries, golf courses, highway medians, and Home Owners Associations (HOAs), as well as industrial uses.

- Agricultural reuse incudes the direct delivery of both undisinfected secondary and disinfected tertiary treated wastewater, delivering recycled water to the FID via their canal facilities, and delivery of recycled water to other interested parties for agricultural use.
- Groundwater recharge affords the City an opportunity to directly augment the City's potable water supply and provide a use for recycled water during winter. The process involves siting and sizing potential recharge basins, and delivering recycled water to be stored in these basins to percolate down to the groundwater aquifers.
- Fisheries enhancement would involve supplementing water released by the United States Bureau of Reclamation (USBR) to maintain fish flows in the San Joaquin River with recycled water; however, the amount of water required for such activities greatly outpaces recycled water production, and this option was deemed impractical and not pursued further.

Two alternatives for recycled water supply and distribution systems were presented in the Master Plan, both with proposed improvements that provided a path to conveying recycled water to the Plan Area. The first alternative was outlined with the idea that the Fresno-Clovis RWRF would be the main source of recycled water for the City, and would supply recycled water to all four quadrants of the recycled water distribution system via numerous pipelines and pump stations. The second alternative assumed a number of satellite recycled water facilities would be built around the City to assist in providing recycled water supplies, thereby alleviating the Fresno-Clovis RWRF of the requirement to supply the entire system.

The Southeast Quadrant includes southeast Fresno and the Plan Area. Alternative 1 of the Master Plan included backbone piping that stops short of the Plan Area. Alternative 2 included backbone piping leading to a proposed satellite recycled water facility (scalping plant) within the limits of the Plan Area. The City is still analyzing the two alternative as presented in the Recycled Water Master Plan as well as other options for the use of recycled water in the Plan Area. The construction of a satellite recycled water facility (scalping plant) within SEDA would allow the area to be self-sustaining, and provide a path for wastewater collection and treatment that would directly benefit the Plan Area. Refer to the Recycled Water Master Plan for details on the proposed recycled water infrastructure.

Per the Recycled Water Master Plan, urban reuse provides the City with the best opportunity to implement recycled water projects that directly offset potable water and are highly visible to the community. However, urban reuse is much more distribution system-intensive than other alternatives like groundwater recharge since potential recycled water users are spread out around the City. The Recycled Water Master Plan recommended aligning the distribution system to serve large water users first to ensure efficient use of the recycled water supply. Smaller users can then be connected to the main distribution system at a later time.

The Recycled Water Master Plan includes assumptions of recycled water capacities and demands for each quadrant of the distribution system based on whether they were supplied via the RWRF or satellite RWFs (Alternative 1 vs Alternative 2, respectively). The Southeast Quadrant was projected to have a treatment capacity of 2.8/5.1 MGD (2.8 MGD without residential or commercial reuse/5.8 MGD with residential and commercial reuse) for Alternative 1 and 3.0 MGD for Alternative 2, and a demand of 995/1,820 AFY (acre feet per year) for Alternative 1 and 951 AFY for Alternative 2. It should be noted that the Master Plan Alternative 1 does not include any delivery of recycled water to the SEDA area, and thus the demands presented are not accurate for planning purposes of the Plan Area. Alternative 2 includes the proposed satellite RWF (scalping plant) potentially located within SEDA boundaries, and thus could be used in estimating demands. However, the timeline for recycled water development within the Plan Area has not been fully developed, and thus updates to the Recycled Water Master Plan are required to determine the extent to which recycled water would be available to SEDA users.

Engineering Report for the Production, Distribution and Use of Recycled Water (September 2015)

The Engineering Report for the Production, Distribution and Use of Recycled Water (included in Appendix C) serves as an update to the Recycled Water Master Plan and discusses further proposed improvements based on the City's plan for a recycled water distribution system, including the tertiary treatment equipment currently in operation.

The Engineering Report focuses on updating the Recycled Water Master Plan with data and information on the disinfected tertiary treatment process at the Fresno-Clovis RWRF, and establishes phases for its expansion – Phase I is the initial facility, which has a production capacity of 5 MGD; subsequent Phase 2 and 3 expansions are planned to provide an additional 10 MGD and 15 MGD of capacity, respectively, resulting in a final capacity of 30 MGD. With this came the establishment of a recycled water distribution system to convey the recycled water to users throughout the City. The engineering report recommends Alternative 2, which includes a pipeline connecting the Southeast quadrant with the recycled water system, as well as a satellite RWF (scalping plant) within the Plan Area. However, the City is still analyzing prospective options for recycled water system alignments.

The Engineering Report estimates that Phase 1 users will mainly be in the urban reuse category, as established in the Recycled Water Master Plan. The types of urban recycled water uses recommended generally include landscape irrigation and industrial uses. Some examples include:

- Parks
- Golf course and country clubs
- Homeowners Association common areas
- Cemeteries
- Airports
- State highway rights-of-way
- Schools and college campuses
- Municipal facilities such as courthouses and city halls
- Water feature impoundments such as Lake Van Ness and Woodward Lake
- Fairgrounds

Some examples of industrial uses include:

- Heating and cooling
- Industrial laundries
- Commercial vehicle washing
- Dust control
- Fire protection
- Sanitary, such as toilet flushing at industrial sites
- Process water (except for food processes)
- Cleanup/wash down water (except for food processes)
- Boiler feed

The City's Recycled Water Ordinance requires recycled water use under certain conditions, where recycled water is available, as summarized below:

a) The City may require all customers who connect to the potable water system to use recycled water for all approved uses, including but not limited to dual plumbing for commercial buildings and single family residential irrigation.
b) Existing commercial properties, existing industrial properties, existing apartments and condominiums, and all homeowners associations are required to use recycled water for landscape irrigation.

c) New commercial projects, new industrial projects, new institutional and governmental projects, and new apartments and condominiums are required to be dual plumbed to provide for internal use of recycled water, and are required to use recycled water for landscape irrigation.
d) New single family residential home projects are required to provide for landscape irrigation with recycled water.

All properties within a Recycled Water Project Area, as is defined in the Recycled Water Ordinance, that host land uses for which recycled water is recommended by the Recycled Water Master Plan, or is required by the Ordinance, are potential recycled water use areas, and the owners or tenants of such properties are potential recycled water users.

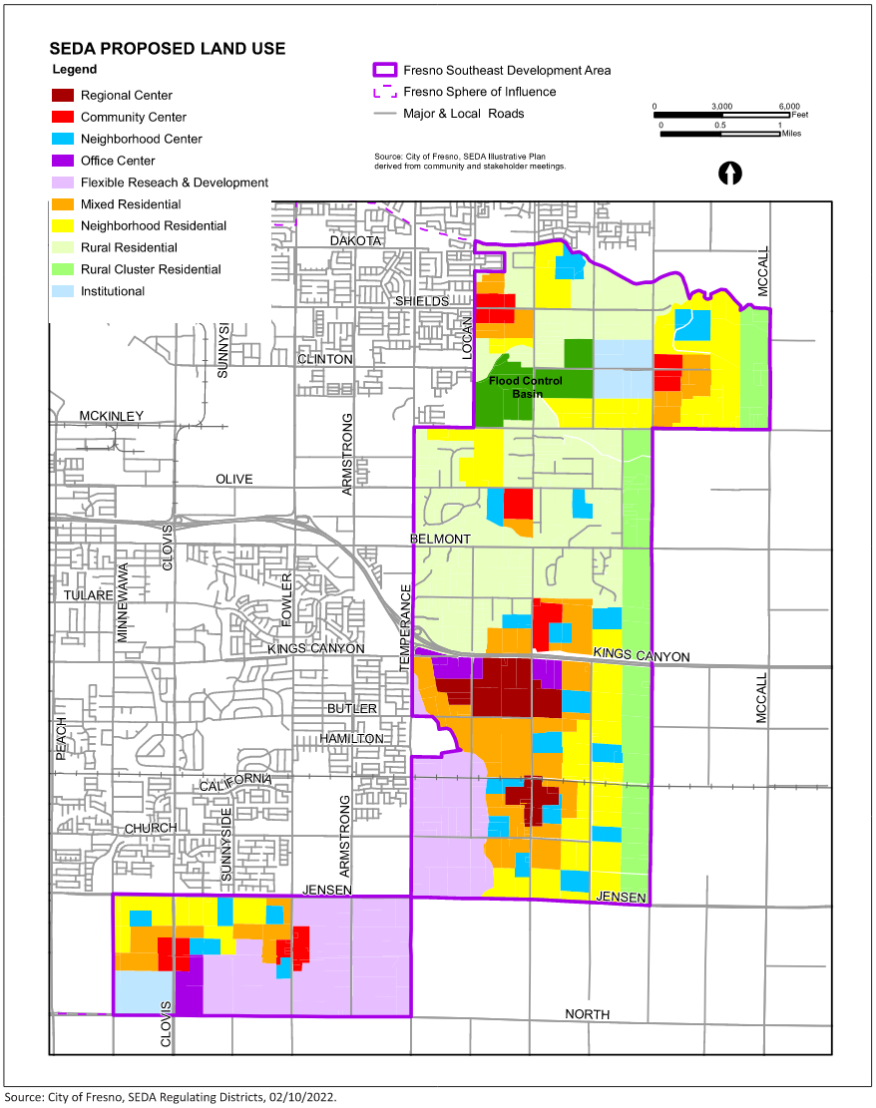
City of Fresno Metropolitan Water Resources Management Plan – Phase 2 Development and Evaluation of Future Water Supply Plan (January 2011)

Phase 2 of the City's Metro Plan for water resources includes a chapter devoted to future recycled water infrastructure (Chapter 7. Future Recycled Water). The Metro Plan discussed current recycled water use and future recycled water use, and includes data on estimated recycled water demands. The Metro Plan estimated that the SEDA Specific Plan area would utilize approximately 5,100 AFY of recycled water – about 18% of the total 2025 projected water demand for the SEDA area (27,800 AFY). These demands were determined with previous land use classifications for the SEDA area, and will thus need to be updated for those land uses being utilized in this Specific Plan. This will be discussed further in Chapter 5. The Metro Plan is also in the process of being updated by the City, and any analysis will need to be revised in accordance with any recommendations included in the revised Metro Plan.

CHAPTER 5
SPECIFIC PLAN RECYCLED WATER INFRASTRUCTURE

5.1 General

The SEDA Specific Plan area has been reevaluated with revised land use classifications – see Figure 5.1 for the chosen alternative for land use classifications. Of these land uses, there will be several that will be able to utilize recycled water for urban or agricultural reuse, as well as groundwater recharge. The Plan Area presents a unique opportunity to develop the recycled water distribution system along with the area-wide development, allowing recycled water use to be engrained into the Plan Area. However, recycled water is not yet utilized in the Plan Area, and the Recycled Water planning documents (Master Plan, Engineering Report, General Plan) do not account for the development of a recycled water distribution system within the Plan Area until after the planned development of the City's growth areas.



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

Figure 5.1 SEDA Proposed Land Use[19]

[19] Southeast Development Area Specific Plan Notice of Preparation, First Carbon Solutions. 02/2022.

5.2 Plan Area Land Uses

The land use classifications for the Plan Area have been developed to be unique for the Specific Plan, and differ from those of the City's General Plan. Many land uses are similar to those of the General Plan, but have been tailored for use in the Specific Plan.

Land uses that would be eligible for recycled water use generally include any with green spaces, landscaping, industrial or agricultural processes. The SEDA Specific Plan document includes information for all specific plan land uses; several promote mixed-use facilities, which may allow recycled water to be utilized in many more ways than original plans would have allotted. Land uses that have landscaping, parks, educational facilities, industrial facilities, or open spaces would all be able to utilize recycled water for irrigation. The Specific Plan includes designated community agricultural and gardening areas, which may also be eligible for recycled water use.

In accordance with the SEDA Specific Plan Draft Policy Document, there will be a large significance placed on open spaces, including parks and other green spaces interspersed throughout its mixed-use centers and neighborhoods. There will also be a focus on community farming and agriculture, especially along buffer zones on the east side of the Plan Area. A system of pedestrian/bicycle trails is planned throughout the area as well. All of these land uses will be eligible to utilize recycled water, mainly for irrigation.

5.3 Plan Area Improvements

Improvements within the Plan Area will be required to facilitate the use of recycled water. Since the recycled water distribution system has not yet been planned for the area, it has been assumed that all land uses that would be eligible for recycled water use will utilize potable water until the recycled water supply and distribution system are available. However, these potable water facilities should be installed in accordance with all recycled water regulations and requirements so as to allow a seamless transition to recycled water. This includes installing purple pipe, purple valve boxes, purple irrigation facilities, and maintaining required clearances with other adjacent utilities.

If the Plan Area is expected to be supplied with recycled water from the Fresno-Clovis RWRF, significant infrastructure will be needed to convey the water from the facility to the Plan Area at a usable flow and pressure. Piping of various sizes and booster pump stations will be required, among other improvements. If a satellite RWF (scalping plant) is planned, then the infrastructure required would mainly consist of a distribution system of pipelines to convey the recycled water to the users, as well as a pipeline to convey solids to the Fresno-Clovis RWRF. Consideration would need to be given to recycled water storage facilities when assessing the demand versus the supply of recycled water produced.

5.4 Projected Baseline Demand

A baseline analysis of the Plan Area was completed to understand a preliminary recycled water demand based solely on estimated area of open space presented in the Specific Plan buildout plan, and only accounting for recycled water that may be used for irrigation of said open space. According to the plan, each land use classification will encompass some percentage of open space, or "Park Acres." These are as follows:

Table 5.1 SEDA Land Use Classifications – Park Acres

SEDA Land Use Classification	Land Use Acres	Park Acres Percentage	Park Acres
Regional Center	310	10%	31
Community Center	290	10%	29
Neighborhood Center	520	10%	52
Mixed Residential	1,090	10%	109
Neighborhood Residential	1,520	10%	152
Rural Residential	2,160	0%	0
Rural Cluster	810	0%	0
Institutional	280	5%	14
Office Center	160	5%	8
Flexible R&D	1,380	5%	69

The total minimum park acres in the Plan Area equals 464 acres. Utilizing precipitation data obtained from the Western Regional Climate Center for Fresno[20], preliminary irrigation calculations were completed to determine the Estimated Total Water Use (ETWU) of the park acres in the Plan Area. Assuming the landscaping would be warm-season turf, and irrigation would mainly be applied via overhead spray/rotors, an annual ETWU with rainfall included of approximately 283 ac-ft (0.3 MGD) was found for the Plan Area (without rainfall yields an ETWU of 1,572 ac-ft, or 1.4 MGD). This represents the minimum required recycled water demand for the park acres included in each of the land use classifications, and does not account for any designated open spaces, agricultural areas, or other miscellaneous potential recycled water uses. This has also been completed without knowledge about the available supply of recycled water for the Plan Area, and demands will need to be reassessed once a supply is available. A summary of the calculations completed can be seen in Appendix A.

This demand is not a clear indication of how much recycled water the Plan Area will actually use. Updates to the Recycled Water Master Plan will be required to fully develop the recycled water distribution system for the Plan Area. Determinations of potential recycled water users will need to be made in order to accurately estimate the anticipated recycled water demand.

[20] Western Regional Climate Center. https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca3257. 2022.

CHAPTER 6
IMPACTS AND MITIGATIONS

6.1 SEDA Planning

Improvements within the Plan Area will require modifications to master planned recycled water facilities and infrastructure.

A draft policy document has been completed for the SEDA Specific Plan (March 2022), which includes updated policies for the Plan Area, and proposed improvements to meet the chosen alternative for development of the area. Included among these are policies directly related to recycled water use in the Plan Area. Refer to the SEDA Specific Plan policy document for details on policies related to recycled water.

6.2 Impacts of Significance

The proposed Specific Plan would result in a significant impact if it would:

1. Require or result in the construction of new water or wastewater treatment facilities or expansion of baseline facilities, the construction of which could cause significant environmental effects.

   Recycled water may be a significant contributor to the Plan Area's water supply system. The principal impact of providing recycled water is the overall water supply rather than direct shortages for end users. This is because the ability exists to trade off and supplement recycled water supply from other sources. The recycled water planning documents do not delve into detailed plans for improvements for the Plan Area. Recycled water is not currently utilized in the Plan Area, and there are no portions of the recycled water distribution system that have been constructed within the area. Thus, any proposed recycled water use would necessitate the expansion of the existing recycled water system, the installation of new recycled water pipelines, and potentially new treatment and storage facilities so as to provide sufficient recycled water at buildout conditions.

   However, the lack of planning document details and existing recycled water supply in the Plan Area makes it difficult to assess the necessary mitigation measures to accommodate the impacts of new facilities. Continued evaluation of available capacity and construction of improvements is required. Construction and operation of potential improvements could result in project-specific impacts that are not currently known because said facilities have not yet been designed or planned. Once further environmental evaluations have occurred and further planning is completed, potential impacts would be considered significant without any mitigations. Impacts related to the construction of new recycled water treatment facilities or expansion of baseline facilities would be less than significant with mitigations. At the time discretionary projects are submitted, the City shall require project-specific environmental evaluations for the expansion of recycled water facilities be completed prior to project approval.

2. Have insufficient recycled water supplies available to serve the proposed Plan from baseline entitlements and resources, and require new or expanded entitlements.

   Recycled water supply shortage impacts would be significant in both real impacts and the cost of non-compliance with regulatory requirements and proposed policies. The proposed Specific Plan would result in an increase in density between the Fresno General Plan and the SEDA Specific Plan, which would modify the generation of wastewater. Since the availability of recycled water is directly related to the generation of wastewater, any

change in wastewater production may affect recycled water availability. There are impacts associated with insufficient recycled water, including utilizing more potable water for non-potable uses.

The Master EIR (MEIR) prepared for the City of Fresno included several mitigation measures for increasing wastewater treatment capacities for the City of Fresno that are applicable to this plan. These include:

- MEIR Mitigation Measure USS-1: the City shall develop and implement a wastewater master plan update.
- MEIR Mitigation Measure USS-3: Prior to exceeding existing wastewater treatment capacity, the City shall evaluate the wastewater system and shall not approve additional development that contributes wastewater to the wastewater treatment facility that could exceed capacity until additional capacity is provided...

It is also not known how many users will exist in the Plan Area, and what the actual demand will be for recycled water. Continued development of the Recycled Water Master Plan and the recycled water distribution system is required to fully understand the needs of the Plan Area. With continued development and implementation of proposed improvements that will enhance the reliability and availability of recycled water in the Plan Area, impacts with mitigation would be less than significant.

6.3 Conclusions

The Plan Area currently does not utilize recycled water, however the SEDA Specific Plan presents the City with an opportunity to expand its recycled water system and increase the viability of recycled water to improve surface and groundwater conservation.

For the purposes of the Specific Plan, it has been assumed that since no recycled water supply exists in the Plan Area, and the distribution system has not been outlined in the City's recycled water planning documents, all land use classifications within the Plan Area will utilize potable water for use cases in which recycled water is allowed, with the stipulation that these systems install facilities that meet recycled water standards and regulations to ensure future conversion to recycled water will not require extensive improvements or revisions to the systems.

City recycled water planning documents, including but not limited to the Recycled Water Master Plan and the City Metro Plan, will need to be updated to account for the development of the SEDA, and account for the policies and revisions present in the Specific Plan.

Mitigations for SEDA from the General Plan to the SEDA Specific Plan include:

a) Develop additional water conservation measures in accordance with the City Metro Plan.
b) Implement recycled water objectives, goals, and policies as described in Chapter 7 of the City Metro Plan.
c) Develop an update to the Recycled Water Master Plan.
d) Develop an update to the Recycled Water Distribution System.
e) Develop recommendations and design and construct wastewater treatment facilities, recycled water supply, distribution, and storage facilities for the Plan Area.
f) Develop list of potential users in the Plan Area to estimate actual recycled water demand.

Appendix A

Preliminary Irrigation Calculations

Evapotranspiration Calculations

Fresno ETo data[1]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	0.9	1.7	3.3	4.8	6.7	7.8	8.4	7.1	5.2	3.2	1.4	0.6	51.1
Average Rainfall (WRCC) (in) [2]	2.09	1.90	1.89	1.03	0.36	0.16	0.01	0.01	0.15	0.53	1.13	1.64	10.90
Effective Rainfall (25% per AB 1881)	0.52	0.48	0.47	0.26	0.09	0.04	0.00	0.00	0.04	0.13	0.28	0.41	2.73
Adjusted Eto	0.38	1.23	2.83	4.54	6.61	7.76	8.40	7.10	5.16	3.07	1.12	0.19	48.38

[1] Appendix A - Reference Evapotranspiration (ETo) Table, MWELO
[2] Western Regional Climate Center

Estimated Total Water Use (ETWU) = (ETo) x (0.62) x (K) x (PA) / (IE)

SEDA Plan Area (PA) – 464 acres
Landscape Factor (K): 0.60 (Warm-Season Turf)
Irrigation Efficiency (IE): 0.75 (Overhead Spray/Rotor)

SEDA Plan Area	Jan	Feb	Mar	Apr	May	Jun	Jul
ETWU without rainfall (gal)	9,022,565	17,042,623	33,082,740	48,120,349	67,167,987	78,195,567	84,210,610
ETWU without rainfall (acre-ft)	27.69	52.30	101.53	147.68	206.13	239.97	258.43
ETWU with rainfall (gal)	3,784,465	19,047,638	18,947,387	10,325,825	3,609,026	1,604,012	100,251
ETWU with rainfall (acre-ft)	**11.6**	**58.5**	**58.1**	**31.7**	**11.1**	**4.9**	**0.3**

SEDA Plan Area	Aug	Sep	Oct	Nov	Dec	Annual
ETWU without rainfall (gal)	71,178,016	52,130,378	32,080,232	14,035,102	6,015,044	512,281,212
ETWU without rainfall (acre-ft)	218.44	159.98	98.45	43.07	18.46	1572.13
ETWU with rainfall (gal)	100,251	1,503,761	5,313,288	11,328,332	16,441,119	92,105,355
ETWU with rainfall (acre-ft)	**0.3**	**4.6**	**16.3**	**34.8**	**50.5**	**282.66**

Annual without rainfall (MGD) = [1,572.13 ac-ft x (325,851 gal / 1 ac-ft)] x (1 year / 365 days) / 10^6 = 1.4 MGD

Annual with rainfall (MGD) = [282.66 ac-ft x (325,851 gal / 1 ac-ft)] x (1 year / 365 days) / 10^6 = 0.3 MGD

Appendix B

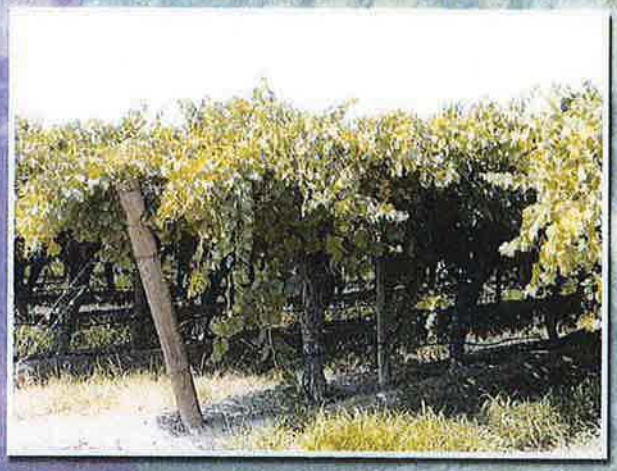
City of Fresno Recycled Water Master Plan

Exhibit A

City of
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DEPARTMENT OF PUBLIC UTILITIES

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CITY OF FRESNO
INCORPORATED OCT. 12, 1885

RECYCLED WATER MASTER PLAN

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1.1 INTRODUCTION

In 2009, the State of California adopted a Recycled Water Policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and by an additional 300,000 acre-feet per year by 2030. In support of these goals, the City has embarked on a Recycled Water Master Plan (Master Plan). The Master Plan is intended to serve as a basis to support the City's decision making process in selecting recycled water projects. The expansion of the recycled water system will enable the City to offset potable water use, enhance the sustainability of the water supply, and lessen the burden on the wastewater treatment plant percolation ponds that are currently used for effluent discharge.

The City is required by the Central Valley Regional Water Quality Control Board (RWQCB) to evaluate the quality of the groundwater beneath the percolation ponds. Constituents of concern are salts, nitrogen, and metals (arsenic and manganese) that are mobilized from the alluvium under reducing conditions created by effluent percolation. Reducing the hydraulic and constituent loading burden on the percolation ponds by implementing a significant reuse program would lower the concentrations of these constituents in the groundwater.

This chapter summarizes the purpose of the Master Plan, related facilities and institutional agreements, prior studies and the types of reuse that will be considered as part of this Master Plan. Many of the reuse options considered could offset existing uses of the City's potable supplies and some selected private wells. Other options could exchange the recycled water with other agencies for potable water credit. Groundwater recharge with recycled water could indirectly supplement potable water supplies.

Therefore, the intent of the Master Plan is to plan and implement a phased recycled water treatment and distribution system that:

- Protects and improves groundwater quality by reducing the use of percolation ponds that currently handle effluent discharge;
- Increases the use of recycled water through urban reuse, groundwater recharge and agricultural reuse to help meet the increasing need water demands in the region;
- Expands the recycled water system in order to enable the City to offset potable water use, thereby enhancing the sustainability of the water supply;
- Puts into practice a recycled water plan and ordinance that supports implementing reuse in the City for existing and future users.

The Master Plan examines urban reuse, agricultural reuse, groundwater recharge, and institutional exchanges of recycled water for potable water. Potential annual recycled water

deliveries were calculated and then used to determine the cost-effectiveness of implementing various recycled water alternatives. The Master Plan also considered diversification as an important strategy for the City to maintain a reliable wastewater disposal and reuse system.

Concurrently to this Master Planning effort, a Recycled Water Ordinance is being developed to require use by existing and future water users, including commercial, residential, and industrial properties.

1.2 BACKGROUND

This section reviews the existing wastewater treatment facilities, existing recycled water use, the related agreements pertaining to wastewater treatment and discharge, and past and ongoing studies and reports relevant to the Master Plan.

1.2.1 Existing Facilities and Recycled Water Use

1.2.1.1 Fresno/Clovis Regional Wastewater Reclamation Facilities

The Regional Wastewater Reclamation Facilities (RWRF) serve the cities of Fresno and Clovis; the Pinedale Water District and Pinedale Utilities District, both of which are within the city limits of Fresno; and some areas within Fresno County not within the city limits of Fresno or Clovis. The RWRF treats domestic, commercial, and industrial wastewater from this service area. The RWRF has a rated capacity of 88 million gallons per day (mgd), but the annual average daily flows are approximately 70 mgd (80,000 AFY). The City of Clovis owns 9.3 mgd treatment capacity, while the City of Fresno owns the rest. The City of Fresno is responsible for day-to-day operations at the RWRF, and is the responsible entity for ensuring regulatory compliance with the RWRF's Waste Discharge Requirements (WDRs).The location of the RWRF is shown on Figure 1.1.

The RWRF is an activated sludge facility producing undisinfected secondary effluent. The majority of the wastewater treated at the RWRF is discharged to percolation ponds. Approximately ten percent of the total secondary undisinfected effluent flow is delivered directly to neighboring farmland for restricted irrigation of feed/fodder and fiber crops. Approximately 19 to 43 percent of the RWRF percolated effluent is extracted and delivered to Fresno Irrigation District (FID). The unused percolated effluent remains in the groundwater basin where it migrates laterally to the southwest. The remaining percolated effluent could be extracted for other non-potable beneficial uses.

1.2.1.2 Existing Recycled Water Use at RWRF

The City provides farmers with undisinfected secondary effluent for restricted irrigation of nonfood crops on agricultural land on-site and off-site the RWRF. On-site reclamation refers to parcels near the RWRF that are owned by the City and leased to farmers. Off-site reclamation refers to irrigation on privately owned agricultural land. The City holds the

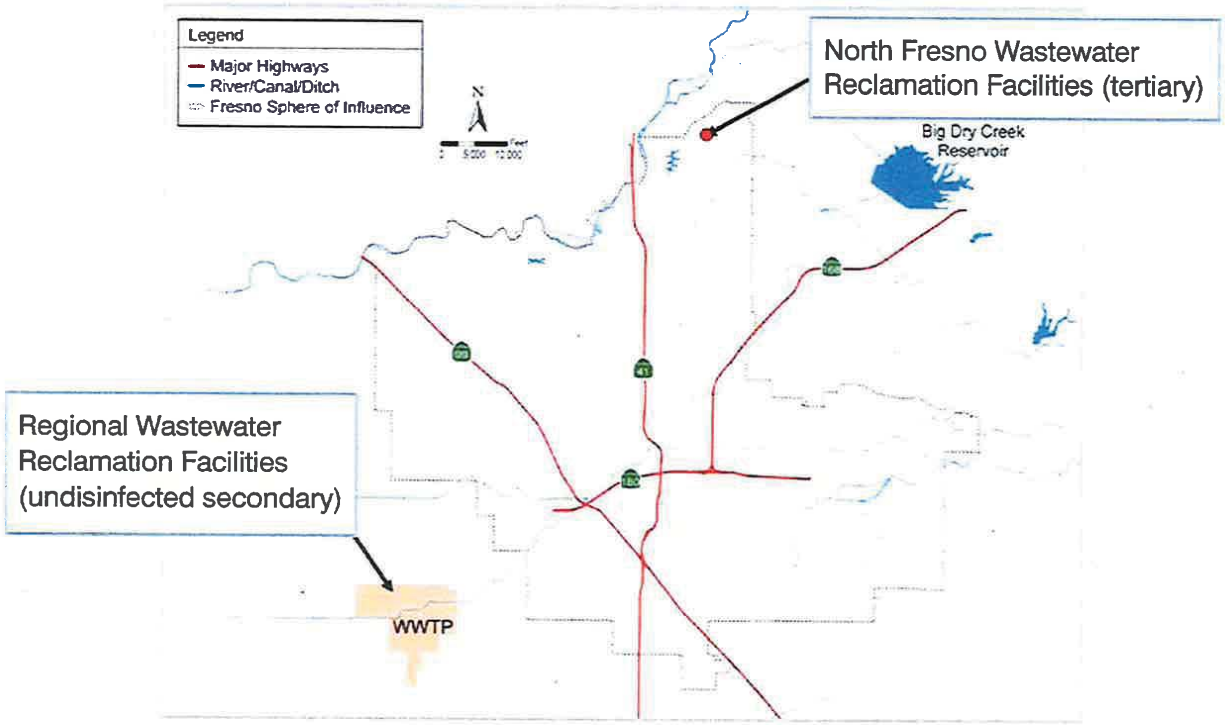


Figure 1.1
RWRF AND NORTH FRESNO WRF LOCATIONS
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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WDRs for the individual farmers who lease the property owned by the City. The landowners hold the WDRs for irrigation on private land. Figure 1.2 shows the areas irrigated with RWRF effluent. As shown in Table 1.1, the combined on-site and off-site agricultural discharge is about 6,000 to 10,000 AF/year, or approximately 10 percent of the total plant flow.

The following is a list of on-site farmers receiving restricted-use recycled water from the RWRF as of December 2009:

- Quist Dairy, six parcels with a total of 458 acres
- Daniel Souza, one parcel totaling 158 acres
- Stephen England, two parcels totaling 285 acres

The following is a list of off-site farmers receiving restricted-use recycled water from the RWRF as of December 2009:

- Alfred Coelho with 520 acres
- Daniel Souza with 786 acres
- Golden State Vintners with 800 acres

Recycled water is made available to the farmers at no charge. Farmers are typically required to install and operate at their expense the necessary pumps and pipelines to transport the recycled water to their own land. On some occasions, the City has provided pipeline and pumping facilities.

FID has historically received between 15,000 and 34,000 AFY of extracted groundwater (percolated effluent). This water is delivered to FID canals and then conveyed to downstream local farmers. Historic recycled water usage and delivery of extracted groundwater is shown in Table 1.1.

1.2.1.3 North Fresno Wastewater Reclamation Facility

The North Fresno Wastewater Reclamation Facility (North Fresno WRF) was recently constructed to serve the residential and commercial development and golf course in a portion of northeast Fresno. It was constructed with sequencing batch reactor (SBR) technology for secondary treatment, cloth media filtration for tertiary treatment, and sodium hypochlorite for disinfection. The permitted capacity of the plant is 0.71 mgd average monthly flow and 1.07 mgd maximum daily flow. The location of the North Fresno WRF is shown on Figure 1.1.

Recycled water in excess of turf demands can be dechlorinated and discharged to a nearby percolation basin, which is owned by the Fresno Metropolitan Flood Control District.

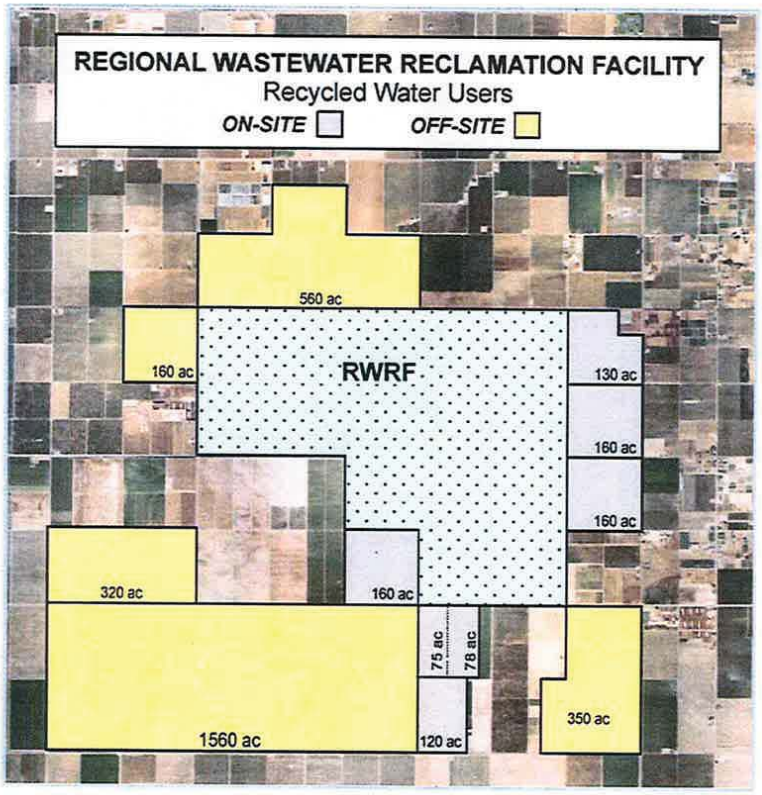


Figure 1.2
FARMLAND IRRIGATED WITH RWRF EFFLUENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Table 1.1 Existing Recycled Water Usage at the RWRF Recycled Water Master Plan City of Fresno					
Year	Plant Influent Acre Feet	Effluent Direct Use To Farmers Acre Feet	Extracted Groundwater Discharge to FID Canals Acre Feet	Total Recycled Acre Feet	Percentage Recycled (%)
2000	76,197	3,798	15,633	19,431	26%
2001	76,236	4,972	26,824	31,796	42%
2002	78,078	6,756	28,902	35,658	46%
2003	78,504	6,715	33,958	40,673	52%
2004	79,452	9,103	32,324	41,427	52%
2005	78,894	8,509	25,022	33,531	43%
2006	80,801	7,405	17,479	24,884	31%
2007	78,009	10,935	27,532	38,467	49%
2008	77,301	10,918	23,215	34,133	44%

1.2.2 Interagency Agreements

1.2.2.1 City of Clovis

On March 3, 1977, the City entered into a joint powers agreement (JPA) with the City of Clovis. The JPA and subsequent agreements provide the following purpose for the joint capacity use, and capacity rights ownership:

- Designates the City of Fresno as the entity responsible for day to day management, operation, and maintenance of the collection system and treatment facilities.
- Establishes capital and operating cost basis.
- Allocates collection system capacity.
- Allows Clovis to acquire additional flow capacity in future sewers and treatment facilities as needed, based on paying a pro-rated share of the cost of such facilities.

The City of Clovis does participate in paying for capital projects for effluent disposal facilities (percolation ponds and associated pipelines and canals, etc.). This includes paying for effluent recycling facilities (pumps, pipelines, canals, etc.) and the groundwater extraction well system. City of Clovis pays a pro rata share of both operations and maintenance (O&M) and capital expenditures using formulas set forth in the JPA. The formulas use either an actual flow percent or a capacity share percent to determine the pro rata share of costs to Clovis.

1.2.2.2 Fresno Irrigation District

In 1974 the City entered into an exchange agreement with FID to establish a groundwater reclamation system consisting of on-site extraction wells and piping that delivers groundwater to FID's Dry Creek and Houghton Canals. The extracted water typically mixes with a variable amount of surface water prior to use on crops, including fodder, fiber, and food for human consumption (e.g., almonds, beans, peaches, raisins, and wine grapes, etc.). The extracted groundwater is discharged to the canals during the growing season for agricultural use on the western side of FID's service area. Each canal can convey up to the 200 cubic feet per second. To date there are no regulatory restrictions on the use of extracted groundwater.

The 1974 agreement between the City and FID stipulates the following:

- City must discharge a minimum of 100,000 AF of extracted groundwater to FID during any ten-year period.
- City may discharge a maximum of 30,000 AF of extracted groundwater to FID in a given year.
- For every acre-foot of extracted groundwater the City discharges to FID, the City is entitled to receive 0.46 AF of surface water from FID.

The City has not historically used its full entitlement of surface water from this FID agreement due to lack of demand and adequate facilities (recharge basins or water treatment facilities).

Any increase in the discharge of extracted groundwater to FID beyond that stipulated in the 1974 agreement is subject to FID approval. The agreement also stipulates the City cannot extract the filtered effluent from beneath the RWRF in volumes that will cause the groundwater level to drop below levels observed in the previous year.

The City and FID have a separate cooperative agreement, dated 1976, that provides for the agencies to use FID's distribution system to satisfy their respective water supply rights, and to work together to protect and preserve the groundwater basin. The agreement also stipulates that the City will retain its treated effluent within the boundaries of FID unless written consent is obtained.

1.2.2.3 Central Valley Energy Center

The City and Central Valley Energy Center (CVEC) entered into an agreement effective August 27, 2001 which allow CVEC to purchase recycled water. Recycled water would be provided primarily from new reclamation wells built specifically for the CVEC project. The facility has not been constructed, and it is not known when the project will be implemented. The terms of the agreement extend to the year 2061. All costs associated with new wells and pipeline facilities necessary for the conveyance would be the responsibility of CVEC.

The maximum allowable quantity of recycled water from the existing and new wells combined is limited to a maximum 7,000 AF/year.

1.2.3 Ongoing and Previous Reports and Studies

The following is a summary of the reports and studies that are ongoing, or have previously been completed, and pertain to the Master Plan.

1.2.4.1 2025 General Plan

The City's General Plan and EIR, adopted in November 2002, provide long-range planning for development over the next two decades. It includes community and specific plans that address growth and infill in different areas of the City. The General Plan identified two growth areas, the North Growth Area and the Southeast Growth Area. The North Growth Area has since been developed and is served by the North Fresno Wastewater Reclamation Facility. The General Plan also established objectives and policies to encourage development/revitalization of the Centre City area and to promote densification through formation of Intensity Corridors. Highway 41 has been designated an Intensity Corridor.

The population and growth projections in the General Plan were based upon the robust growth at the time the Plan was developed. Because of the recent housing market decline, development has slowed significantly. In addition, based on discussions with the Planning and Development Department, the City's new focus for growth is densification and in-fill. Therefore, the General Plan will be revisited in the coming years. It is likely that as the General Plan changes, planning scenarios for the use of the Recycled Water Master Plan will also need to be updated.

1.2.4.2 SEGA Plan and Satellite Treatment Study

Incorporation of the Southeast Growth Area (SEGA) into the City was a major goal of the 2025 General Plan. To accommodate future growth, the City considered building a satellite recycled water facility (SRWF) in SEGA. Two reports were prepared, the 2001 "Satellite Wastewater Treatment Plant Study" and the 2006 "Satellite Plant Study Update." Two possible locations for the satellite plant were identified in this general area. Based on an analysis of the service areas, the capacities would be either 12 mgd or 15 mgd. In addition to distributing the recycled water to various users mentioned above, effluent flows would also be discharged to the FID canals for unrestricted agricultural irrigation reuse. During the winter months flows would be discharged to percolation ponds or irrigation canals.

The original intent of the City is that SEGA would be self-sustaining with respect to water and wastewater. The City has a separate specific plan under development to further define the SEGA development and the use of recycled water within SEGA. Therefore, evaluation of recycled water uses within the SEGA area was beyond the scope of this Master Plan. With the decline in development and the redirection of the General Plan, it is likely that

SEGA will develop at a much slower rate than envisioned in the 2025 General Plan. Due to the uncertainty in SEGA's development, the site and capacity of a future recycled water facility in this area is unknown (see Figure 1.3).

1.2.3.1 Best Practicable Treatment and Control Comprehensive Evaluation

The City's Waste Discharge Requirements (WDR 5-01-0136) requires that the RWRF identify waste constituents that threaten to degrade the groundwater, and complete a technical evaluation with recommendations for how these constituents will be treated or controlled in the discharge via a "Best Practicable Treatment and Control (BPTC) Comprehensive Evaluation" report. The BPTC was submitted to the RWQCB in December 2009 and addressed the six COCs that were identified in "Final List of Constituents of Concern for Best Practicable Treatment and Control" (Carollo Engineers) submitted in January 2007. The six COCs were:

- Arsenic
- Manganese
- Total Dissolved Solids (TDS).
- Electrical Conductivity (EC).
- Sodium.
- Total Nitrogen.

A major recommendation of the evaluation for each COC was to reduce hydraulic and COC loading into the percolation ponds by direct effluent recycling. This Recycled Water Master Plan provides an alternative use for the RWRF's effluent.

1.3 TYPES OF REUSE

This section describes the types of reuse considered in this Master Plan. The categories of reuse are urban irrigation, groundwater recharge, agricultural irrigation and fisheries enhancement.

1.3.1 Urban Reuse

Urban reuse is composed of the following demands for recycled water:

- Irrigation of public and private landscaped areas.
- Industrial uses (heating, cooling, industrial laundries, and other approved uses).
- Dual plumbing for toilet flushing in condominiums and institutional buildings.
- Ornamental lakes or fountains.

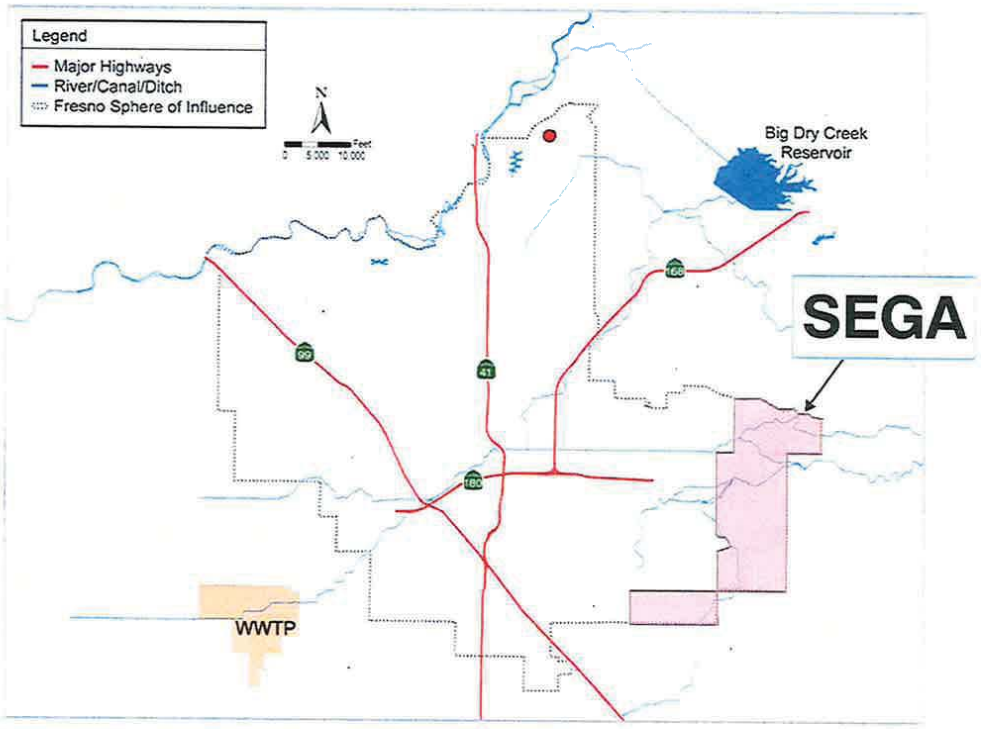


Figure 1.3
LOCATION OF SOUTHEAST GROWTH AREA (SEGA)
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Although these are all possible uses for recycled water, some are easier to implement than others. Installation of a recycled water distribution system ("purple pipe") can be expensive, especially through a fully developed area, and potential demands need to be sufficiently large to warrant it.

1.3.1.1 Irrigation

Irrigation reuse is the largest potential existing potable offset. In general, golf courses are the largest application for irrigation reuse, followed by parks, schools, cemeteries and large water features. Highway median irrigation can also be a significant use in some areas, depending on the land area. Irrigation of new development areas is considered to the limited extent possible given the redirection of the General Plan discussed above.

The Recycled Water Ordinance will require use of recycled water by existing and future irrigation users including commercial, institutional and governmental properties, apartment and condominiums, single family residences, home owners associations (HOA), and open spaces.

1.3.1.2 Dual Plumbing

Dual plumbing poses a real opportunity for potable offset recycled water use in new facilities, and the concept is gaining wider public acceptance. Due to the difficulty and expense to dual plumb existing buildings, this has not been included as a significant use in the Master Plan. However, the proposed Recycled Water Ordinance does require dual plumbing in new nonresidential construction, new apartments and condominiums, and in apartments and condominiums that undergo significant remodeling and the remodel cost exceeds 30 percent of the property value.

1.3.1.3 Industrial

Although the City has many industrial users, only a few of them have large uses that can be offset with recycled water. Most of the industries in Fresno are food processors, and for public health reasons or public perception, recycled water is generally not used in food processing operations. The viable industrial uses consist mainly of industrial laundries or heating/cooling demands for large buildings. The Recycled Water Ordinance will require use of recycled water by existing and future industrial users.

1.3.2 Groundwater Recharge

Groundwater recharge is the augmentation of potable groundwater supplies with recycled water. Recharge can be performed via spreading (or "recharge") basins or direct injection. The state's draft Groundwater Recharge Reuse Regulations require reverse osmosis and advanced oxidation for direct injection. Due to the very high costs for these treatment requirements, this Master Plan only considered spreading basins for groundwater recharge.

Groundwater recharge is a desirable use since it can occur year-round, whereas irrigation demand is seasonal. Treatment facilities that produce high quality recycled water during the summer months for irrigation may also serve groundwater reuse recharge projects (GRRPs) during the winter.

Recharge potential is limited by land available for basins and the ability to obtain an adequate supply of diluent water. Diluent water is the water used to dilute the recycled water in the GRRP. It can be surface water, storm water, or groundwater. The draft regulations require a 4:1 blend of diluent water with recycled water for surface spreading recharge projects.

Due to the permitting process, as discussed in Chapter 2, implementation of GRRPs takes longer to implement. For this reason, GRRPs may not be implemented immediately, but may play an important role in the long term strategy for water supply and reuse implementation in Fresno. Potential sites for recharge basins are identified, as well as the issues and steps needed to implement groundwater recharge.

1.3.3 Agricultural Reuse

Agricultural irrigation represents the largest potential for beneficial reuse because the RWRF is surrounded by agricultural lands. As noted earlier, the City currently applies undisinfected secondary effluent to agricultural lands for restricted use. Depending on the crop, this type of use does not require additional wastewater treatment. The City could possibly expand its use of recycled water by delivering either secondary or tertiary treated water directly to local farmers.

Agricultural users in the vicinity use FID water and their own groundwater wells, not the City's potable supply. To derive a potable offset or "new supply" benefit from an agricultural reuse program, an agreement where the City exchanges recycled water for surface water would be needed.

As discussed under Section 1.2, the City has an existing exchange agreement with FID. The City has the option of reentering into negotiations with FID to increase deliveries of the extracted water to FID canals, or to deliver tertiary recycled water to the FID for unrestricted reuse. If a new exchange agreement is negotiated, both water and recycled water facilities would need to be constructed: Additional facilities may be needed to deliver larger recycled water flows from the RWRF to FID's canals. Additional facilities may be needed within the city to convey and treat FID's surface water for potable use, or to recharge it to the groundwater aquifer. The City has master planned the expansion of the northeast water treatment plant and construction of another southeast water treatment plant.

Agricultural exchange agreements with other water and irrigation districts are also possible. Any agreement would consist of exchanging recycled water for surface water. Additional conveyance facilities would be needed to deliver recycled water beyond the boundaries of

FID and additional water facilities would be required to accept and use a new surface water supply. This would be subject to FID consent, as discussed in Section 1.2.

1.3.4 Fisheries Enhancement Exchange

The US Bureau of Reclamation (USBR) is required by a court order to release sufficient water from the Friant Dam to maintain fish flows downstream in the San Joaquin River. An institutional exchange agreement may be possible whereby the City could deliver recycled water to supplement fish flows in exchange for a smaller amount of surface water to augment potable supplies. Since this alternative involves surface water discharge, the City would be required to obtain an NPDES permit.

1.4 RECYCLED WATER MASTER PLAN ORGANIZATION

The remainder of the Master Plan further develops the background, site-specific factors in the City and potential project alternatives for implementing recycled water projects in Fresno. The organization of the Master Plan is as follows:

- Chapter 2 – Regulatory and Water Quality Issues
- Chapter 3 –Potential Recycled Water Demands
- Chapter 4 – Project Alternatives
- Chapter 5 – Summary and Recommendations

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REGULATORY AND WATER QUALITY REQUIREMENTS

2.1 INTRODUCTION

The purpose of this chapter is to identify existing and proposed state and regional regulatory requirements governing recycled water use in the City of Fresno. This chapter also analyzes the suitability of the RWRF effluent for irrigation.

2.2 CURRENT RECYCLED WATER REGULATIONS

The State Water Resources Control Board (SWRCB), the Regional Water Quality Control Boards (RWQCBs), and the California Department of Public Health (CDPH) have regulatory authority over projects using recycled water. The primary regulation governing recycled water use is the California Code of Regulations, Title 22.

2.2.1 California Code of Requirements - Title 22

Title 22 requirements are established and administered by the CDPH. Title 22 defines four types of recycled water uses based on the treatment process used, and the effluent total coliform bacteria, and turbidity levels. The CDPH has established the permitted uses for these four types of recycled water quality as summarized in Table 2.1. Title 22 also establishes approved uses of recycled water for industrial use, as shown in Table 2.2.

Table 2.1 Summary of Approved Title 22 Uses of Recycled Water for Irrigation
Recycled Water Master Plan
City of Fresno

Treatment Level	Approved Uses	Total Coliform (median)
Disinfected Tertiary	Spray Irrigation of Food Crops Landscape Irrigation(1) Unrestricted Recreational Impoundment	2.2 / 100 ml
Disinfected Secondary 2.2	Surface Irrigation of Food Crops Restricted Recreational Impoundment Surface Irrigation of Orchards, Vineyards	2.2 / 100 ml
Disinfected Secondary 23	Pasture for Milking Animals Landscape Irrigation(2) Landscape Impoundment	23 / 100 ml
Undisinfected Secondary	Fodder, Fiber and Seed Crops	N/A

Notes:
(1) Includes unrestricted access golf courses, parks, playgrounds, school yards, and other landscaped areas with similar access.
(2) Includes restricted access golf courses, cemeteries, freeway landscapes, and landscapes with similar public access.

Table 2.2	Summary of Approved Title 22 Industrial Recycled Water Uses Recycled Water Master Plan City of Fresno	
Supply for Cooling and Air Conditioning:		
Industrial or commercial cooling or air-conditioning involving cooling tower, evaporative condenser, or spraying that creates mist		
Industrial or commercial cooling or air-conditioning not involving cooling tower, evaporative condenser, or spraying that creates mist		
Other Allowed Uses:		
Flushing toilets and urinals		Structural fire fighting
Priming drain traps		Non-structural fire fighting
Industrial process water that may contact workers		Industrial process water that will not come into contact with workers
Industrial boiler feed water		Mixing concrete
Decorative fountains		Flushing sanitary sewers
Commercial laundries		Soil compaction
Consolidation of backfill material around potable water pipelines		Artificial snow making for commercial outdoor use
Dust control on roads and streets		Cleaning roads, sidewalks, and outdoor work areas
Commercial car washes, not heating the water, excluding the general public from washing processes		

2.2.2 Recycled Water State Policy

Recycled water projects have historically been difficult to permit. The SWRCB recognized that a burdensome and inconsistent permitting process can impede the implementation of recycled water projects. As a result, the SWRCB adopted a Recycled Water Policy (RW Policy) in 2009 to establish more uniform requirements for water recycling throughout the State, and to streamline the permit application process in most instances.

The RW Policy includes a mandate that the State increase the use of recycled water over 2002 levels by at least 200,000 acre feet per year (AFY) by 2020, and by an additional 300,000 AFY by 2030. The RW Policy also includes goals for stormwater reuse, conservation and potable water offsets by recycled water. The onus for achieving these mandates and goals is placed both on recycled water purveyors and potential users.

Absent unusual circumstances, the RW Policy states that recycled water irrigation projects that meet CDPH Title 22 requirements and other State or Local regulations be issued permits by Regional Boards within 120 days. These streamlined projects will not be required to include a groundwater monitoring component.

The RW Policy requires development of salt/nutrient management plans for every basin in California. These plans are to be adopted as Basin Plan amendments by 2015. These management plans will be developed by local stakeholders and funded by the regulated community. The City is participating in the Central Valley Salinity Alternatives for Long Term Sustainability (CV SALTS) group, which is made up of stakeholders who are leading this effort in the Central Valley.

The findings of the salt/nutrient management plans will govern whether anti-degradation analyses are necessary for specific projects. While the plans are in the process of being drafted, anti-degradation analyses will be required for recycling projects where the discharge is more than 10 percent of the basin's available assimilative capacity for one project, or 20 percent for multiple projects. The RW Policy does not address the CDPH draft regulations for groundwater recharge.

The RW Policy specifies that a Blue-Ribbon Advisory Panel be convened to guide future actions with respect to Compounds of Emerging Concern (CECs). If any regulations arise from new knowledge of risks associated CECs, then projects will be given compliance schedules.

2.2.3 Groundwater Recharge Regulations

CDPH issued Draft Groundwater Recharge Reuse Regulations in 2008. A summary of the draft regulations is provided in this section, and a copy of the full draft regulations is included in Appendix A. Final regulations are not expected in the near future.

The draft regulations for a groundwater recharge reuse project (GRRP) include requirements in the following areas:

- Method of recharge
- Level of treatment
- Contribution of recycled water
- Retention time
- Water Quality

Regulations are established for the two methods of groundwater recharge, surface spreading or injection of recycled water into a groundwater aquifer. The level of treatment required depends on the method of recharge selected. For either method, the recycled water at a minimum shall be disinfected and filtered to meet tertiary treatment standards as defined by Title 22.

The draft regulations require that only a fraction of the water recharged through spreading basins may consist of recycled water. The remaining fraction must be diluent water from another source. The requirements for initial recycled water contribution for the different methods of recharge and level of treatment are listed in Table 2.3.

Table 2.3	Initial Recycled Water Contribution (RWC) for Different Types of GRRPs Recycled Water Master Plan City of Fresno

Type of GRRP	Initial RWC
Subsurface injection with Reverse Osmosis (RO) and advanced oxidation	50 percent
Subsurface injection without RO and advanced oxidation	Not permitted
Surface spreading with RO and advanced oxidation	50 percent
Surface spreading without RO	20 percent

The diluent water contribution is calculated as a 60-month rolling average. Therefore, diluent water can be banked in anticipation of, or made up after, a dry year. Sources for diluent water can include surface water, storm water or groundwater.

The draft recharge regulations dictate the retention time between recharge site and the nearest drinking water well, as measured by tracer studies. For each GRRP, the recycled water shall be retained underground for a minimum of six months to control pathogenic microorganisms.

The recycled water quality for a GRRP must meet the standards set by the CDPH and are reviewed and permitted on a site-specific, project-by-project basis. The concentration of total nitrogen in a new GRRP must either be less than 5 milligrams per liter (mg/L) measured in the treated effluent above ground, or 10 mg/L measured in the groundwater. The total organic carbon (TOC) limit in the filtered effluent must be less than 16 mg/L, and the limit in the groundwater is 2.5 mg/L for the initial recycled water contribution of 20 percent.

GRRPs must be monitored for regulated chemicals, including organic and inorganic chemicals, radionuclides, disinfection byproducts, lead and copper to ensure compliance with Title 22 maximum contaminant levels (MCLs). Monitoring is also required for a set of unregulated chemicals, priority toxic pollutants and other chemicals that the CDPH specifies, which may include pharmaceuticals, endocrine disruptors and other indicators of municipal waste.

CDPH will only consider an application to implement a recharge project if the Agency managing the treatment facility has in place a pretreatment and source control program. Additionally, before a GRRP is permitted, the Agency must have a plan for an alternative drinking water source in case the GRRP violates California drinking water standards or is degraded so that it is no longer is a safe source of drinking water. A list of steps necessary for the approval of a GRRP is provided in Appendix B.

2.2.4 Updates to the 2010 California Plumbing Code

The California Plumbing Code was recently updated to relax the restrictive rules for installing dual plumbing for indoor recycled water use, as well as for gray water. These changes pertain to Chapter 16 of Title 24, Part 5, of the California Code of Regulations.

The code revisions for recycled water were approved by the Building Standards Commission and will be part of the 2010 Code. The new rules remove some of the restrictions on the installation of recycled water pipe in buildings. The major features of the new dual plumbing rules are:

- Recycled water pipe can now run in the same wall/ceiling cavity as potable pipe.
- The labeling requirements for purple pipe are relaxed.
- The annual inspection is a visible inspection, followed by a cross-connection test if there's reason to believe a cross-connection exists, rather than an automatic cross-connection test each year.

2.3 FUTURE REGULATORY CONSIDERATIONS

Future regulatory concerns for the use of recycled water consist of the potential regulation of endocrine disrupting chemicals and other compounds of emerging concern (CECs). The State Recycled Water Policy highlights CECs as a potential issue for recycled water. A discussion of the current status of these emerging pollutants is provided below.

2.3.1 Microconstituents

In recent years there have been heightened scientific awareness and public debate over potential impacts that may result from exposure to microconstituents, some of which are endocrine disrupting compounds (EDCs). Humans, fish, and wildlife species could potentially be affected by sufficient environmental exposure to EDCs.

In 1996, new legislation required that the U.S. EPA "determine whether certain substances may have an effect in humans that is similar to an effect produced by a naturally occurring estrogen or other such endocrine effect." In response, the EPA developed the Endocrine Disrupter Screening and Testing Advisory Committee. This effort to develop a robust test to identify EDCs is ongoing, and its results may lead to increased monitoring and limits on CECs in recycled water in the future.

Based on the current state of knowledge and the low levels of microconstituents in surface waters, it is likely to be many years before any such standards are promulgated. Nonetheless, in December 2009, the EPA took the first step in the regulation of microconstituents in water by putting 13 of these compounds on their Contaminant Candidate List. These compounds will be tested in the future to determine whether drinking

water criteria are necessary. If in the future these compounds are given human health criteria, they will be given limits in GRRPs.

While there are no current regulations regarding these constituents in recycled water, the State Recycled Water Policy convened a Blue Ribbon Panel to advise regulators as to the best way to proceed with monitoring for EDCs and other CECs. In June, 2010, the Blue Ribbon Panel released its recommendations for monitoring CECs in recycled water. The Panel recommends immediately monitoring for caffeine, 17-beta estradiol (a sex hormone) and triclosan (the active ingredient in antimicrobial soaps). In November 2010, the SWRCB will decide how to incorporate them into future permits. It will be important to continue to track research and regulations related to microconstituents in recycled water.

2.4 WATER QUALITY REQUIREMENTS

Water quality parameters such as salinity, nitrogen and metals can affect the acceptability of recycled water by users. This section reviews recommended water quality levels for reuse and compares these to the RWRF effluent.

2.4.1 General Irrigation Use Guidelines

The successful long-term use of recycled water for landscape and agricultural irrigation depends more on rainfall, leaching, soil drainage, irrigation water management, salt tolerance of plants, and soil management practices than upon water quality itself.

The Fresno RWRF effluent and extraction well monitoring results for 2008 were reviewed for key irrigation water quality parameters. Table 2.4 shows the RWRF effluent and extracted water quality compared to water quality guidelines for irrigation. Based on existing data, the degree of use restriction for irrigation parameters ranges from none to moderate; therefore the RWRF's effluent and extracted quality is appropriate for irrigation. However, if effluent is used for groundwater recharge, it will require nitrification and denitrification to meet the total nitrogen requirements.

Table 2.5 summarizes the concentrations of trace elements in the RWRF effluent and extracted well water. None of these constituents are at sufficiently high concentrations to be of concern as a water quality issue for agriculture or urban irrigation.

2.4.2 Water Quality for Industry

Industrial reuse applications approved by Title 22 and listed in Table 2.2 include applications such as cooling towers, ash sluicing, commercial vehicle washing, laundry facilities, dust control, fire protection, and waste dilution. In addition, petroleum refineries, chemical plants, and metal working facilities have recycled water uses beyond cooling purposes.

Table 2.4 Site Specific Salinity Objectives for Dominant Crops
Recycled Water Master Plan
City of Fresno

Constituent	EC, dS/m	TDS, mg/L	Chloride, mg/L	Sodium, mg/L	Boron, mg/L	Sodium Adsorption Ratio	Total Nitrogen, mg/L
Average RWRF Effluent Concentration	0.79	430	77	82	0.2	3.2	17
Average Extraction Well Concentration	0.85	525	87	84	0.2	2.5	2.6
General Guidelines[1]	0.7 - 3.0	450 - 2000	70 - 355	>70	1.0 - 2.0	3 - 9	Agronomic Rates
Site-Specific Limits for AGR[2]	1.4	766	175	161	1.0	N/A	Agronomic Rates
Most Sensitive Crops	Almonds and Grapes		Almonds		Unknown		

Notes:
(1) For Slight to Moderate Restrictions on use. Source: Ayers and Westcot 1984.
(2) Source: Grattan and Isidoro-Ramirez, 2005.

Table 2.5 Recommended Maximum Concentrations of Trace Elements for Agricultural Use
Recycled Water Master Plan
City of Fresno

Element	Recommended Limit (mg/L)[1]	Average Effluent Concentration (mg/L)	Average Extraction Well Concentration (mg/L)
Aluminum	5.0	0.026	<0.02
Arsenic	0.10	0.001	0.017
Cadmium	0.01	0.0008	0.0002
Chromium	0.10	0.0017	0.0008
Copper	0.20	0.006	0.003
Iron	5.0	0.4	0.09
Manganese	0.20[2]	0.036	*1.0*
Nickel	0.20	0.0028	0.015
Lead	5.0	0.0004	0.0003
Selenium	0.02	0.001	0.002
Zinc	2.0	0.04	0.006

Notes:
(1) Source: Ayers and Westcot, 1984
(2) Usually only toxic to plants in acidic soils

Parameters of concern for industrial reuse include calcium, magnesium, and hardness. As the concentrations of these parameters are similar in the RWRF effluent and in the City's potable water supplies, recycled water is considered suitable for industrial applications. For laundry facilities water must be nonstaining. Generally, this means that the water should be low in iron, manganese and color. The City would therefore need to verify that the constituents present do not stain. Commercial laundries are listed as potential recycled water users by the EPA (Guidelines for Water Reuse, US EPA, 2004).

2.5 REGULATIONS FOR DISCHARGE TO THE SAN JOAQUIN RIVER

If discharge to the San Joaquin river was part of a recycled water program, for example, as part of a fisheries enhancement program, an NPDES permit would be required. The North Fresno WRF already has an NPDES permit (CA0085189) , whose requirements indicate what would be required in a future NPDES permit. In general, permit limits for river discharge would be more extensive and restrictive than limits for urban or agricultural irrigation reuse.

Average month effluent limitations for the existing North Fresno WRF NPDES permit include:

- BOD – 10 mg/L
- TSS – 10 mg/L
- Total nitrogen – 10 mg/L (including 2 mg/L as ammonia and 8 mg/L as nitrate)

Additionally, the City would need to monitor and meet limits for colifom, electrical conductivity, chlorine residual and toxicity.

CITY OF FRESNO
INCORPORATED OCT. 12, 1885

POTENTIAL RECYCLED WATER DEMANDS

3.1 INTRODUCTION

As discussed in Chapter 1, there are four types of reuse considered in this master plan: urban reuse (including irrigation and industrial uses), agricultural reuse, groundwater recharge and fisheries enhancement. This Chapter focuses on identifying and quantifying potential demand for the reuse opportunities and describes the overall approach used to evaluate the options. The discussion herein provides the basis for the selection and grouping of users into the project alternatives that are identified in Chapter 4.

3.2 URBAN REUSE OPPORTUNITIES

The types of urban recycled uses identified include urban irrigation (i.e., school yards, parks, cemeteries, golf courses, highway medians, Home Owners Associations (HOAs)) and industrial uses. Residential uses were also considered. This section describes how potential urban reuse customers (or users) were identified.

3.2.1 Recycled Water Ordinance

In order to implement the Recycled Water Program, the City needs to develop and adopt a "Recycled Water Ordinance." The purpose of the ordinance is to establish water recycling policy and criteria for its use within the Sphere of Influence. In general, the Ordinance will accomplish the following:

- Establish Administrative Authority
- Establish approved uses of recycled water
- Define areas of potential eligibility for recycled water service
- Specify mandatory and voluntary uses of recycled water, depending on user classifications
- Require installation of transmission and distribution infrastructure
- Encourage the use of voluntary retrofits for existing users that may not be addressed in the ordinance
- Require the City of Fresno to prepare Rules and Regulations
- Provide enforcement and severability clauses

The City needs to prepare "Rules and Regulations Governing the Distribution and Use of Recycled Water" that will be consistent with the Ordinance. The Rules and Regulations will govern the design, construction, and use of both the distribution system, to be operated by the City, and on-site recycled water systems to be operated by the users. The Wastewater

Management Division of the Department of Public Utilities will have the authority to enforce the Rules and Regulations by virtue of the Recycled Water Ordinance. The Wastewater Management Division will provide all operation, oversight, and administration of the Rules and Regulations for the end use of recycled water. In general, the Rules and Regulations document will include the following elements:

- Responsibilities for the City, Users, and Use Area Supervisors
- Requirements for the design, installation, and inspection of the distribution systems and on-site recycled water systems
- Application procedures and the City approval process
- Operation, Maintenance, and Management responsibilities for Users and the City
- Cross connection control test procedures
- Employee training requirements
- Prohibitions and Enforcement

3.2.2 Quadrants

Since the City is spread out over such a large area (105 square miles), the study area was divided into quadrants to facilitate the configuration of project alternatives, as illustrated in Figure 3.1. Potential users will typically be grouped by quadrants and served by recycled water produced either in that quadrant via the addition of satellite treatment or by a pipeline from the RWRF.

3.2.3 Existing Potential Urban Recycled Water Users

Of the existing urban water users, approximately 300 potential non-residential recycled water customers were identified by reviewing city GIS data for parks, schools, golf courses, and cemeteries. The customers were refined using multiple sources including previous reports, discussions with City staff, City water meter records and GIS mapping. In addition, large residential users were identified by identifying areas in the City with large lots and using GIS data and aerials to estimate potential irrigation demands.

3.2.3.1 Non-Residential Urban Irrigation Reuse

Potential recycled water demand at school yards, parks, cemeteries, and golf courses, was estimated based on the irrigable area obtained from GIS data and aerial maps. The estimated percentage of irrigable areas for different types of land uses are listed in Appendix C. The expected landscape irrigation requirements were calculated using climatological data for the Fresno area.

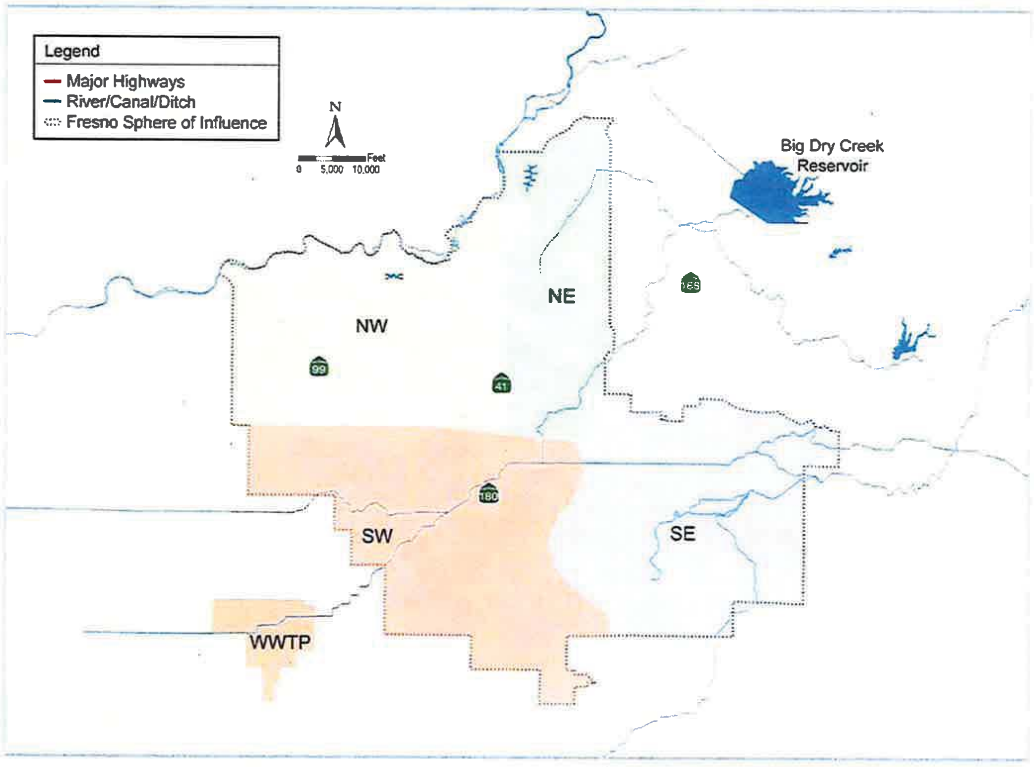


Figure 3.1
MAP OF QUADRANTS FOR
RECYCLED WATER PROJECT ALTERNATIVES
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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The City is in the process of implementing a water meter program for residential users. The City already meters non-residential users, however, although total water use data is available for many customers, metered water use data is not specifically broken out for irrigation uses. Therefore, landscape irrigation reuse requirements were calculated based on evapotranspiration and rainfall data. Calculated irrigation requirements were also used to estimate peak month demand, peak day demand, and peak hour demand for distribution system sizing considerations.

The amount of irrigation required for the potential irrigation customers is directly dependent on precipitation quantities in the region. The amount of precipitation, evapotranspiration, and irrigation required for the potential irrigation customers are listed in Table 3.1. The reference evapotranspiration was obtained from the California Irrigation Management Information System (CIMIS) evapotranspiration zoning map. To calculate the landscape evapotranspiration, the landscaped area crop coefficient was estimated using information contained in the Guide to Estimating Irrigation Water Needs of Landscape Plantings in California (2000) by the California Department of Water Resources. Based on interviews with local golf course superintendents, the main irrigable species used for landscaping in Fresno is warm-season turfgrass. It is assumed that parks, schools and cemeteries also use warm season turf grass (including varieties such as bermuda grass, bahia grass, buffalo grass, etc.), which is the "typical" type of grass used in areas with hot summers.

As can be seen in Table 3.1, the net annual average landscape irrigation requirement in the study area is approximately 32 inches (or 2.7 feet) per year. Based on data from CIMIS, the irrigation season is roughly March through October, a period of 245 days. Landscape irrigation demand peaks in the month of July, which is estimated to be 6.3 inches, or 20 percent of the annual total.

The recycled water system storage, pumping, and pipeline sizing requirements are based on the maximum day demand. The maximum day peaking factor represents the average day of the maximum month demand. The peak hour demand takes into account variations in demand over a 24-hour period. Urban irrigation of large areas (such as golf courses) commonly occurs at night over an 8-hour period; therefore the peak hour demand is generally 3 times larger than the maximum day demand.

To quantify total recycled water demand, peaking factors are used to calculate the average day, maximum day, maximum month and peak hour demands as follows:

- Average day flow = 1.0
- Maximum month to average day flow = 2.4 (based on climatological data)
- Maximum day to average day flow = 3.1 (30 percent higher than maximum month)
- Peak hour to average day flow = 9.3 (based on an 8-hr/d irrigation period)

Table 3.1	Average Annual Landscape Irrigation Requirements Recycled Water Master Plan City of Fresno			
Month	Landscape Area Irrigation Required[1] (Inches)	Average Rainfall[2] (Inches)	Net Irrigation Requirement[3] (Inches)	Percent of Annual Net Irrigation Requirement[4] (%)
January	0.72	2.11	0.0	0%
February	1.26	1.90	0.0	0%
March	1.98	1.87	0.1	0%
April	***3.06***	***1.01***	***2.8***	***9%***
May	***3.96***	***0.37***	***4.9***	***15%***
June	***4.68***	***0.14***	***6.1***	***19%***
July	***4.68***	***0.01***	***6.3***	***20%***
August	***4.14***	***0.01***	***5.6***	***17%***
September	***3.24***	***0.16***	***4.2***	***13%***
October	***2.16***	***0.51***	***2.2***	***7%***
November	1.08	1.14	0.0	0%
December	0.54	1.58	0.0	0%
Total	**31.50**	**10.81**	**32.2**	**100%**
			2.7 feet	

Notes:

(1) Landscaped area irrigation required was obtained using the reference evapotranspiration from the California Irrigation Management Information System ET Zone Map. According to Water Use Classification of Landscape Species (WUCOLS) reference map, the City of Fresno is located in Zone 12. Irrigation requirements are calculated as $ET_L = K_L * ET_o$ Where: ET_L = Evapotranspiration of landscaped areas (in inches), K_L = Landscaped area crop coefficient, ET_o = Reference evapotranspiration (in inches).The ET values are adjusted for the landscape irrigation coefficient K_L, where $K_L = K_s * K_{mc} * K_d$ which accounts for the species, microclimate and vegetation density. These factors were estimated to be 0.6, 1, and 1, respectively.

(2) Source: Fresno Station #042357 Data from the Western Regional Climate Center Precipitation Gauges, 1948-2008; ***Bold italics in table represent irrigation season.***

(3) [Evapotranspiration - Rainfall] *1.15/0.85. Where 0.85 = 85% Irrigation Factor (Average value from Carlos and Guitjens, University of Nevada) and 1.15 = 15% Leaching Fraction (Average value from Ayers and Westcot, "Water Quality for Agriculture", Food and Agriculture Organization of the United Nations).

(4) Current month net irrigation requirement divided by total net irrigation requirement.

Treatment facility capacity was based on maximum day demand, and distribution system sizing was based on a combination of maximum day and peak hour demand, depending on whether storage is available near users. While this approach is conservative for pipe sizing, and pipeline sizes can be reduced if storage near users is identified, it allows capacity in the pipeline for serving potential new or unidentified users along the pipe route.

A full list of all the non-residential urban irrigation sites identified, the estimated irrigable acreage, and the estimated average annual water demand is included in Appendix C. In total over 12,000 acre feet per year (AFY) of potential urban irrigation demand was identified for irrigation of parks, schools, cemeteries and golf courses. These users are located throughout the City, and average pipeline costs to serve smaller users are approximately $1.2 million per mile. Therefore, serving the largest users will drive the development of the distribution system alignments.

3.2.3.2 Residential and Commercial Irrigation Reuse

There are limited examples of residential recycled water irrigation projects in California. One example is the El Dorado Irrigation District where the Serrano planned community installed recycled water during the initial construction of the development for the purpose of irrigating residential irrigation in front and back yards. Another example is Irvine Ranch Water District where a few hundred estate-sized residential lots use recycled water for front and backyard irrigation. In general, backyard irrigation is less desirable than front yard irrigation because of the lack of access for any maintenance concerns.

Implementation of recycled water for densely developed existing residential or commercial areas would be difficult due to the amount of roadway or private land that must be disturbed for a minimal demand at each turnout. Typically, only front yards are served for residential irrigation, so that the City doesn't need to maintain a lateral that traverses to the back of the homeowner's property. If the City wishes to serve residential and commercial users, the average demand is approximately 25 AFY per mile of pipe (assuming an average of 5 percent irrigable area in commercial areas and 20 percent irrigable areas in residential areas of 5 lots per acre and less).

It will be less expensive and will cause less disturbance to the community to install purple pipe in new residential areas compared to existing residential areas. However, there are a few existing residential areas, such as the Fig Garden Community, where there are large lot sizes and dirt shoulders where installing purple pipe for irrigation would yield a greater return in recycled water supplied per mile of pipe installed than other more densely developed areas.

Toilet flushing is another possible use for recycled water in new multi-unit developments. The demand for toilet flushing ranges from 11 to 43 AFY per mile of pipe for a 10 to 40 unit complex.

3.2.3.3 Industrial Reuse

Industrial users with high water use were identified by the City's water billing records. As part of the industrial pretreatment program, industries are required to report different types of water use to the City. Using these records, it is possible to estimate the potential recycled water demand. Based on Title 22 approved uses, the following types of industrial water use in Fresno can be served by recycled water:

- Sanitary (i.e., restrooms) - for toilet flushing at industrial sites
- Process water except for food processors
- Cleanup/wash down except for food processors
- Boiler Feed
- Cooling
- Irrigation

Title 22 does not allow the use of recycled water in food processing facilities where food can come into contact with the water. However, some of the non-food processing water uses listed above can also be served with recycled water at industries that process food. Assuming that all the above allowable uses are served with recycled water, as shown in Table 3.2, the potential recycled water demand for industries is 2,595 AFY. The Recycled Water Ordinance encourages existing industries to recondition their facilities to use recycled water.

Unlike irrigation reuse which peaks during the summer and drops to zero in the winter, the non-irrigation and non-food processing types of uses identified for industrial reuse vary throughout the year, but are expected to have a steadier demand with lower seasonal peaks.

3.2.3.4 Caltrans (Highway median irrigation)

The Caltrans median irrigation system is made up of individual points of connection with the City's water distribution system, and is not internally interconnected. Each point of connection can irrigate an area up to three quarters of a mile in each direction.

Table 3.2 Potential Industrial Users Recycled Water Demand Recycled Water Master Plan City of Fresno		
Name of Industry	**Type of Industry and Major Use (for Recycled Water)**	**Existing Water Use (AFY)**
Ameripride	Laundry – Wash water	126
Angelica Textile Services	Laundry– Wash water	125
Aramark	Laundry– Wash water	160
Beef Packers	Food Processor – Boiler/Cooling	62
California Dairies (Danish Creamery)	Food Processor – Toilet Flushing/Boiler/Cooling	632
Cellulo Co.	Filter Manufacturer – Process	167
Cornnuts Inc.	Food Processor – Boiler	8
Darling International	Food Processor – Cooling	68
Foster Farms Belgravia	Food Processor - Toilet Flushing/Cooling	147
Foster Farms Dairy	Food Processor – Boiler/ Cooling	50
Foster Farms Poultry	Food Processor – Toilet Flushing/Boiler/Cooling	131
Fresno Community Hospital	Hospital – Cooling and Irrigation	108
Kraft Foods (Capri Sun)	Food Processor – Boiling/Cooling	171
Lyons Magnus	Food Processor – Boiler/Cooling	23
Mission Linen	Laundry– Wash water/Toilet Flushing	78
Pacific Choice Brands	Food Processor – Boiler/Cooling	99
Pepsi-Cola Bottling	Food Processor - Toilet Flushing/Boiler/Cooling	20
Producer's Dairy	Food Processor - Toilet Flushing/Boiler/Cooling	16
Prudential Overall Supply	Laundry – Wash water	43
Saint Agnes Hospital (2006)	Hospital – Cooling/Irrigation	42
University Medical Ctr.	Hospital – Cooling	51
Veterans Administration Hospital	Hospital – Cooling/Irrigation	88
Wawona Frozen Foods (Fresno)	Food Processor – Boiler/Cooling	44
Zacky Turkey	Food Processor – Boiler/Cooling	136
	Total	**2,595**

There are few freeway crossings, so in most cases a single point of connection only irrigates one side of the freeway. Caltrans' total water annual water use for 2008 and 2009, as billed by the City, is approximately 800 AFY. While it may not be feasible to run purple pipe to every Caltrans connection, individual points of connection can represent significant water use – up to 20 AFY each.

Many of the newer and improved highways are using plant-specific sprinklers and are no longer irrigating with long sweeping big gun sprinklers that spray water over a large area. This type of irrigation system is being phased out due to water waste and runoff issues. As landscaped areas along the freeways are upgraded, they will use much less water. That being said, highway medians remain a key targeted recycled water user in this Master Plan.

3.2.4 Recycled Water for Future Development

The City's General Plan and EIR, adopted in November 2002, provide long-range planning for development over the next two decades. It includes community and specific plans that address growth and infill in different areas of the City. The General Plan identified two growth areas, the North Growth Area and the Southeast Growth Area. The North Growth Area has since been developed and is served by the North Fresno Wastewater Reclamation Facility. The General Plan also established objectives and policies to encourage development/revitalization of the Centre City area and to promote densification through formation of "Intensity Corridors". The area on either side of Highway 41 has been designated an "Intensity Corridor."

The population and growth projections in the General Plan were based upon the robust growth at the time the Plan was developed. Because of the recent housing market decline, development has slowed significantly. In addition, based on discussions with the Planning and Development Department, the City's new focus for growth is densification and in-fill. Therefore, the General Plan will be revisited in the coming years. It is likely that as the General Plan changes, planning scenarios for the Recycled Water Master Plan will also need to be updated.

The revised General Plan's focus on densification may result in the decrease of irrigable green space for future developments. However, there will be increased opportunities to implement reuse for dual plumbing inside new buildings. In general, the City intends for recycled water to be an integral component of future development. The draft Ordinance requires use of recycled water for irrigation of landscape in common areas and front yards for new developments. The Ordinance also requires dual plumbing for new apartments and condominiums.

Incorporation of the Southeast Growth Area (SEGA) into the City was a major goal of the 2025 General Plan. The original intent of the City was that SEGA would be self-sustaining with respect to water and wastewater and the City intended to build a satellite recycled water facility for SEGA. The City intends to have a separate specific plan under

development to further define the SEGA development and the use of recycled water within SEGA. The SEGA specific plan was put on hold during the duration of this master planning process. Therefore, evaluation of recycled water uses within the SEGA area is beyond the scope of the Recycled Water Master Plan (Master Plan). However, opportunities to utilize a satellite facility for users in the southeast quadrant outside of SEGA will be considered in the Master Plan. With the decline in development and the redirection of the General Plan, it is likely that SEGA will develop at a much slower rate than envisioned in the 2025 General Plan.

Due to the uncertainties surrounding the location and timing of future developments, it is difficult to quantify potential reuse demands for serving these future users. In general estimated demands for future residential development range from 13 AFY per mile of pipeline for high-density residential development (apartment buildings) to 35 AFY per mile for low-density residential development (2 homes per acre). For indoor dual plumbing in condominiums and apartments, demand can range up to 43 AFY per mile for a forty-unit building. Distribution systems are sized so that they can accommodate future growth, so delivering recycled water to new developments will be part of future growth and infill projects.

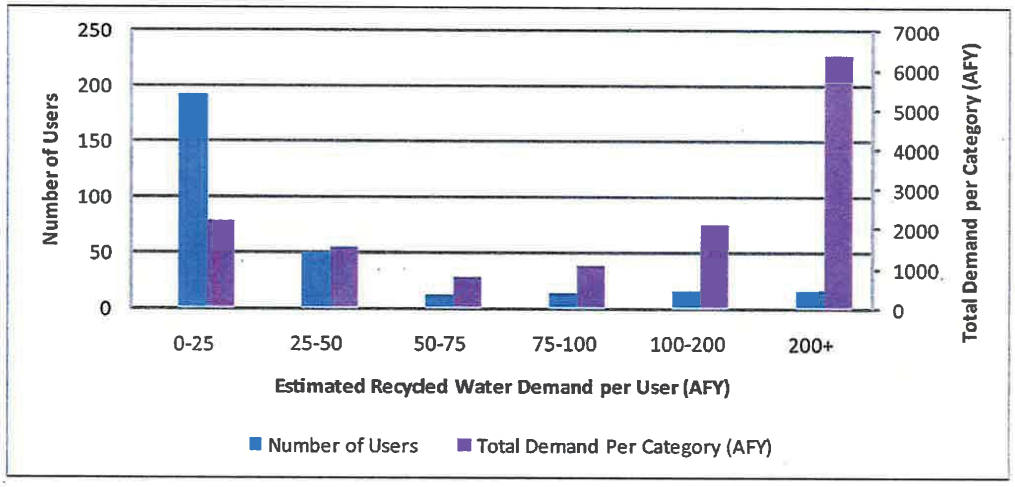
Future service to the Hwy 41 intensity corridor is included in this Master Plan. Based on a combination of dual plumbed mid- and high-rise development with 10 percent irrigable green space, the estimated demand for an 8-mile stretch along this corridor is approximately 300 AFY.

Areas within the City, primarily in the southwest and southeast quadrants, that are currently being used for agricultural are zoned for future residential development. Pipelines that go through these areas will be sized to deliver water to future residences at a rate of 35 AFY per mile. In the meantime, recycled water can be made available to any willing agricultural users that are along the pipeline alignment.

3.2.5 Distribution of Recycled Water to Urban Customers

Urban reuse provides an opportunity to implement recycled water projects that directly offset potable water and are highly visible to the community. However, urban reuse is more distribution system-intensive than other alternatives such as groundwater recharge and agricultural reuse, since landscape irrigation and industrial users are spread out across the City. While all irrigation and allowable industrial users are potential recycled water customers, aligning the distribution system to first serve large users, provides the most "bang for the buck" in pipeline construction.

The majority of the estimated demand is among existing large water users. Figure 3.2 shows the distribution of estimated use volumes among the potential users. As seen, the largest demand comes from eleven users with an individual demand exceeding 200



This graph illustrates that the "biggest bang for the buck" in distributing recycled water for urban reuse is to serve users of more than 200AFY.

Figure 3.2
DISTRIBUTION OF NUMBER OF RECYCLED WATER USERS AND TOTAL RECYCLED WATER DEMAND
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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AFY each. These larger users are generally land-intensive parks, cemeteries and golf courses that are located around the outskirts of the City. These 11 large volume users account for approximately 60 percent of the total estimated irrigation demand (or 8,000 AFY). The City will maximize the initial use of recycled water at the lowest cost by designing a recycled water distribution system to primarily serve these potential customers. The use of recycled water can be further maximized by connecting smaller nearby users to the distribution system connecting the large users. Additional smaller users can then be connected in the future, since they will have little impact on the sizing of the distribution system or treatment facilities.

In addition to large users, recycled water will be delivered to high profile, demonstration sites, such as City Hall. Recycled water will also be provided in the future to new "green" development where recycled water would be used for landscape irrigation and indoor dual plumbing.

3.3 AGRICULTURAL REUSE

Fresno is fortunate in that agricultural reuse provides a significant opportunity for recycled water use with relatively low capital, regulatory and operational investment. There are five types of opportunities for direct agricultural reuse considered in this Master Plan:

- Expansion of direct deliveries of undisinfected secondary effluent to farmers
- Direct deliveries of tertiary treated effluent for unrestricted reuse to farmers
- Expansion of the existing practice of delivering extracted percolated effluent to Fresno Irrigation District (FID) via canal system
- Delivery of tertiary treated effluent for unrestricted reuse to FID via canal system
- Delivery of tertiary treated effluent for unrestricted reuse to another agency via pipeline

Based on the existing RWRF flow (approximately 80,000 AFY) and existing reuse volumes (approximately 35,000 AFY of direct secondary effluent reuse and extracted percolate delivered to FID), up to 45,000 AFY of additional effluent could be used for other purposes. The existing agreement with FID prevents the RWRF from taking any action that would lower the groundwater in the vicinity of the RWRF below the previous year's levels. While the amount of diversion or extraction allowable without affecting groundwater levels has not been studied, it is assumed that the full flow of the RWRF is available for beneficial reuse since there is currently a groundwater mound beneath the RWRF.

3.3.1 Direct Delivery of Undisinfected Secondary Effluent via Pipeline

The RWRF currently delivers approximately 10,000 AFY of undisinfected secondary effluent to nearby growers of non-food crops. RWRF staff performed a preliminary evaluation of expanding the direct reuse system to nearby growers willing to accept recycled water (shown in Figure 3.3). Corn for animal feed is allowed under Title 22 to be irrigated with undisinfected secondary effluent. Between the two identified corn-growing farms, an additional 1,400 acres could be served with undisinfected secondary effluent, provided that piping was available to convey the water. Corn uses approximately 3 feet of water per acre per year, so the 1,400 acres translates to a recycled water demand of 4,200 AFY. Expanding direct delivery of secondary effluent recycled water to nearby farmers relieves the hydraulic loading on the RWRF percolation ponds and meets the City's goal to increase recycling.

3.3.2 Direct Delivery of Tertiary Effluent to Growers via Pipeline

In addition to expanding the existing secondary reuse system, the City could upgrade its treatment facilities and deliver tertiary water to individual farmers for unrestricted reuse.

Serving the users directly would require installing a new distribution system to serve individual users. Farmers in the area are already served by an extensive canal system managed and owned by FID. Based on the City's direction, this alternative was not considered further in this Master Plan for large scale implementation of reuse to local farmers, as it would be more cost effective to utilize the existing canal system. However, individual growers could be served with turnouts from the urban reuse distribution system. Demands have been estimated at 450 to 900 AFY per mile of pipeline, assuming 1/8 to 1/4 mile of land could be irrigated on either side of a pipeline.

3.3.3 Expand Existing Practice of Delivering Extracted Percolate to FID Canals

Between 2000 and 2008, the RWRF extracted up to 34,000 AFY of percolated effluent from extraction wells and delivered this water to FID canals for use by downstream agricultural users (See Table 1.1 in Chapter 1). This alternative would expand on this existing practice to increase pumping from the groundwater beneath the percolation ponds for delivery to FID.

The City is surrounded by agricultural areas that are served by FID. FID maintains 800 miles of canals and provides water to 150,000 acres of farmland. A list of growers in the area immediately adjacent to the RWRF (Township 14, Range 19) was obtained from the County so that agricultural water demands could be estimated. Table 3.3 shows the annual demand of crops commonly grown near the RWRF. An average annual irrigation demand of 3.2 feet was calculated by taking an area-weighted average of the demands of all the crops.

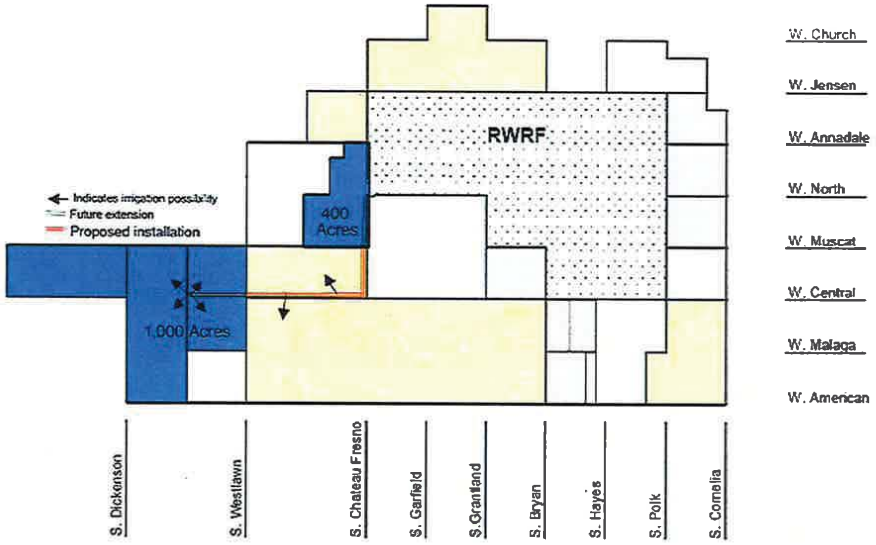


Figure 3.3
POTENTIAL EXPANSION OF DIRECT REUSE DELIVERY SYSTEM
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CITY OF FRESNO

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Figure 3.4 shows the FID canal system in the vicinity of the RWRF. The City currently provides extracted water in the Houghton and Dry Creek canals near the RWRF. Depending on the alternative considered and the location of new treatment systems and pipelines, additional supply of recycled water can be delivered to various canals within the

Table 3.3 Irrigation Demands of Crops Prevalent Near the RWRF
Recycled Water Master Plan
City of Fresno

Crop	Annual Irrigation Demand (feet)
Alfalfa	4.5
Citrus	3.0
Corn	3.0
Orchard	3.9
Other(1)	2.7
Pasture	4.6
Small Grain	1.4
Vineyard	2.7

Note:
(1) "Other" is an estimate for crops that do not fall into the listed categories.

FID system. The City's current extraction wells and pipeline system for delivery to each of these canals cannot accommodate more flow; therefore new infrastructure would be required.

Preliminary discussions with FID have indicated that if the appropriate contracts and agreements were in place, they would be willing to operate their canals continuously to convey recycled water away from the RWRF to agricultural users or recharge basins. Further discussions with FID to better define canal capacity would be necessary prior to implementing this alternative.

In the past, pumping extracted groundwater from below the percolation ponds for use in agricultural irrigation has not been regulated. Due to concerns that this existing practice may be regulated differently in the future, research is being started to demonstrate the effectiveness of soil-aquifer treatment (SAT). The research is expected to show that SAT (of unfiltered and undisinfected wastewater) produces high quality water that is equivalent to Title 22 requirements for unrestricted reuse.

Agricultural reuse by sending either extracted percolate or tertiary water to FID canals presents an opportunity to exchange surface water for the recycled water. The existing agreement with FID would need to be renegotiated to allow increased deliveries. The City has not historically used its full entitlement of surface water from the existing FID agreement due to lack of demand and adequate facilities (recharge basins or water

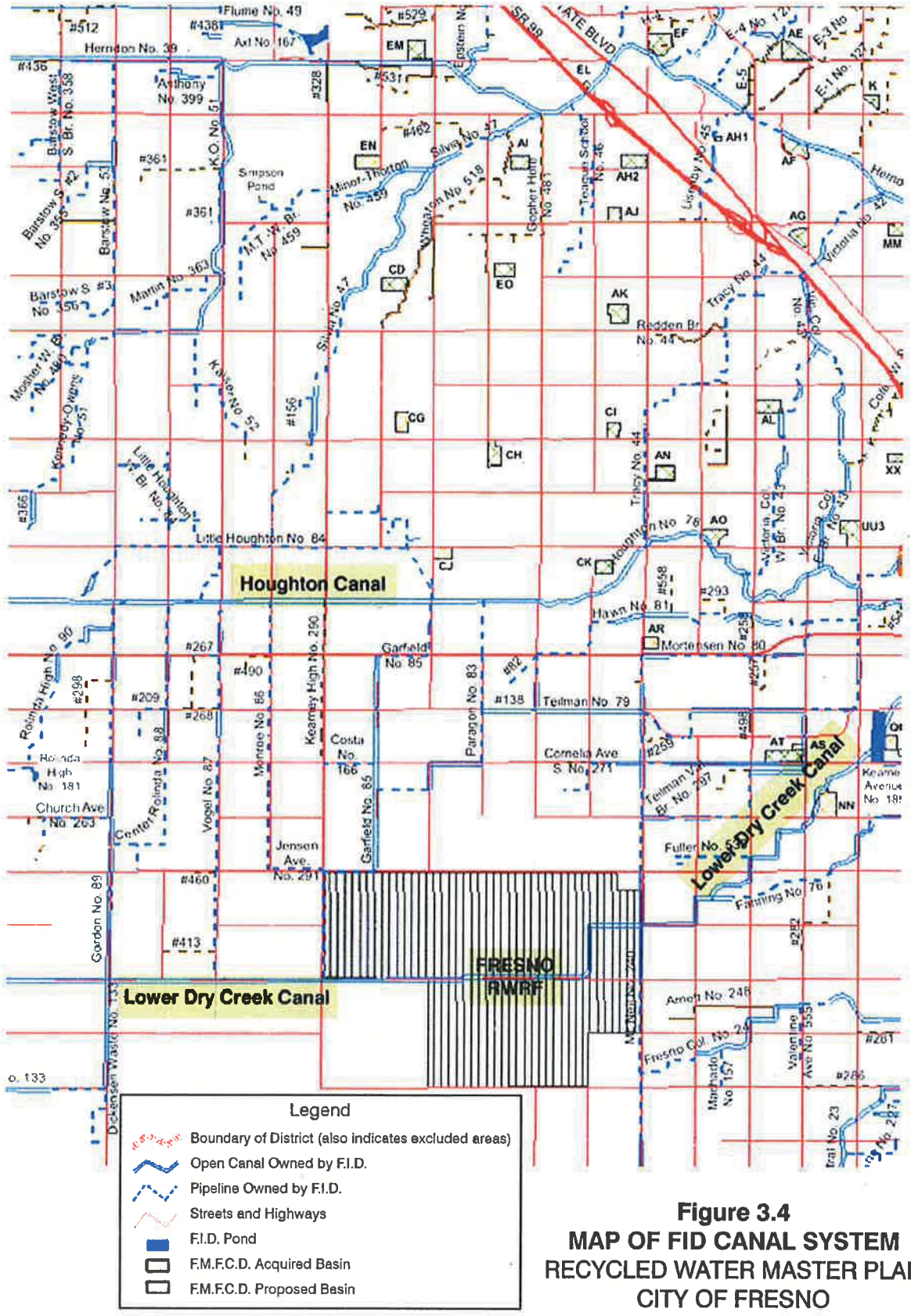


Figure 3.4
MAP OF FID CANAL SYSTEM
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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treatment facilities). Additional facilities would be needed within the city to convey and treat FID's surface water for potable use, or to recharge it to the groundwater aquifer. The City has master planned the expansion of the northeast water treatment plant and construction of another southeast water treatment plant. As the City faces dwindling water supplies and decreasing groundwater levels, the surface water exchange will become more critical to its overall water portfolio.

3.3.4 Delivery of Tertiary Effluent to FID Canals

Instead of delivering extracted groundwater to FID canals, tertiary treated recycled water could be delivered directly to the canals. This alternative would require the RWRF to upgrade to tertiary treatment. The City would also need to renegotiate its agreement with FID to allow this type of delivery. This alternative would be more expensive than delivery of extracted percolated effluent (due to the additional treatment), while providing the same volume of water. However, this alternative is considered in the Master Plan in case the Regional Water Quality Control Board (RWQCB) does not recognize the percolation and extraction as equivalent to tertiary treatment in the future. Again, in order to take advantage of any new exchange agreement, additional facilities would be needed to convey and treat FID's surface water for potable use, or to recharge it to the groundwater aquifer.

3.3.5 Delivery of Recycled Water to Other Agencies via Pipeline

Delivery to other agencies, or irrigation districts, would likely require the RWRF to upgrade to tertiary treatment. In addition, the City would need to renegotiate its agreement with FID to convey recycled water outside FID's boundaries. This alternative was explored in the 1996 RWRF Master Plan, and the relevant section of that study is included in Appendix D. As this alternative has many institutional and political challenges, it will not be further explored as part of this Master Plan. However, in the interest of providing a diverse portfolio of options, the City should consider evaluating opportunities for potable water exchanges with other agencies in the future.

3.4 GROUNDWATER RECHARGE OPPORTUNITIES

Groundwater reuse recharge projects (GRRPs) are an opportunity to directly augment the City's potable supply, and provide a use for recycled water during the winter. Fresno's residents are already familiar with surface water recharge facilities scattered throughout the City, so the public is more likely to accept groundwater recharge than other cities unfamiliar with the concept.

Fresno's groundwater recharge potential depends on the ability to site basins in areas that have high percolation, the availability of diluent water and the travel time of percolated recycled to drinking water wells. As discussed in the regulatory section (Chapter 2), recharge basins must have six-months of hydraulic separation from the point of recharge to the nearest drinking water well. This separation requirement limits the ability to site

recharge facilities in the more developed parts of the City. Most likely, recharge facilities will be sited in the less developed areas of Fresno where there are fewer drinking water wells.

3.4.1 Diluent Water Sources

As discussed in Chapter 2, recharge regulations require that recycled water be blended with diluent water at a 1:4 ratio for surface spreading of tertiary recycled water. There are typically two sources of water that can be used for the diluent water: stormwater and raw (untreated) surface water. Fresno is fortunate to have several possible sources of diluent water: surface water from the US Bureau of Reclamation (USBR), Kings River entitlements for being inside FID boundaries, as well as stormwater managed by the Fresno Metropolitan Flood Control District (FMFCD). FMFCD operates recharge basins throughout the City for the purpose of recharging raw surface water and stormwater.

In discussions with FMFCD staff, they have indicated their willingness to work with City staff to provide diluent water in exchange for new recharge basins that would provide additional capacity for stormwater storage. Ideally, they prefer not to comingle recycled water in their stormwater basins in order to separate maintenance and operation issues between the two agencies and to simplify permitting issues. Stormwater would primarily be available as diluent water during the winter months. Surface water could theoretically be provided year-round for use as diluent water.

3.4.2 GRRP Basin Siting and Sizing

If stormwater water is to be used as diluent water, the best place to site the GRRP basins is adjacent to FMFCD basins or conveyance facilities. This way, stormwater can easily be conveyed into the recycled water recharge basins. If surface water is used as diluent water, then the water would be supplied from FID canals directly into the GRRP basins and the basins would best be sited near the canals.

The City is also considering the construction of "super-recharge basins" to increase the capacity to recharge surface water. If these basins are constructed, a portion of the recharge water could be made up of recycled water, provided there is adequate (6 months) travel time to the nearest drinking water well. Tentative locations of these super-recharge basins are shown in Figure 3.5.

The size of the GRRP basins will likely be driven by the availability of land (rather than the area needed to percolate the available recycled water) as the City is well developed in many parts of town. Basin sizing will also be driven by the volume and timing of delivery of diluent water, as there is four times more volume of diluent water required for blending than there is recycled water recharged. If diluent water is provided by FMFCD, then it will only be available during the winter, which is likely the same time that excess recycled water will be available for recharge (i.e., during the non-irrigation season). In this situation, the basin would need to be large enough to accommodate water from both sources at the same time. The amount of recycled water that can be percolated in a given area is maximized if

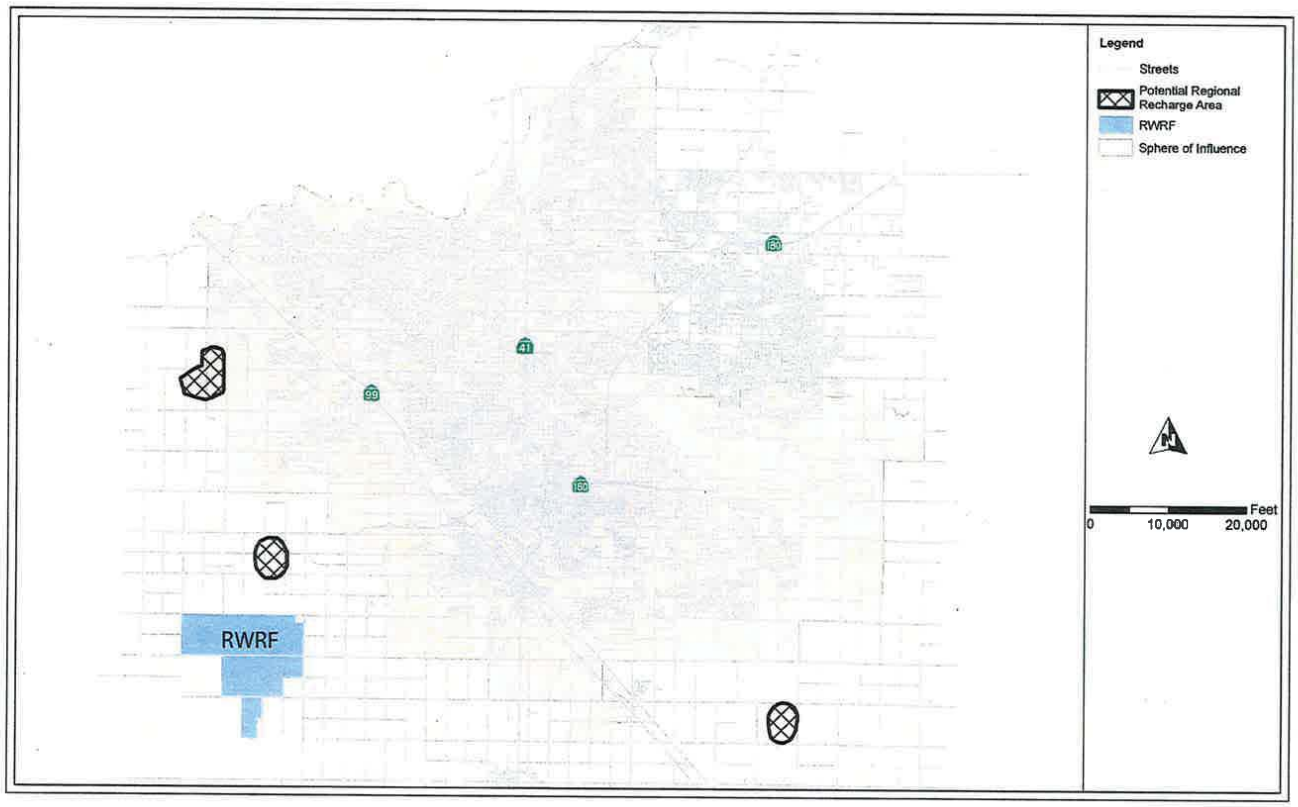


Figure 3.5
TENTATIVE LOCATIONS OF SUPER-RECHARGE BASINS
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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diluent water is provided during a different time of year, or in an adjacent basin, so that the recycled water does not have to compete for basin capacity with the diluent water.

Percolation rates have been measured in FMFCD basins varying from 1.2 to 4.8 inches/day. Similar percolation rates would be expected in future GRRP basins. These percolation rates result in a recharge capacity of 33,000 to 130,000 gallons/acre/day (0.1 to 0.4 acre feet/acre/day) while the basin is in use. Percolation rates are highest on the west side of town, where it is also easiest to supply recycled water from the RWRF, and where fortunately there is an abundance of undeveloped land available. Including super-recharge basins, a total of approximately 2,450 acres of land have been preliminarily identified as possible sites for recharge basins. If all the identified sites were implemented, approximately 31,850 AFY of recycled water could be recharged (using an average percolation rate of 2.4 inch/day).

3.5 FISHERIES ENHANCEMENT EXCHANGE OPPORTUNITIES

The USBR is required by a 2006 Federal Court settlement to release sufficient water from the Friant Dam to maintain fish flows downstream in the San Joaquin River. One reuse alternative identified early in this Master Plan was the potential use of recycled water for stream flow enhancement.

In discussions with the USBR, agency representatives indicate that the amount of recycled water that could be supplied is a tiny fraction of the volume that is needed for fish flow maintenance in the river. The amount of water required to enhance San Joaquin River, 500,000 AFY, is significantly more than the City's entire potential recycled water supply, which is less than 80,000 AFY. The USBR staff also expressed concerns that the water quality and the temperature of the recycled water may be not being appropriate for the fisheries. Additionally, the USBR requires the water mostly in the spring when there is a high demand for recycled water for irrigation uses.

As a result of all this, discussions with the USBR were not pursued further, since fisheries enhancement exchange did not appear to be viable.

CITY OF FRESNO
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PROJECT ALTERNATIVES

4.1 INTRODUCTION

Presented in this chapter is the development of the various recycled water uses (urban, agricultural and groundwater recharge) into project alternatives to be carried forward for further analysis. The project alternatives were configured to maximize the delivery of recycled water to each quadrant of the City, and to provide adequate cost and implementation information for moving forward with a recommended recycled water program.

4.2 SUMMARY OF PROJECT ALTERNATIVES

Project alternatives were developed for each type of water reuse including urban irrigation and industrial reuse, groundwater recharge, and agricultural reuse alternatives. Components of the project alternatives included: regional treatment or satellite treatment, distribution system, collection system flow diversions for satellite treatment, and influent and effluent storage.

4.2.1 Urban Alternatives

The City was divided into quadrants to develop the configuration of urban reuse project alternatives. Potential users were identified in each quadrant. Alternatives were then developed by grouping users in each quadrant and determining how they could be served. There were two treatment (recycled water production) alternatives considered when serving urban users: Alternative 1) delivering recycled water from the RWRF; and Alternative 2) delivering recycled water from Satellite Recycled Water Facilities (SRWFs) located in the vicinity of the uses. The designation of Alternative 1 or 2 were applied to recycled water use in each of the quadrants: the Southwest, Northwest, Northeast and Southeast. The project alternatives are summarized in Table 4.1. The total estimated demand that could be served by each alternative is also listed in Table 4.1, along with treatment flows. Alternatives in the same quadrant do not necessarily have the same demand, as different alignments allow serving different users.

Potential users were grouped into alternatives based on volume of demand and location. The larger users with demands over 100 AFY dictated the proposed pipeline alignments. In general these large users, such as golf courses, cemeteries and parks are located on the edges of town. Serving these larger users created a "backbone" distribution system around the City with spurs into the more densely developed areas to pick up additional users. The identified larger users and their demands are shown in Figure 4.1 along with the proposed backbone distribution system. Groundwater recharge opportunities could also be served by

Table 4.1 Summary of Urban Reuse Project Alternatives Recycled Water Master Plan City of Fresno				
Quadrant/ Alternative	**Demand AFY[1]**	**Treatment Capacity at RWRF (mgd)[1,2]**	**Treatment Capacity at SRWF (mgd)[2]**	**Comments**
SW - 1	4,140/5255	5.5/8.1	-	Served entirely from the RWRF
SW - 2	4,340	1.4	4.1	Served partially from the RWRF and partially from a SRWF at either Fruit & Church or south of Roeding Park
NW - 1	1,951/3,733	5.3/10.4	-	Served entirely from the RWRF
NW - 2	1,709	-	4.7	Served from a new SRWF at Herndon and Hayes
NE - 1	2,720/3,568	3.7/6.1	1.07	Served partially from the RWRF and partially from the North Fresno WRF
NE - 2	508	-	1.07	Served entirely from the North Fresno WRF
NE - 3.A	263	-	0.7	Served from a new SRWF on CSUF campus
NE - 3.B	4,900	-	4.0	Served from a new SRWF at Granite Park
SE - 1	995/1,820	2.8/5.1	-	Served entirely from the RWRF
SE - 2	951	-	3.0	Served from a new SRWF near at the fairgrounds, or a nearby park in SEGA

Notes:
(1) Where numbers are presented as x/y, x is the demand or flow without residential and commercial reuse, and y is the number including residential and commercial reuse. Demands do not include potential for groundwater recharge.
(2) Treatment flows based on maximum day demand of potential urban irrigation and industrial reuse customers.

this distribution system during off-irrigation periods. Groundwater recharge basins could be filled in the winter when urban irrigation demands are minimal.

The backbone distribution system alignments shown in Figure 4.1 were selected based on consideration of the following elements: available right-of-way, utility conflicts, traffic volumes, highway and railroad crossings, jurisdictional agencies and special circumstances.

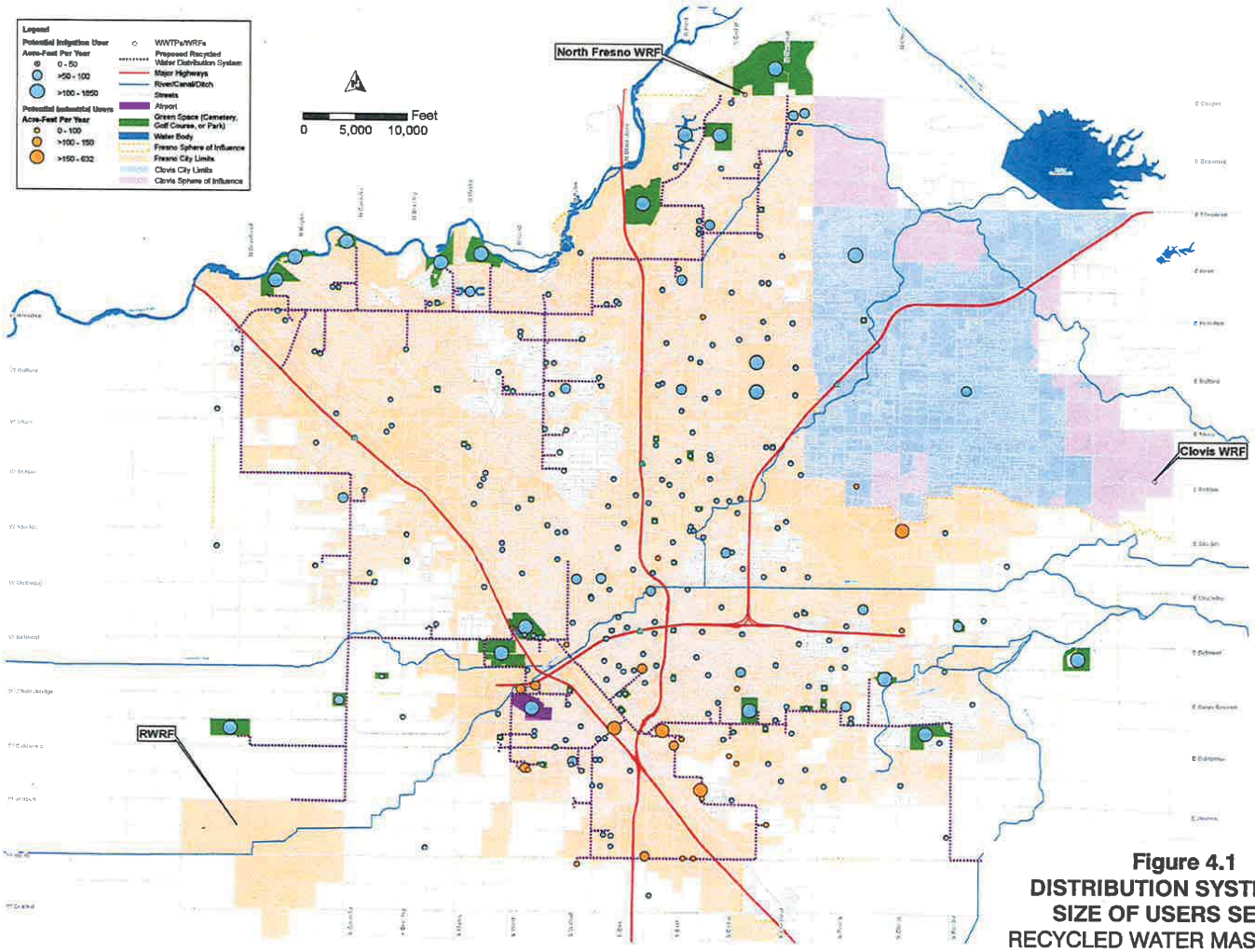


Figure 4.1
DISTRIBUTION SYSTEM AND SIZE OF USERS SERVED
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Although the distribution system was aligned to primarily serve larger users, for Alternative 1 (served from the RWRF) it was sized to accommodate smaller existing and future users as well. For the most part, significant numbers of smaller users cannot be served in Alternative 2 (served from SRWFs) since flows would not be sufficient to serve these smaller users. The additional users served under Alternative 1 include: 1) existing residential and commercial areas, and 2) future residential and commercial areas identified in the latest General Plan. Summarized in Table 4.2 are the potential demands for existing and future residential and commercial areas if all users within a mile of distribution pipeline are served with recycled water for irrigation. It was assumed for residential areas that only front yards would be irrigated with recycled water. Also shown in Table 4.2 are the assumptions of the demands to be served for the purposes of developing cost estimates.

Table 4.2 Potential Irrigation Demand for Existing and Future Residential[1] and Commercial Users within 1 Mile of Distribution System Recycled Water Master Plan City of Fresno

Quadrant	Northeast	Northwest	Southeast[2]	Southwest	Total
Water use if all identified users served (AFY)					
Existing	1552	2628	1212	580	**5968**
Future	288	1876	876	2500	**5544**
Assumption of demand to be served (AFY)					
Existing (1/2 of users)	776	1314	606	290	**2984**
Future (1/4 of users)	72	469	219	625	**1386**
Distribution system (miles)[3]					
Existing (1/2 of users)	31	54	23	15	**123**
Future (1/4 of users)	4	19	9	23	**55**

Notes:
(1) For residential densities up to 5 lots per acre.
(2) Does not include future demands in SEGA planning area.
(3) Distribution system length was estimated by using a ratio of the total length of City's 8-inch potable water system to the total City land area and multiplying this ratio by the area of commercial and residential areas proposed to be served by recycled water.

Once the "back bone" of the distribution system is established for larger recycled water users under Alternative 1, the City has the flexibility to extend laterals up existing residential streets and through commercial areas to serve the smaller users. Since it is not likely that all users will be served, in an effort to not oversize the treatment and distribution system, it was assumed that half of the identified existing residential (with densities up to 5 lots per acre) and commercial users would be served. Specific areas and developments for residential irrigation will be identified in the future. Pipeline cost for serving existing residential and commercial users was estimated to be $700,000/mile, including turnouts to individual users. The average demand for existing residential and commercial users served per mile was estimated to be 25 AFY/mile.

As discussed in earlier chapters, the City's General Plan is in the process of being updated and based on discussions with the planning department there will be a renewed focus on densification in the City. As a result, outlying areas that are adjacent to the proposed distribution system may not be developed as previously identified in the existing General Plan. Therefore, it was assumed that future development demands will be far less (assumed one quarter) of the potential area identified in the General Plan within one mile of the distribution system. It is anticipated that the costs for serving recycled water to future development will be borne by the developer (based on the proposed "Purple Pipe Ordinance").

The existing General Plan also identifies a future high-rise and mid-rise intensification corridor along Highway 41. It was assumed that this corridor would be served with recycled water for toilet flushing. This would offset an additional 200 AFY beyond the demands listed in Table 4.2. Existing and future users are shown in Figures 4.2 and 4.3.

4.2.2 Agricultural Alternatives

There were three agricultural reuse alternatives carried forward for further development in this Master Plan. They were: AG 1 - expanding the existing system to deliver additional undisinfected secondary effluent to local users; AG 2 - expanding deliveries of extracted percolated effluent to FID; and AG 3 - upgrading to tertiary treatment and delivering recycled water to growers for unrestricted reuse. These alternatives are summarized in Table 4.3.

Table 4.3 Summary of Agricultural Reuse Project Alternatives Recycled Water Master Plan City of Fresno

Quadrant/ Alternative	Demand AFY	Tertiary Treatment Capacity at RWRF (mgd)	Comments
AG - 1	4,200	-	No additional treatment is necessary
AG - 2	20,000	-	No additional treatment necessary, but additional facilities for extraction and delivery is required.
AG - 3	20,000	27(1)	Assuming increased extraction of percolate for unrestricted reuse is not permittable by RWQCB. New tertiary facilities required.

Note:
(1) Based on estimated peak day demand.

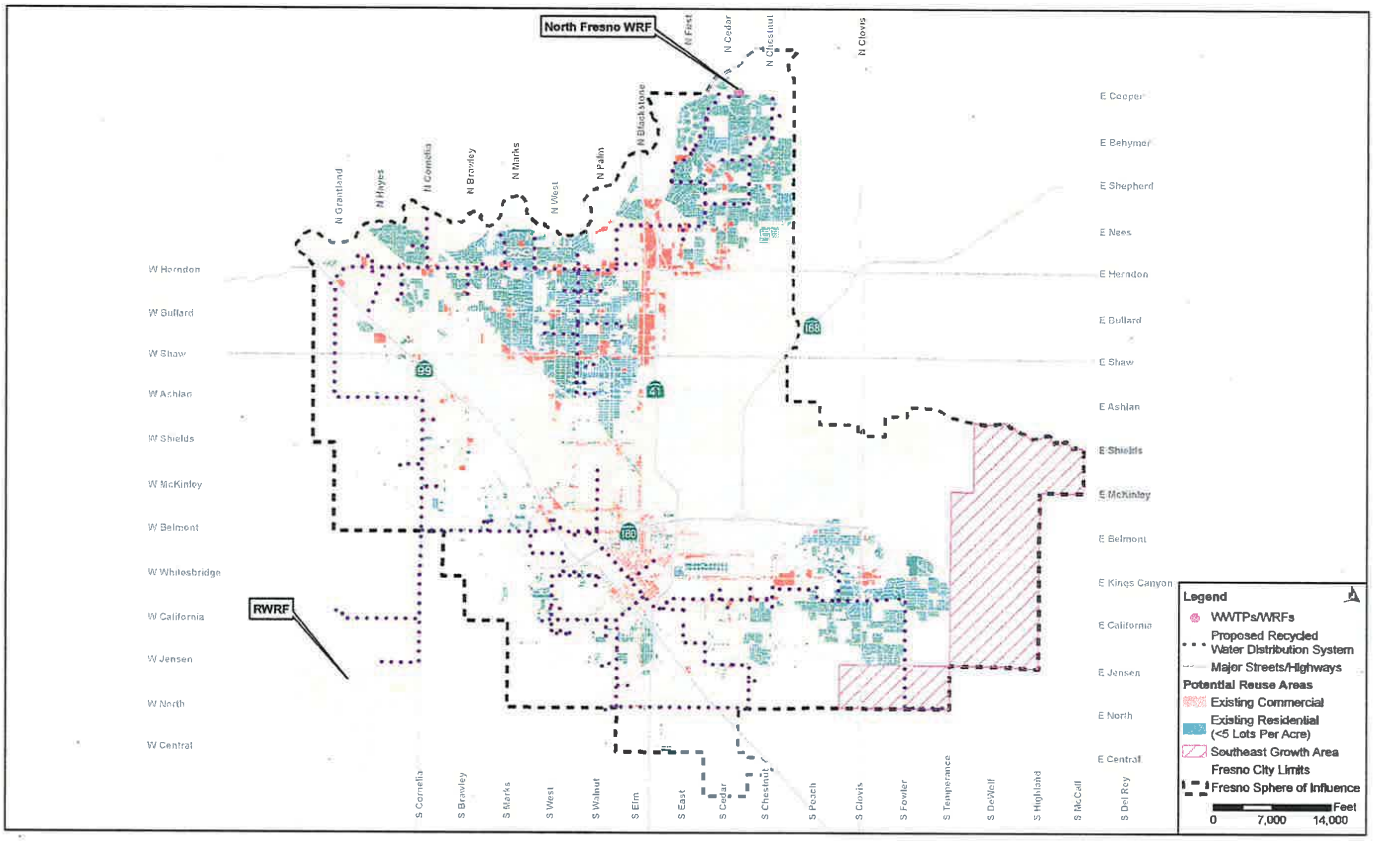


Figure 4.2
EXISTING RESIDENTIAL AND COMMERCIAL DEVELOPMENT
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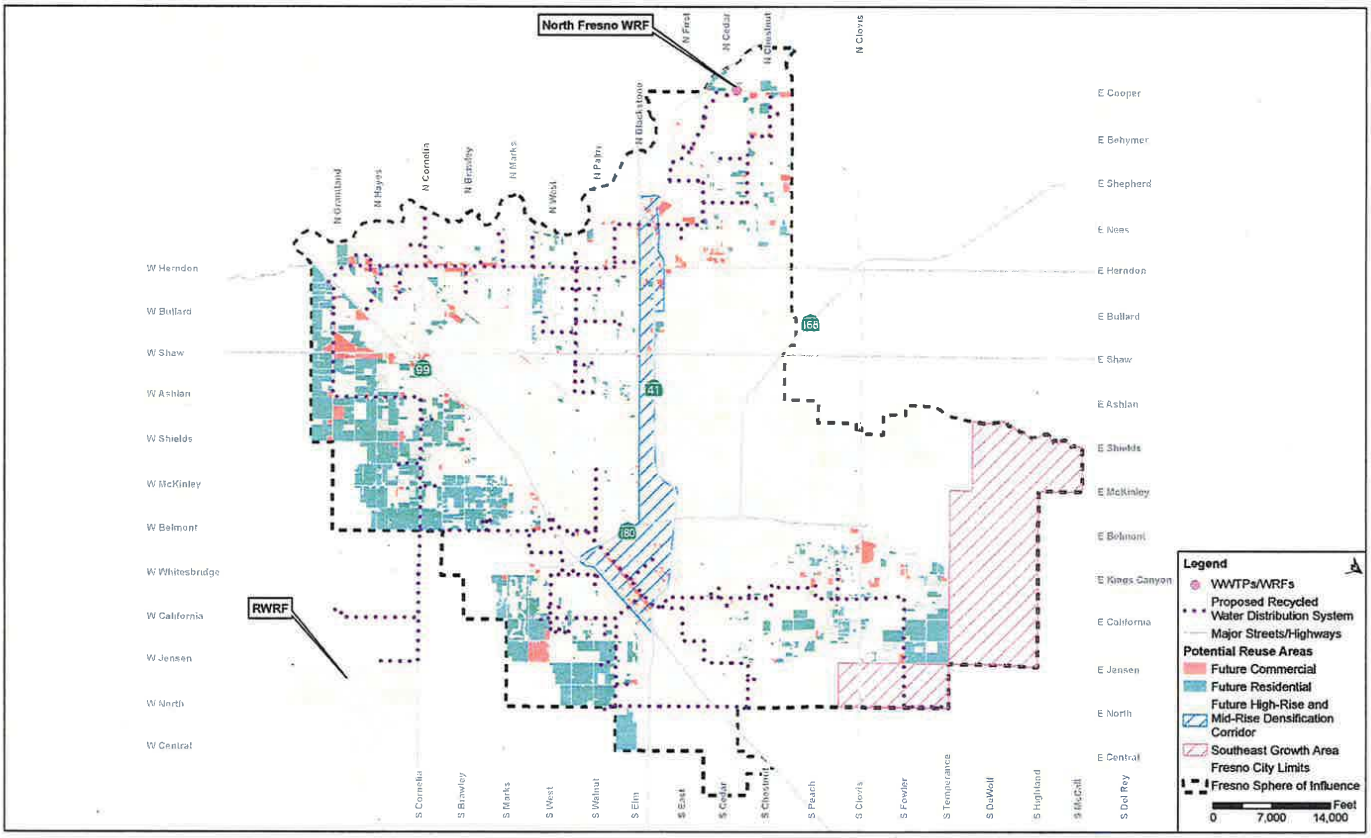


Figure 4.3
FUTURE RESIDENTIAL AND COMMERCIAL DEVELOPMENT
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The agricultural alternatives presented were generally developed assuming separate pipeline systems for urban users and agricultural users. However, in those instances where potential agricultural customers can be served directly from the urban distribution system, they will be.

4.2.3 Groundwater Recharge Reuse Projects (GRRPs)

Groundwater recharge with recycled water presents a significant opportunity for the City to both implement reuse and improve regional water supplies. For these reason, GRRPs are a critical component of the City's Recycled Water Master Plan. The City already utilizes the strategy of recharging surface water and stormwater to recharge the groundwater basin. Including the addition of recycled water to recharge the groundwater basin is a natural extension of this existing strategy. Additional recharge basins will also better leverage the City's ability to recharge existing and future surface water supplies.

In general, GRRPs would be implemented in coordination with the urban reuse alternatives. Treatment requirements for recharge utilizing spreading basins are similar to urban reuse, except that GRRPs require reduction of total nitrogen through nitrification/denitrification.

The urban recycled water distribution system would be utilized to deliver recycled water to the GRRP basins primarily during the winter months when there is little to no urban irrigation demand. For this reason GRRPs are an ideal complement to an urban reuse system to provide year-round reuse and effluent diversification. Diluent water required for GRRPs (as described in Chapter 2) can be provided from surface water or stormwater at any time water is available.

There are challenges to implementing GRRPs including: 1) finding a site with space and adequate detention time to the nearest potable well, 2) identifying and managing diluent water sources, and 3) meeting the conditions required for permitting a GRRP.

The City is developed and has limited open areas of land available for siting recharge basins, with the exception of the outer edges of town, particularly to the west. The City's extensive network of drinking water wells throughout town also complicates the siting of recharge basins, as a six month "travel time" is required between any GRRP basin and the nearest potable well. As part of this Master Plan effort, a reconnaissance-level investigation was conducted to identify potential GRRP sites. The investigation focused on areas of undeveloped lands adjacent to FID canals and/or to existing FMFCD basins, for greater ease of delivering diluent water to the GRRP. A discussion of potential GRRP basin sites is provided in Section 4.5. Once a GRRP site is selected, permitting studies will be required, including tracer studies to demonstrate adequate hydraulic distance between the GRRP basin and the nearest drinking water well.

It is the recommendation of this Master Plan that the City begin acquiring land as soon as possible, develop recharge basins, and begin use of these basins to recharge surface water while the permitting studies are being conducted for approval to recharge recycled water.

4.3 URBAN ALTERNATIVE 1 – RECYCLED WATER SERVED BY RWRF

Urban Alternative 1 utilizes the RWRF to produce and distribute recycled water throughout the City. Figure 4.4 shows an overview of this alternative, including the pipe segments that are considered the system "backbone" and laterals that would serve individual users. The system requirements for serving each individual quadrant of the City are discussed further on in this chapter.

4.3.1 Treatment

Recycled water for urban reuse from the RWRF (or a SWRF) must meet tertiary Title 22 standards, as described in Chapter 2. At the RWRF this will require construction of filtration and disinfection facilities since secondary treatment is already provided. Additionally, projects that include a GRRP component would require nitrification and denitrification (NdN) to less than 10 mg/l total nitrogen. The facilities needed for NdN are discussed in Section 4.5 - Groundwater Recharge.

Alternatives for filtration for the RWRF include cloth filters, media filters or microfilters. Alternatives for disinfection at the RWRF include ultraviolet light (UV) and ozone. Chlorine was not considered a viable disinfectant alternative due to concerns of forming regulated disinfection by products, such as trihalomethanes. However, it is recommended that chlorine be used to maintain a residual in the distribution system for urban reuse, although it is not required. A range of treatment train costs were developed with media filtration paired with UV for a lower cost option, and membranes paired with ozone for a higher cost option. There is adequate room onsite for either of these treatment trains. For the purposes of cost estimates, media filtration + UV was considered the most probable treatment train.

The existing secondary treatment facilities at the RWRF are comprised of sides A, B and C. All three plants are activated sludge processes, with Plant A being the oldest (constructed in the 1970s) and Plant C being the newest (construction completed in 2009). The facilities include aeration basins and secondary clarifiers. Both the B and C plants were designed with the capability to provide nutrient removal. Figure 4.5 shows a potential location for tertiary and disinfection facilities that would draw from any of the secondary treatment trains at the RWRF.

4.3.1.1 Expanding Treatment at the North Fresno WRF

The North Fresno WRF currently serves users in the northeast quadrant of the City and is permitted (ORDER NO. R5-2006-0090-01; NPDES NO. CA0085189) for a discharge of 0.71 million gallons per day (mgd) average monthly flow and 1.07 mgd maximum daily flow. The plant is designed and permitted to produce a denitrified tertiary disinfected effluent with sequencing batch reactors (SBRs), disc filtration, and chlorination. The recycled water demand in the northeast quadrant exceeds the permitted capacity of the North Fresno WRF. Therefore, options to increase the capacity were evaluated.

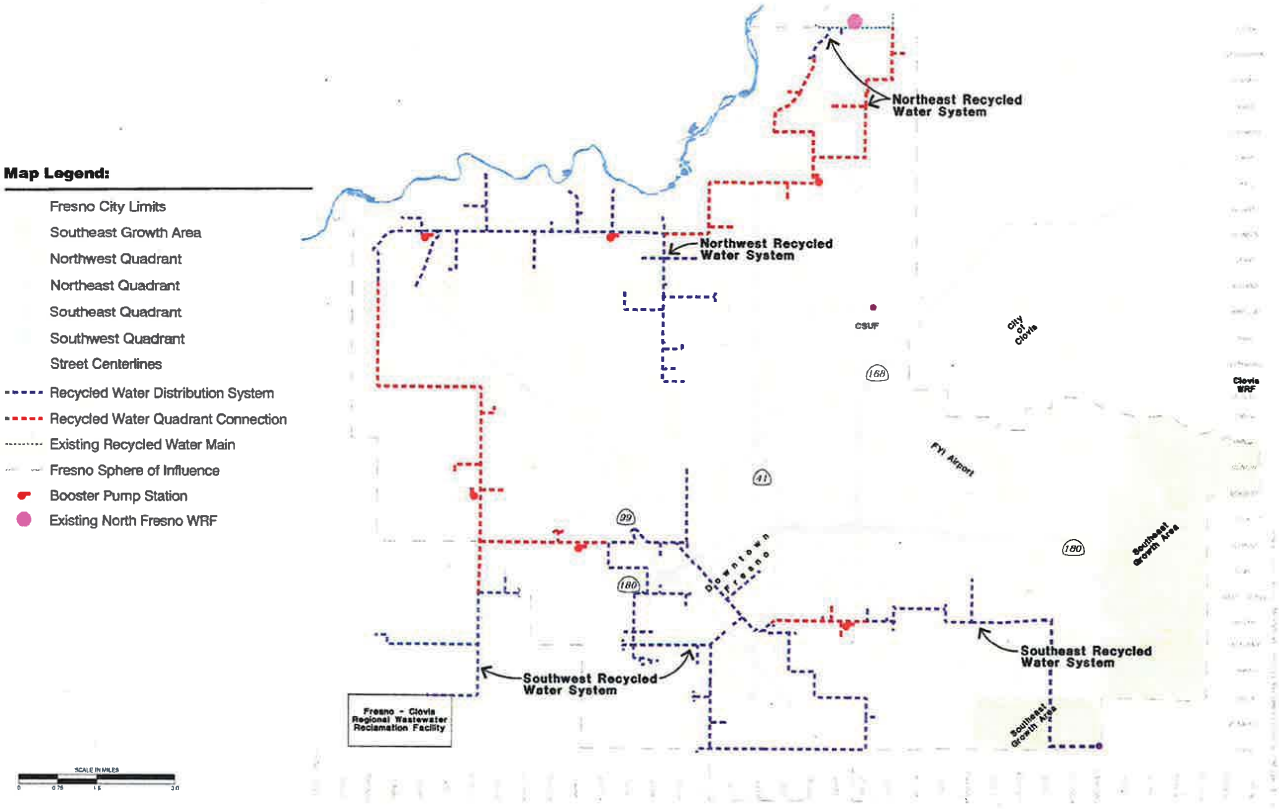


Figure 4.4
OVERVIEW OF ALTERNATIVE 1 DISTRIBUTION SYSTEM
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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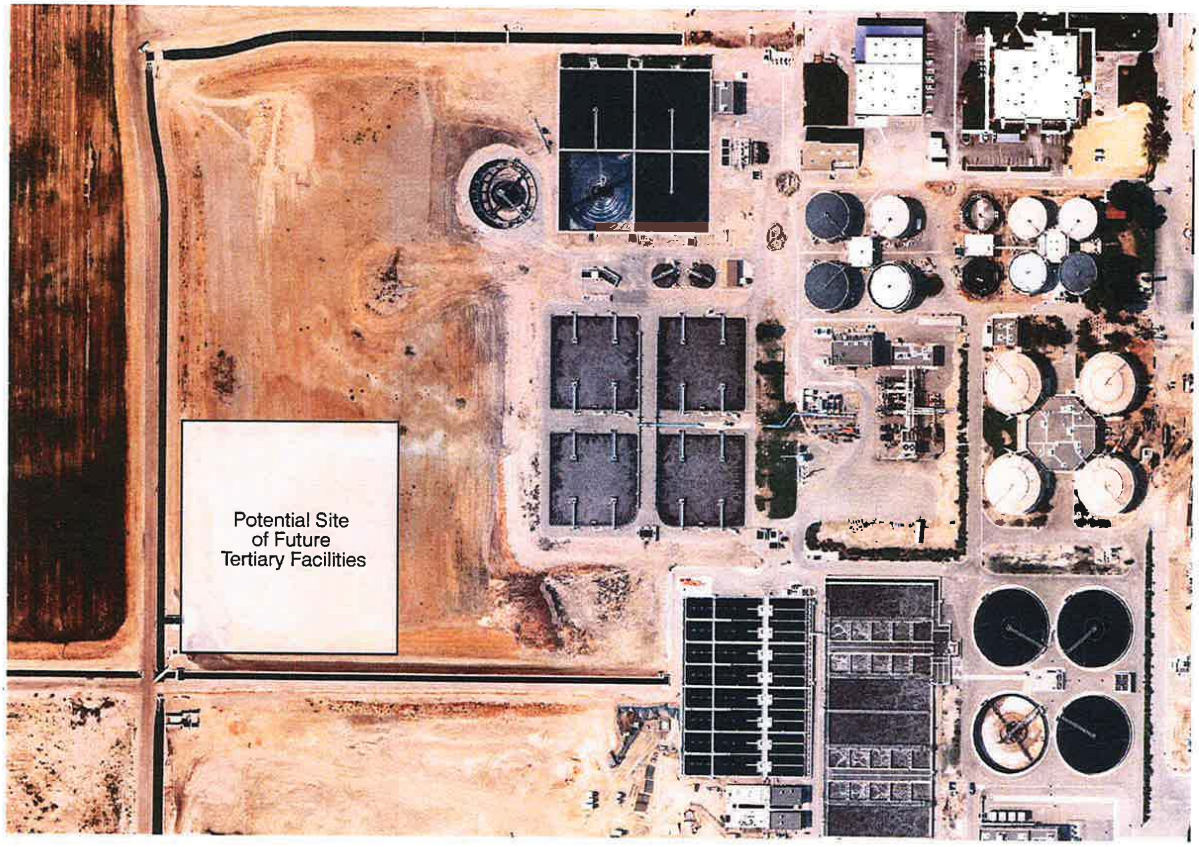


Figure 4.5
A-SIDE/B-SIDE TERTIARY
FACILITIES SITE
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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In order to expand the average monthly treatment capacity to 1.07 mgd, the following facilities would be needed at the North Fresno WRF:

- A second channel grinder and screen at the headworks to match the current equipment.
- Two new SBR basins and associated mixers, decanters, piping, and pumps. (The basins would be built adjacent to SBR units on the north side of the SBR structure.)
- Two new aeration blowers (space is provided for the future blowers adjacent to the existing blowers.)
- An additional post-secondary equalization pump
- Two more filter discs within each package filtration tank.
- Two more effluent irrigation pumps in the existing pump station.
- All other ancillary equipment (piping, electrical, instrumentation, chemical feed, etc.) to make a complete system.

The above improvements assume the following:

- The existing influent lift pumps have adequate capacity to pump the increased flows.
- Peak flows greater than 1.07 mgd can be diverted away from the plant at the influent lift station, and sent to the RWRF.
- The standby generator is adequate for the additional equipment and their loads.

This analysis also assumed the chlorination system, which does not function well, would be replaced as the primary disinfectant with a UV or ozone system to minimize disinfection byproduct formation. Chlorine would likely still be used to maintain a residual in the distribution system for urban reuse, although it is not required.

4.3.2 Storage

Recycled water system storage is a key component of recycled water systems because of the difference in collection system flows, treatment capacity and distribution system demands. Adequate storage addresses the inconsistency of these flows/volumes to allow facilities to be optimally sized to convey and treat average flows as opposed to peak flows.

Influent storage of peak flows is required in cases were minimum sewer flows are below treatment plant capacity. Influent storage would not be required for tertiary facilities at the RWRF since the potential recycled water demands for urban reuse are much smaller than the RWRF's influent capacity.

Effluent storage can provide reliability for when treatment processes are down or can serve peak flow demands above the treatment capacity. Effluent storage needs could be provided by constructing dedicated recycled water storage tanks or by converting one of the existing RWRF percolation ponds to a storage pond with compacted clay or membrane

liner. In either case, the RWRF site is a good location for storage due to the large amounts of available land. Additional storage facilities would also be provided in the distribution system on City-owned land where possible. This distribution system storage would allow flexibility to serve additional users without oversizing the distribution system. It is typical for recycled water distribution systems to have one maximum day of storage, which gives the system the flexibility to deliver peak day demand.

4.3.3 Southwest Alternative (SW1)

Users in the Southwest Quadrant would be served by recycled water generated at the RWRF. The users and distribution systems for this alternative are illustrated in Figure 4.6. Major users in this quadrant are City and County parks, cemeteries, schools, Highway 180, industrial users, and existing and future residential and commercial development. Recycled water for indoor dual plumbing in the Highway 41 mid- and high-rise intensification corridor would be supplied in the future as part of this alternative.

Treatment flows required for SW1 are 5.5 mgd for the identified large urban users, or up to 8.1 mgd if existing and future residential and commercial irrigation is implemented. These flows represent the combined maximum day demand for the users identified in this quadrant. As mentioned previously, because the capacity of the RWRF is greater than the recycled water demand of the system, influent storage would not be required.

The irrigation customers or industries in the Southwest quadrant do not have onsite storage, therefore effluent storage at the RWRF site or distribution system storage would need to be provided. Approximately one day at maximum month demand, or 8.1 million gallons (MG) of total storage would be required.

4.3.4 Northwest Alternative (NW1)

Alternative NW1 would extend the SW quadrant backbone pipeline north to serve users in the northwest quadrant. The distribution system would connect to major golf courses, schools, parks in the area, Highway 99 median landscaped areas, and existing and future residential and commercial development. Shown on Figure 4.7 are the users' locations and potential distribution system routes.

For NW1, all flows would be treated at the RWRF and no influent storage would be required. The recycled water demand identified for this quadrant was 5.3 mgd to serve large urban users, or up to 10.4 mgd if existing and future residential and commercial irrigation is implemented.

The golf courses identified as potential recycled water customers in the northwest region have onsite storage in the form of ponds. An additional 6.9 MG would need to be added to provide one day of storage for other users. The storage facilities would be divided between the RWRF and a new facility on City owned land near Herndon and Hayes.

Distribution System Summary

	Length of Pipe	Recycled Water Delivered*
Pipeline No. 1	13.15 mi	1,423 acre ft / yr
Pipeline No. 2	2.17 mi	368 acre ft / yr
Pipeline No. 3	1.44 mi	95 acre ft / yr
Pipeline No. 4	4.78 mi	1,129 acre ft / yr
Pipeline No. 5	3.08 mi	362 acre ft / yr
Pipeline No. 6	2.63 mi	194 acre ft / yr
Pipeline No. 7	3.28 mi	131 acre ft / yr
Pipeline No. 8	2.96 mi	140 acre ft / yr
Pipeline No. 9	2.79 mi	283 acre ft / yr
Total:	36.28 mi	4,125 acre ft / yr

*No agricultural or future demand included in calculations.

Map Legend:

- Airports
- Cemeteries
- Fresno City Limits
- Parks & Golf Courses
- Schools
- Water Bodies & Ponds
- Heavy Industrial User
- Light Industrial User
- Fresno Sphere of Influence
- Street Centerlines

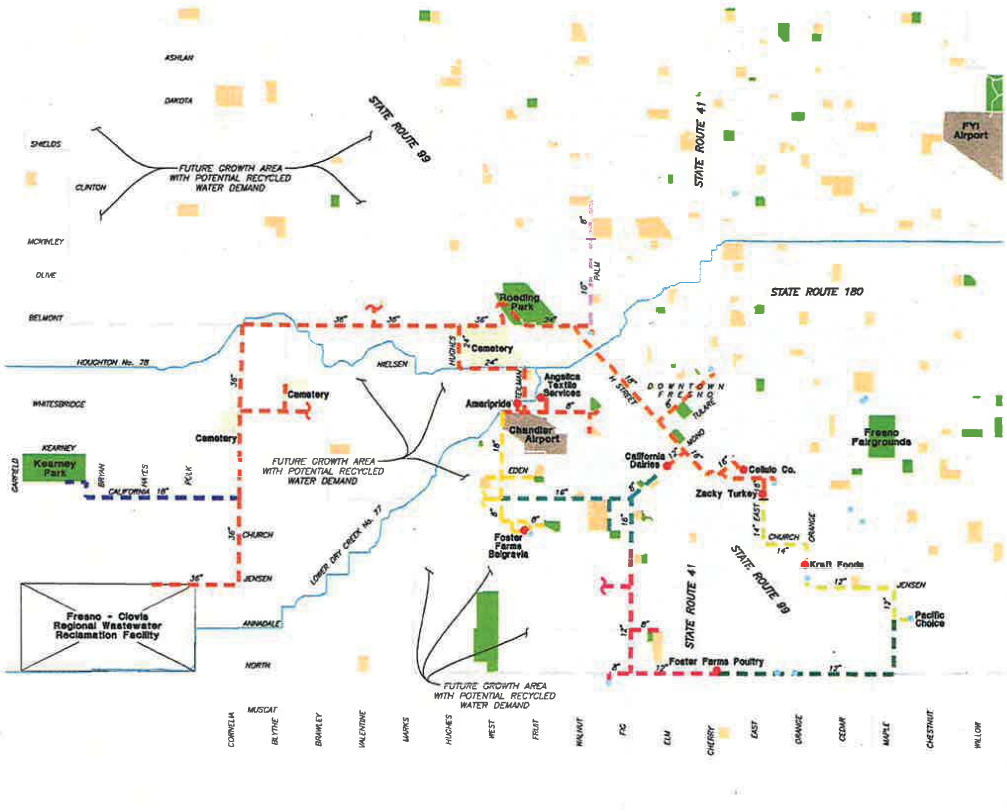


Figure 4.6
SOUTHWEST PROJECT ALTERNATIVE 1
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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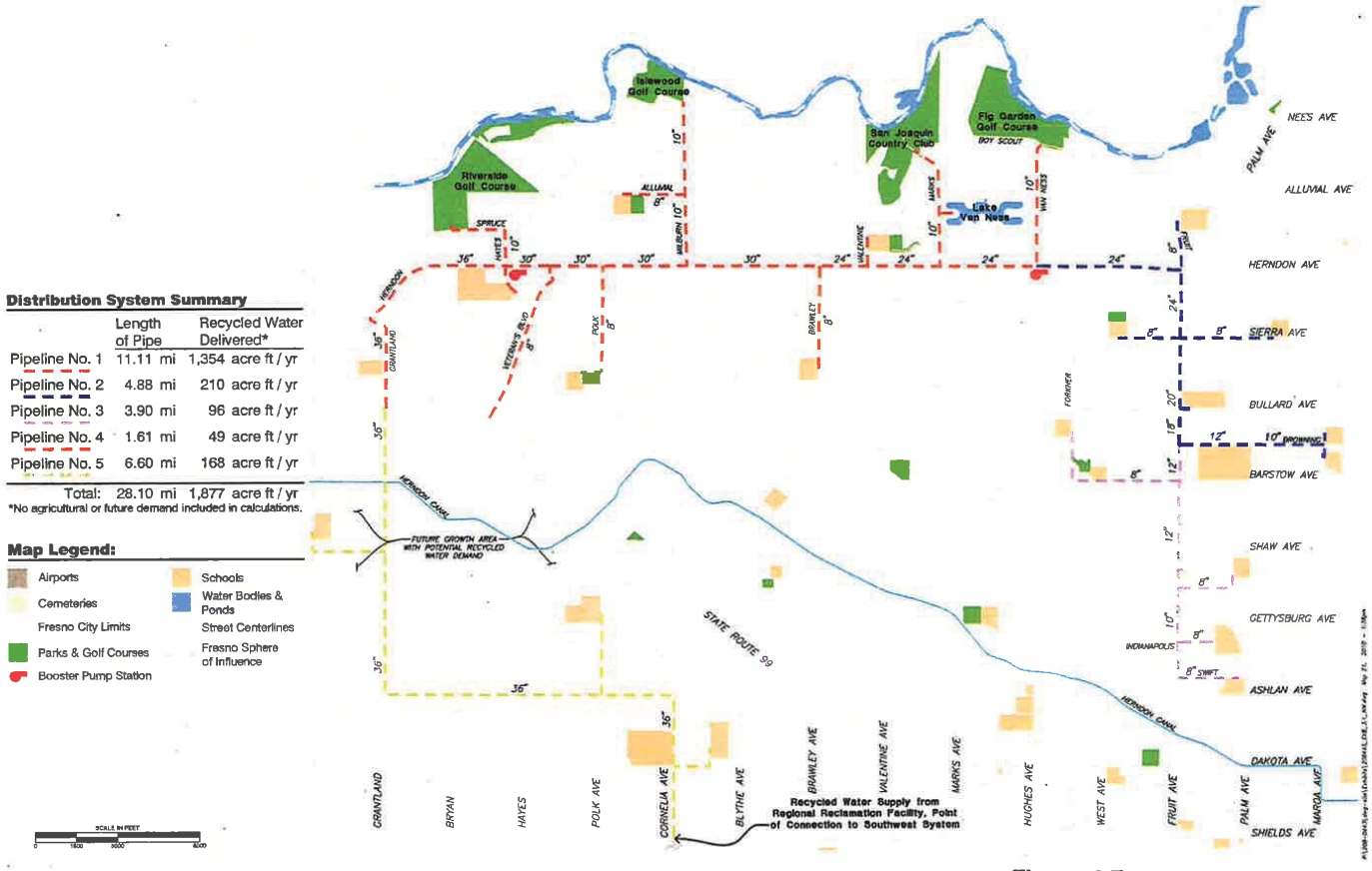


Figure 4.7
NORTHWEST PROJECT ALTERNATIVE 1
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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4.3.5 Northeast Alternative (NE1)

Alternative NE 1 would be a hybrid alternative that includes serving the NE quadrant from both the RWRF and the North Fresno WRF to supply larger users including Woodward Park, Highway 41 irrigated areas, golf courses, local schools, and existing and future residential and commercial development. Shown on Figures 4.8 are the users' locations and potential distribution system routes for this alternative.

The existing North Fresno WRF would be expanded from its existing permitted average monthly capacity of 0.71 mgd to an average monthly capacity of 1.07 mgd by expanding the existing SBR and disc filter treatment technologies. To increase the flows at the North Fresno WRF, sewer lift station #6 would be rerouted to direct more wastewater to the North Fresno WRF to increase its recycled water production capacity. It was assumed that existing storage facilities at the North Fresno WRF would be used, so no additional storage for influent or effluent would be required at that facility.

The RWRF would provide additional treatment of 3.7 mgd for the larger urban users not served by the North Fresno WRF, or up to 6.1 mgd if existing and future residential and commercial irrigation users are served. The backbone pipeline from the RWRF would be extended from the northwest quadrant east of Highway 41. Approximately 6.1 MG of additional effluent storage would be required in the northeast quadrant for the area served from the RWRF.

A backbone pipeline was initially proposed to extend down Herndon Avenue, from Palm Avenue to Cedar Avenue and south to serve the CSUF campus. This alternative was discarded due to dependency on the entire backbone pipeline, and length of time required to implement.

4.3.6 Southeast Alternative (SE1)

SE1 would extend the backbone pipeline from the Southwest Quadrant to serve users in the southeast. The distribution system would serve nearby parks, schools, Fresno Pacific University, the Sunnyside Golf Course, irrigated areas on Highways 41 and 99, and existing and future residential and commercial development. As discussed in Chapter 1, while SE 1 includes potential future users in the southeast quadrant of the City service area, it does not include recycled water delivery to the future SEGA development. The proposed SE distribution system is illustrated on Figure 4.9. The backbone piping system in the southeast quadrant was not extended to the north as all the identified larger users, such as Airways Golf Course and Palm Lakes Golf Course, have been abandoned or are no longer in use.

For SE 1, flows would be treated at the RWRF, so no influent storage would be required. The RWRF would provide additional treatment of 2.8 mgd for larger urban users, or up to 5.1 mgd if existing and future residential and commercial irrigation are served. These flows would be in addition to the demands in the other quadrants.

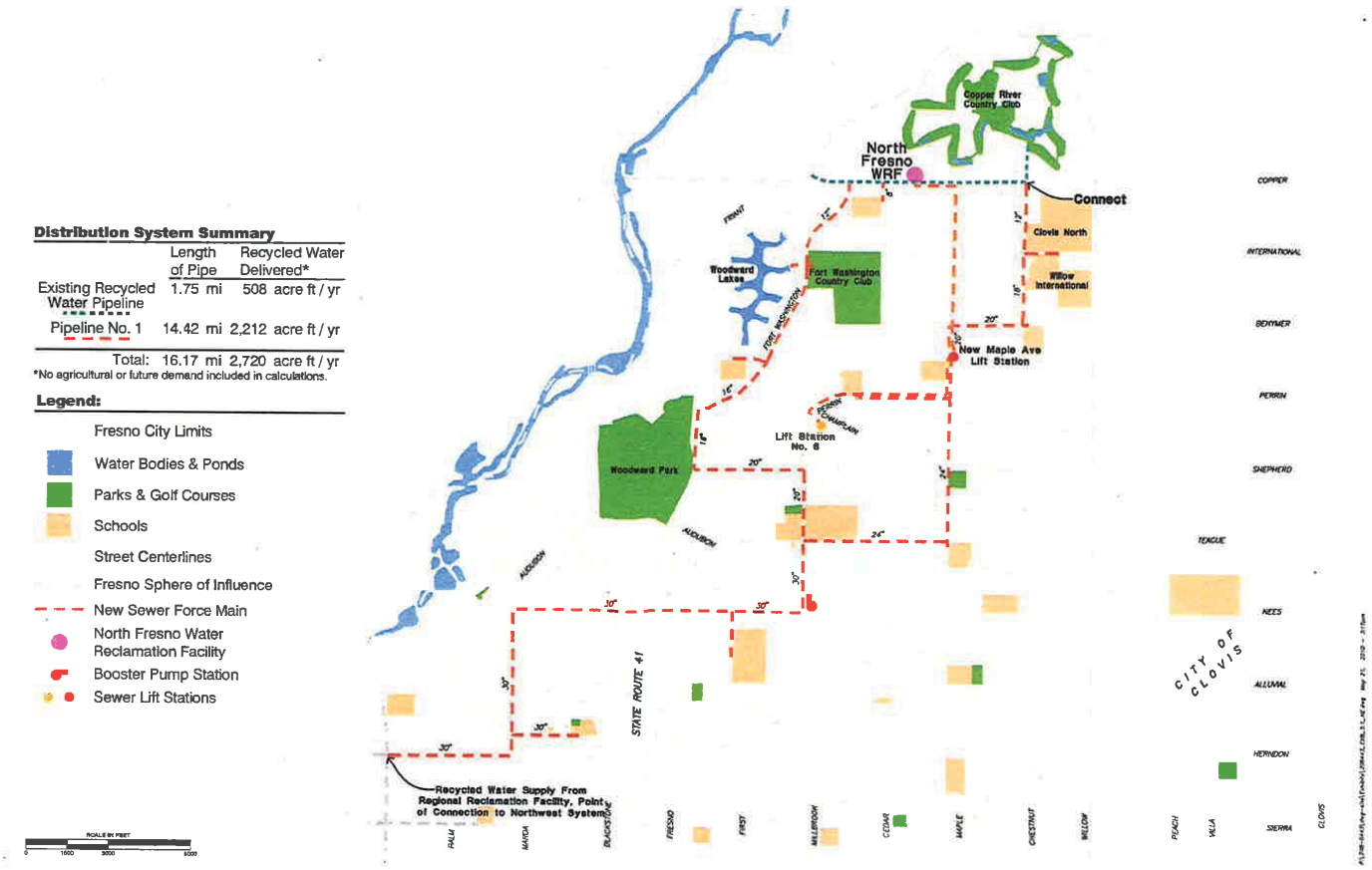


Figure 4.8
NORTHEAST PROJECT ALTERNATIVE 1
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Distribution System Summary

	Length of Pipe	Recycled Water Delivered*
Pipeline No. 1	3.24 mi	554 acre ft / yr
Pipeline No. 2	1.26 mi	330 acre ft / yr
Pipeline No. 3	0.86 mi	111 acre ft / yr
Total:	7.35 mi	995 acre ft / yr

*No agricultural or future demand included in calculations.

Map Legend:

- Fresno City Limits
- Parks & Golf Courses
- Schools
- Southeast Growth Area
- Street Centerlines
- Booster Pump Station
- Clovis Water Reclamation Facility
- Heavy Industrial User
- Existing Recycled Water Pipeline
- Fresno Sphere of Influence

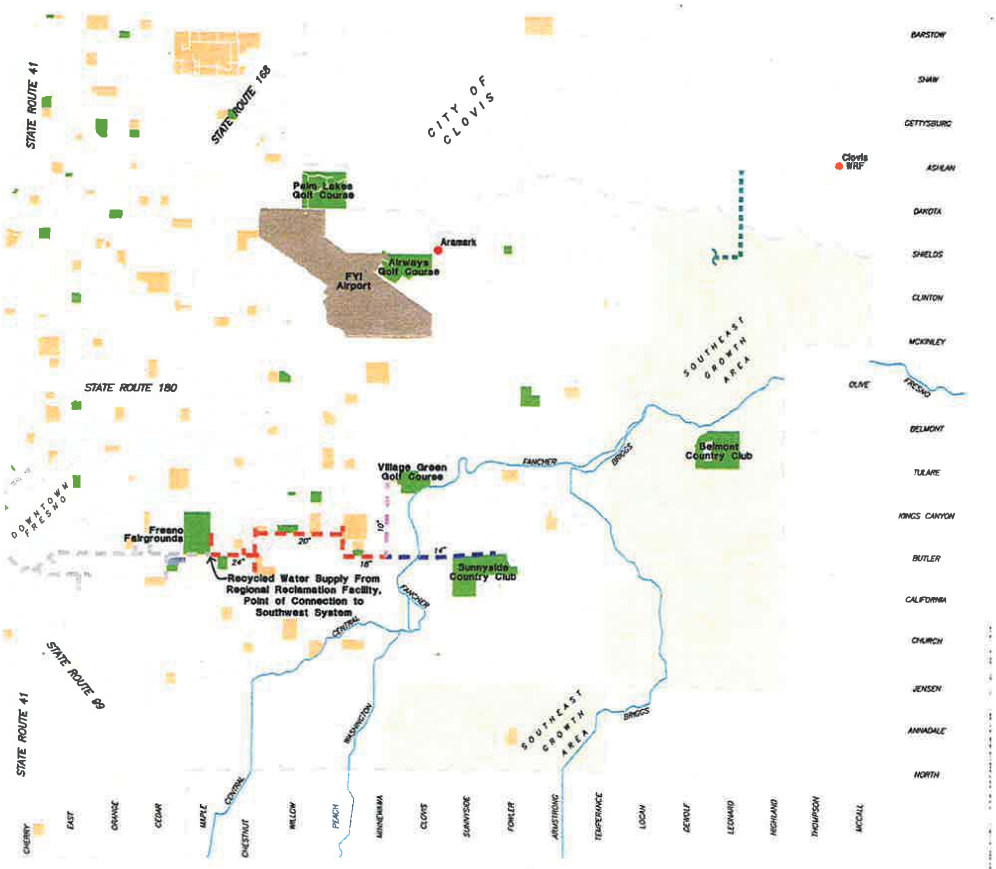


Figure 4.9
SOUTHEAST PROJECT ALTERNATIVE 1
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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To serve the SE demands, approximately one day of effluent storage (approximately 5.1 MG) would be needed. This storage could be divided up between storage at the RWRF and distribution system storage on other City owned lands in the SE quadrant.

4.3.7 Costs for Urban Alternative 1 – Served by the RWRF

Conceptual level cost estimates for project alternatives served from the RWRF are presented in Table 4.4. These costs are construction costs which include an appropriate planning level contingencies for treatment facilities and the distribution system. Costs are presented in January 2010 dollars (ENR 8660).

Table 4.4 Cost Estimates for Urban Alternatives 1 Served from RWRF (in Millions)[1] Recycled Water Master Plan City of Fresno

	Alternative	Distribution System			Treatment [2]	Storage [3]	Total
		Backbone	Spurs	Total			
Capital Costs ($M)	SW1	22	27	49	12	7	68
	NW1	37	13	50	9	6	65
	NE1	24	12	40[4]	11	5	56
	SE1	13	4	17	6	4	27
O&M Costs ($M/yr)	SW1	-	-	0.3	0.4	0.2	0.9
	NW1	-	-	0.2	0.3	0.2	0.7
	NE1	-	-	0.2	0.7	0.2	1.1
	SE1	-	-	0.1	0.2	0.2	0.5

Notes:
(1) All costs presented in January 2010 dollars (ENR 8660).
(2) Low cost alternative is presented here, and is media filtration + UV. High cost alternative is microfiltration + ozone and is included in Appendix F. Treatment costs include feed pump station. Costs do not include treating flows for residential and commercial irrigation.
(3) Assuming half the storage is provided by a new facility on City-owned property outside of the RWRF land.
(4) Includes $4M to reroute lift station 6 and increase flow at North Fresno WRF.

Costs are based on the following assumptions:

- Except for the North Fresno WRF, costs are based on serving the City from the RWRF
- Distribution costs build on each other. For example, NW 1 assumes that the SW 1 distribution system and treatment facilities are already in place
- NW 1 and NE 1 are consecutive phases of the distribution system that are served from the SW 1 pipeline
- SE 1 also builds on the SW 1 distribution system but does not include service to SEGA

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- Feed pump station is included in treatment cost estimate, and recycled water delivery pump station is included in distribution system pump station cost estimate.
- Storage costs at sites other than the RWRF are based on welded steel tanks. Costs do not include land acquisition.
- More detailed cost information is provided in Appendix F.

4.4 URBAN ALTERNATIVE 2 - SERVED BY SRWF

As an alternative to serving all users from the RWRF, Alternative 2 serves urban users through a combination of satellite facilities (or SRWFs), and tertiary treatment at the RWRF. Where possible, facilities will be sited on land already owned by the City to minimize land acquisition costs (approximately $45,000 per acre).An overview of the distribution system for Alternative 2 is shown in Figure 4.10. Figure 4.10 shows both the distribution system "backbone" and the spurs that will deliver recycled water to individual users.

Because sewer flows are lower in outlying areas compared to influent flows at the RWRF, fewer users can be served from the SRWFs. In general, there is insufficient flow to serve significant numbers of residential and commercial areas if larger users are prioritized. Because of these lower sewer flows, a SRWF in the southeast quadrant would be the only system that could potentially also serve residential and commercial irrigation users.

4.4.1 Treatment for SRWFs

Tertiary treatment at the RWRF was discussed under Alternative 1 (Section 4.3). In contrast to the RWRF options where only filtration and disinfection are required, for SWRFs new treatment plants are required. New SWRFs would include preliminary treatment (screening and grit removal), primary treatment, secondary treatment, disinfection, odor control, a distribution system pump station, and operations building. Other requirements would include: architecture/landscaping, standby power, SCADA (Supervisory Control and Data Acquisition) and site work/yard piping. It is proposed that solids from these satellite plants would be sent to the RWRF for treatment. As a result, the SRWFs would not provide solids treatment. Sewer flows beyond the capacity of the SRWFs would be sent to the RWRF. Also if the SRWF is not operated year round, sewer flows would be conveyed to the RWRF during non-operational periods.

Considerations for selection of treatment processes for SRWFs include:

- Selection of technologies with a small footprint to best fit into developed residential neighborhoods
- Use of alternative disinfection (other than chlorine - with the exception of providing a residual for the distribution system).
- Use of modular systems that allow future expansion.
- Selection of tertiary treatment that meets Title 22 standards.

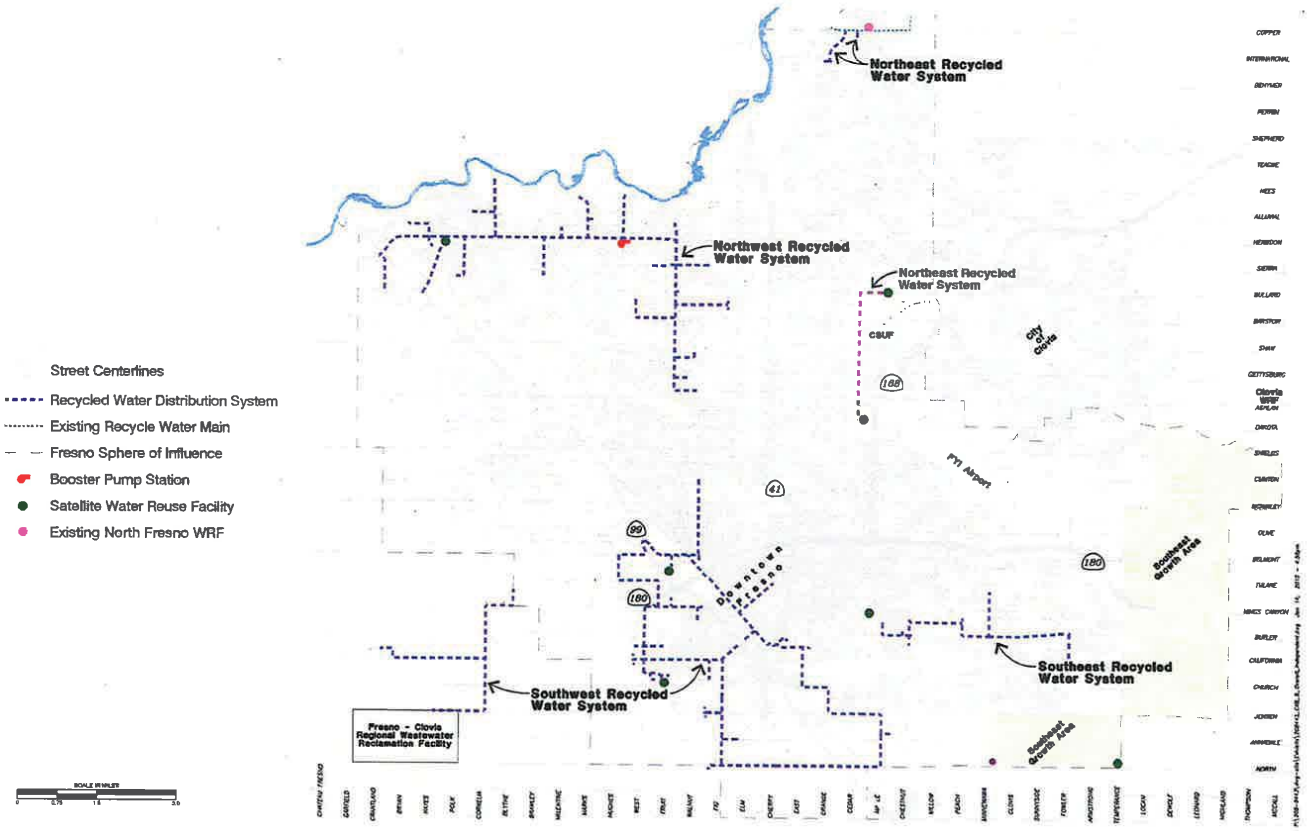


Figure 4.10
OVERVIEW OF ALTERNATIVE 2 DISTRIBUTION SYSTEM
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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- Use of nitrification and denitrification for potential groundwater recharge.
- Bypass of the SRWF when sewer flows exceed storage and treatment capacity.
- Storage and discharge back to the sewers of treated flows in excess of recycled water demand.

Using these criteria, a range of treatment trains was developed. A nitrifying/denitrifying (NdN) activated sludge process followed by media filtration and UV was selected as the lowest cost alternative, and a membrane bioreactor (MBR) followed by ozone was selected as the highest cost alternative. The MBR/ozone alternative produces a higher quality effluent that may be more suitable for meeting future regulations, but both alternatives produce tertiary water that meets current regulations. MBR treatment provides both secondary and tertiary treatment. The MBR alternative has significantly smaller footprint that would provide more flexibility for siting the plant in residential areas.

Treatment trains were selected for cost estimates of SWRF as follows:

- Where there is sufficient space to build an activated sludge facility, the most likely treatment train was considered to be activated sludge + media filtration + UV.
- Where space is constrained, the most likely treatment train was considered to be MBR + UV.

The improvements needed to expand the North Fresno WRF were discussed in Section 4.3.1.

4.4.1.1 Footprint for SRWFs

Footprint could be a major consideration when selecting treatment processes for SRWFs. While MBR facilities are more expensive than conventional wastewater treatment plants, they are often chosen for satellite facilities in urban areas due to their small footprint. If the footprint is small enough, it is desirable to minimize neighborhood impacts by building the facility below grade or in a contained building. While activated sludge with NdN is the lower-cost alternative for SRWF technology, it is more difficult to site and more difficult to contain because of its larger footprint.

Table 4.5 lists the area requirements for the two different technologies with respect to the different SRWF alternatives. These footprint requirements are planning level estimates. Actual area requirements will depend on the final site layout. Alternatives NE1 and NE2 utilize the existing North Fresno WRF site, and therefore, are not shown in Table 4.5.

4.4.2 Storage

Flow considerations for SRWFs include balancing variable sewer flows and recycled water demand; flow required for minimum recycled water flow conveyance; flow equalization to maintain biological processes; solids disposal; and effluent disposal during wet weather.

Table 4.5 Space Requirements for SRWFs Recycled Water Master Plan City of Fresno			
Alternative	Capacity (mgd)	MBR footprint (acres)[1]	Activated Sludge with NdN footprint (acres)[2]
SW 2	4.1	2.2	8.1
NW 2	4.7	1.9	6.8
NE 3.A	0.7	1.0	1.6
NE 3.B	4.0	2.2	8.1
SE 2	3.0	1.7	6.0

Notes:
(1) Includes headworks, MBR, UV chamber, odor control facility, blower building, effluent pump station, electrical building, control building, influent storage, effluent storage.
(2) Includes headworks, primary clarifier, activated sludge with NdN, secondary clarifier, microfilters, UV chamber, odor control facility, blower building, effluent pump station, electrical building, control building, influent storage and effluent storage.

4.4.2.1 Flow Diversion from the Collection System

All of the alternatives with SRWFs involve scalping flow from the existing collection system. SRWFs must be carefully located to ensure that they have access to an existing sewer trunk with sufficient flow to supply recycled water demands of the users. In addition to meeting the recycled water demands, adequate flow must be maintained in the sewer to provide a scour velocity and to convey solids generated at the SRWF back to the RWRF. Alternatively solids from the SRWF could be trucked to the RWRF. Calculations for storage requirements at SRWFs were based on preliminary flow monitoring data and sewer models. Flow monitoring in the collection system near potential extraction points is currently ongoing to ascertain that there are sufficient flows in the collection system for scalping the desired recycled water flows.

The flow scalping for the alternative NE3.B will possibly have multiple benefits, including a relief from sewer surcharging in the Orange Avenue trunk sewer system. There will be avoided cost benefits from the future sewer improvements required along this trunk to prevent surcharging. The proposed alternative has the ability to scalp up to 4.0 mgd.

4.4.2.2 Influent Flow and Storage at SRWFs

For project alternatives SW 2, NW 2 and NE 3, estimated minimum sewer flows were less than the planned capacity for the SRWFs. Therefore, influent storage at the SRWFs or up-sizing the treatment plant and increased effluent storage would be necessary to maximize reuse. Influent storage is the preferred of these two options because it allows the SRWF to operate at capacity at night and serve the identified users. Figure 4.11 conceptually illustrates this SWRF operational concept.

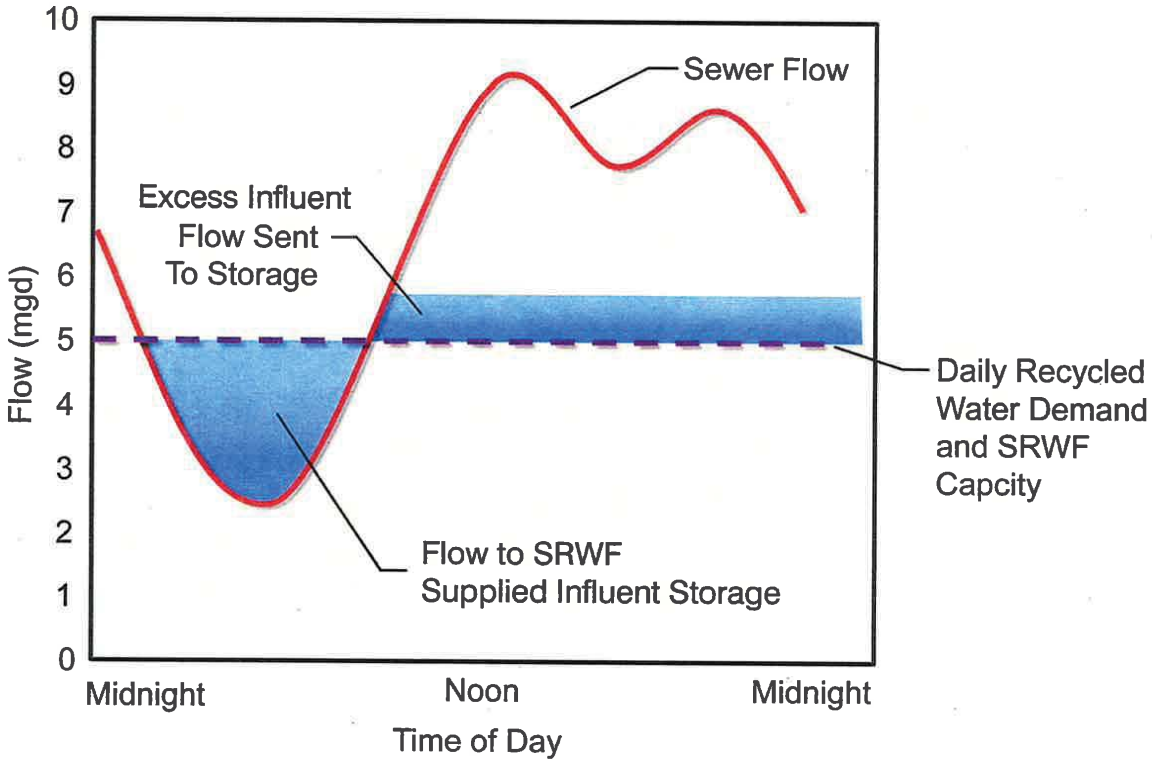


Figure 4.11
INFLUENT STORAGE TO MAXIMIZE REUSE AT SRWFs
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Influent storage has the risk of producing odors and likely additional maintenance (regular cleaning). Any influent storage at a satellite facility would need to be covered to reduce impacts to adjacent neighbors. Sewer flows in each of the potential SWRF locations are being verified by ongoing flow monitoring, which will be used to determine storage requirements.

4.4.2.3 Effluent Flow and Storage at SRWFs

Typically, recycled water demand for irrigation is highest during times when wastewater flows are lowest (i.e., night-time hours). Therefore effluent storage is required to balance out the supply and demand. For the purpose of estimating effluent storage needs, it was assumed that recycled water would be produced constantly throughout the day, and used by irrigation users for eight hours/day during the night. Similarly it was assumed that industrial users would require recycled water for eight hours/day during the day. Some potential recycled water users have onsite storage that would reduce the storage needs at the SRWFs. It is typical for recycled water distribution systems to have one maximum day of storage, which gives the system the flexibility to deliver peak day demand.

During wet weather periods, the recycled water produced at the SRWF would exceed the recycled water demand. Alternate effluent disposal would be required during these periods. Disposal alternatives include discharge to the trunk sewer for re-treatment at the RWRF, groundwater recharge, discharge to the Fresno Irrigation District (FID) irrigation canals, or a combination of the same. Another alternative would be for the SRWF to be operated only during the irrigation season, in which case the plant would be required to be started up and reconditioned prior to the irrigation season each year.

4.4.3 Southwest Alternative (SW2)

Users in the Southwest Quadrant would be served by satellite facilities located either south of Roeding Park or at a parcel that is owned by the City at the intersection of Fruit Ave. and Church Ave. Larger users for this alternative are similar to users identified for SW1 and include parks, cemeteries, schools, industries, highway medians, City Hall and other government building, and redevelopment uses in the downtown area. The users and distribution systems for this alternative are illustrated on Figure 4.12.

SW2 requires a portion of the flow to be treated at the RWRF, and the remainder of flow to be treated at a SRWF. The total potential demand served in this quadrant is 4,340 AFY.

As illustrated in Figure 4.9, influent storage is required at SRWFs where minimum daily sewer flows are lower than the average daily flow to the treatment facility. Based on flow monitoring date, it is estimated that the daily minimum sewer flow is 3.0 mgd near the site south of Roeding Park, and 4.2 mgd near the Fruit Ave and Church Ave site, whereas the SWRF capacity would be 4.1 mgd in either location (based on the maximum day demand of identified users). Influent storage of approximately 370,000 gallons would be required for a SRWF south of Roeding Park, and no storage would be required for a SWRF at Fruit Ave.

Distribution System Summary

	Length of Pipe	Recycled Water Delivered*
Pipeline No. 1	3.84 mi	145 acre ft / yr
Pipeline No. 2	2.17 mi	368 acre ft / yr
Sub-total:	6.01 mi	513 acre ft / yr
Pipeline No. 3	5.49 mi	1,277 acre ft / yr
Pipeline No. 4	1.44 mi	95 acre ft / yr
Pipeline No. 5	4.78 mi	1,129 acre ft / yr
Pipeline No. 6	3.08 mi	362 acre ft / yr
Pipeline No. 7	2.63 mi	194 acre ft / yr
Pipeline No. 8	3.28 mi	131 acre ft / yr
Pipeline No. 9	2.96 mi	155 acre ft / yr
Pipeline No. 10	2.79 mi	283 acre ft / yr
Sub-total:	26.45 mi	3,626 acre ft / yr
Total:	32.46 mi	4,139 acre ft / yr

*No agricultural or future demand included in calculations.

Map Legend:

- Airports
- Cemeteries
- Fresno City Limits
- Parks & Golf Courses
- Schools
- New Satellite Recycled Water Facility
- Heavy Industrial User
- Light Industrial User
- Street Centerlines
- Fresno Sphere of Influence

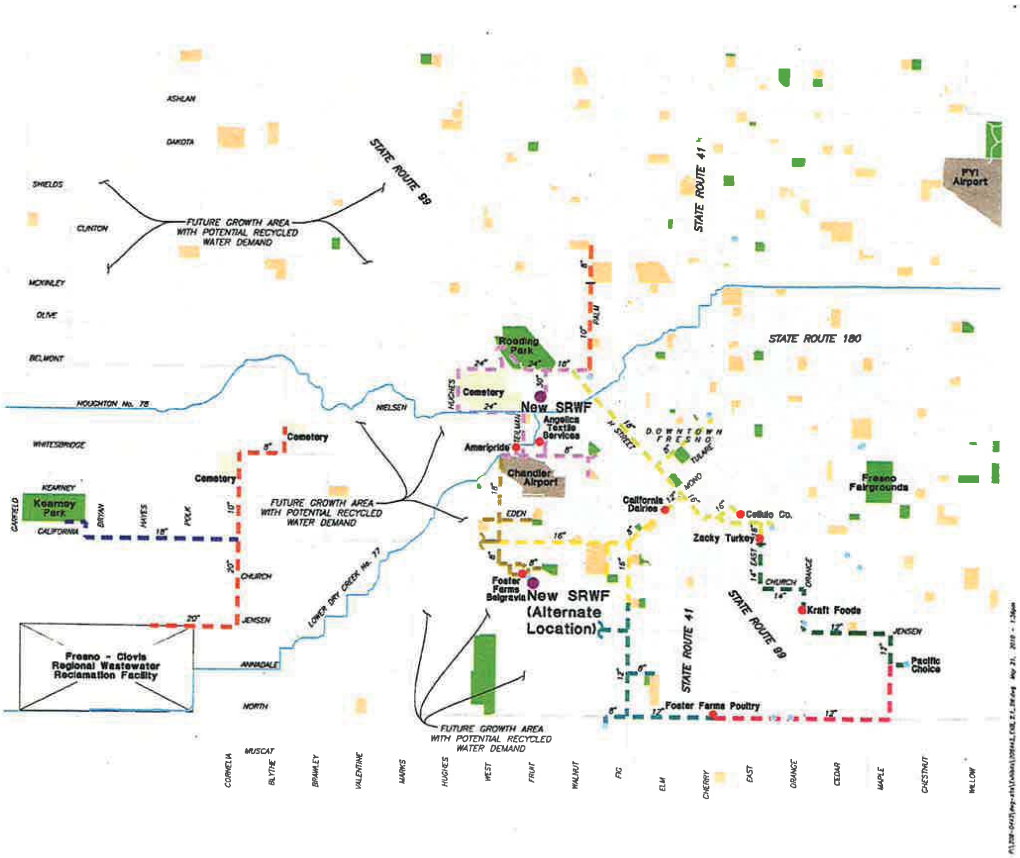


Figure 4.12
SOUTHWEST PROJECT ALTERNATIVE 2
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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and Church Ave. (since minimum sewer flows at that location are larger than the flows required at the SRWF). Sewer flow curves from monitoring data are presented in Appendix F.

Similar to SW1, a maximum day flow of 5.5 MG of effluent storage would be required for SW 2 to serve the identified larger urban users. 4.1 MG of new storage would need to be constructed in proximity to the distribution system served by the SWRF at either the site south of Roeding Park, or at the site at Fruit Ave. and Church Ave. The remaining 1.4 MG could be stored at the RWRF.

The City owns the site at Fruit and Church Ave., however, this site is not large enough for a satellite facility to treat the 4.1 mgd. Therefore, either more land (approximately 0.7 acres for an MBR facility) would need to be acquired, or the facility could be constructed underground in a "stacked" treatment configuration, which would greatly increase construction costs. Approximately 17.4 acres of land would need to be purchased if a SWRF was built at the site near Roeding park.

4.4.4 Northwest Alternative (NW2)

NW2 would serve the northwest quadrant from a new satellite facility, which could be located on a city-owned parcel to the southwest of Herndon Ave and Hayes Ave. The users served would be similar to NW 1, consisting of golf courses, parks and schools. Due to the lack of adequate sewer flows, no future or existing residential and commercial users would be served. Figure 4.13 shows the users' locations and potential distribution system routes for NW2.

Flows for NW2 would be treated at a SRWF sized for 4.7. This flow is less than flows identified for NW1 because for NW1 additional recycled water uses would be served by the backbone pipeline from the RWRF extending from the Southwest quadrant.

The peak day urban demand for the SWRF is 4.7 mgd, however, the daily minimum sewer flow near the proposed SRWF is only 2.7 mgd. As a result, influent storage of approximately 670,000 gallons would be required to run the SWRF at a steady rate. Sewer flow curves from monitoring data are presented in Appendix E.

The golf courses in the northwest region all have onsite storage in the form of ponds. Approximately one day of storage for users other than the golf courses, approximately 1.2 MG, would need to be supplied.

Since the City already owns the site at Herndon Ave and Hayes Ave, no additional land would be acquired for NW2. The site is approximately 16 acres, and although some of that area would be used for a new road alignment in the future, it would be adequate for either treatment alternative. However, if for aesthetic purposes the City wished to build a subsurface facility, the MBR process with its smaller footprint would be a more attractive alternative.

Distribution System Summary

	Length of Pipe	Recycled Water Delivered*
Pipeline No. 1	11.11 mi	1,354 acre ft / yr
Pipeline No. 2	4.88 mi	210 acre ft / yr
Pipeline No. 3	3.90 mi	96 acre ft / yr
Pipeline No. 4	1.61 mi	49 acre ft / yr
Total:	21.50 mi	1,709 acre ft / yr

*No agricultural or future demand included in calculations.

Map Legend:

- Airports
- Cemeteries
- Fresno City Limits
- Northwest Satellite Recycled Water Facility
- Booster Pump Station
- Parks & Golf Courses
- Schools
- Water Bodies & Ponds
- Street Centerlines
- Fresno Sphere of Influence

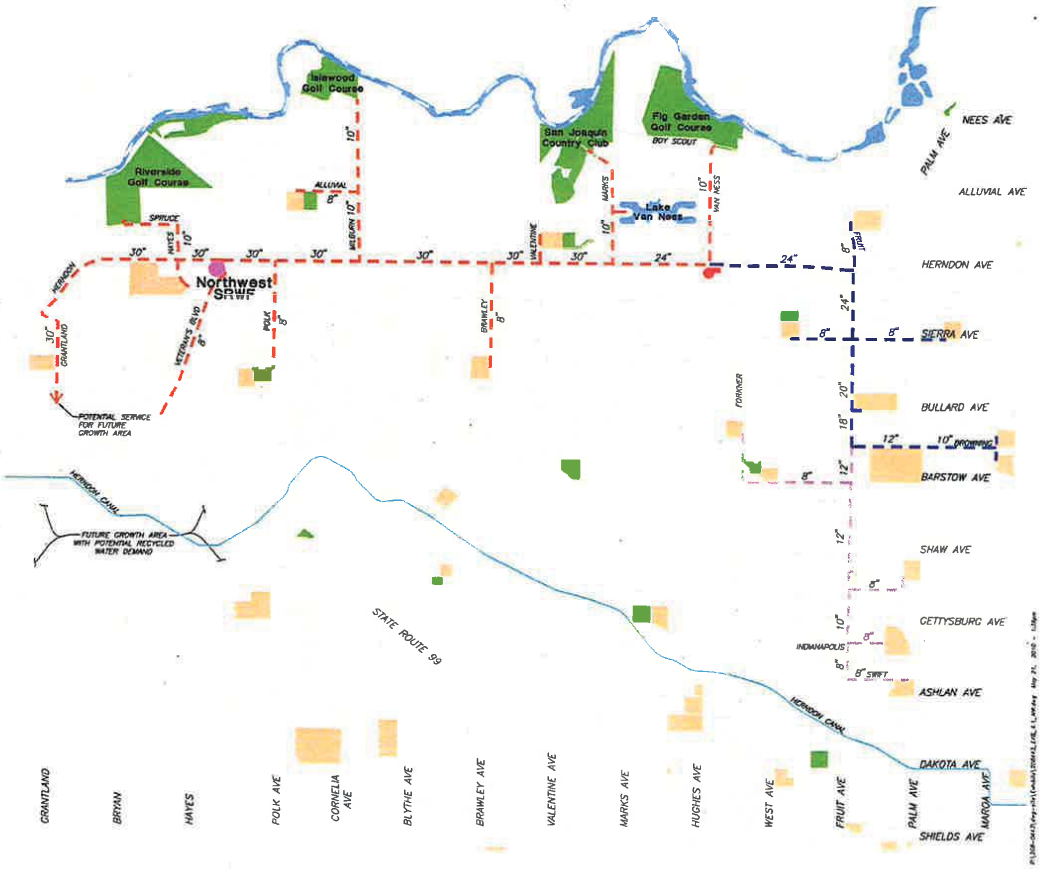


Figure 4.13
NORTHWEST PROJECT ALTERNATIVE 2
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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4.4.5 Northeast Alternatives (NE2 and NE3)

The two northeast alternatives served from SRWFs are NE2, where users are served by the North Fresno WRF which would be expanded to its full capacity; and NE3, where users in the central Fresno region would be served by one of two possible SRWFs.

The Northeast Quadrant is unique because of the existing North Fresno WRF. However, this existing facility was originally sized to serve the Copper River development and is now under consideration to serve as the primary SRWF for that quadrant of the City. A major limiting factor to this, however, is that the majority of influent supply for this quadrant is downgradient of the existing plant. Alternative NE2 would require rerouting flow from downgradient sewers. However, even with this rerouting of NE quadrant flow, the potential demand for this quadrant is higher than the potential volume of wastewater flow generated. As a result, not all potential users in the northeast quadrant would be served by the North Fresno WRF. Figure 4.14 shows the users' locations and potential distribution system routes for each alternative.

4.4.5.1 NE 2

Alternative NE 2 is similar to NE 1, except that fewer users can be served because the quadrant is served by the NFWRF as opposed to a backbone pipeline extension from the RWRF. The North Fresno WRF would be expanded to an average monthly capacity of 1.07 mgd. Sewer lift station 6 (located at Perrin and Chaplain) would be rerouted to supply the North Fresno WRF with sufficient flow to operate at 1.07 mgd.

Similar to NE 1, no additional influent or effluent storage would be required for this quadrant. No land acquisition would be necessary for this alternative, since new facilities would be on North Fresno WRF lands.

4.4.5.2 NE 3

For NE3, there are two alternatives to serve the areas around CSUF. The alternatives are independent of NE1 and NE2. In this alternative, a SRWF would be constructed at either the CSUF's campus (as a demonstration reuse project) or on the Granite Park site to serve nearby users and CSUF.

4.4.5.2.1 *NE 3.a*

The flow for the NE3 SRWF would be 0.7 mgd, which represents the maximum influent flow that can be supplied by the nearby sewer. Minimum sewer flows in this area are significantly reduced when school is not is session (summer and holidays), and as a result, approximately half a day's influent storage (or 350,000 gallons) would be necessary to maintain minimum flows through the SRWF. The campus has a one million gallon water storage tank for irrigation uses that could potentially be used for recycled water storage. Therefore distribution system storage may not be needed. It was also assumed that the project would also utilize the existing irrigation system onsite.

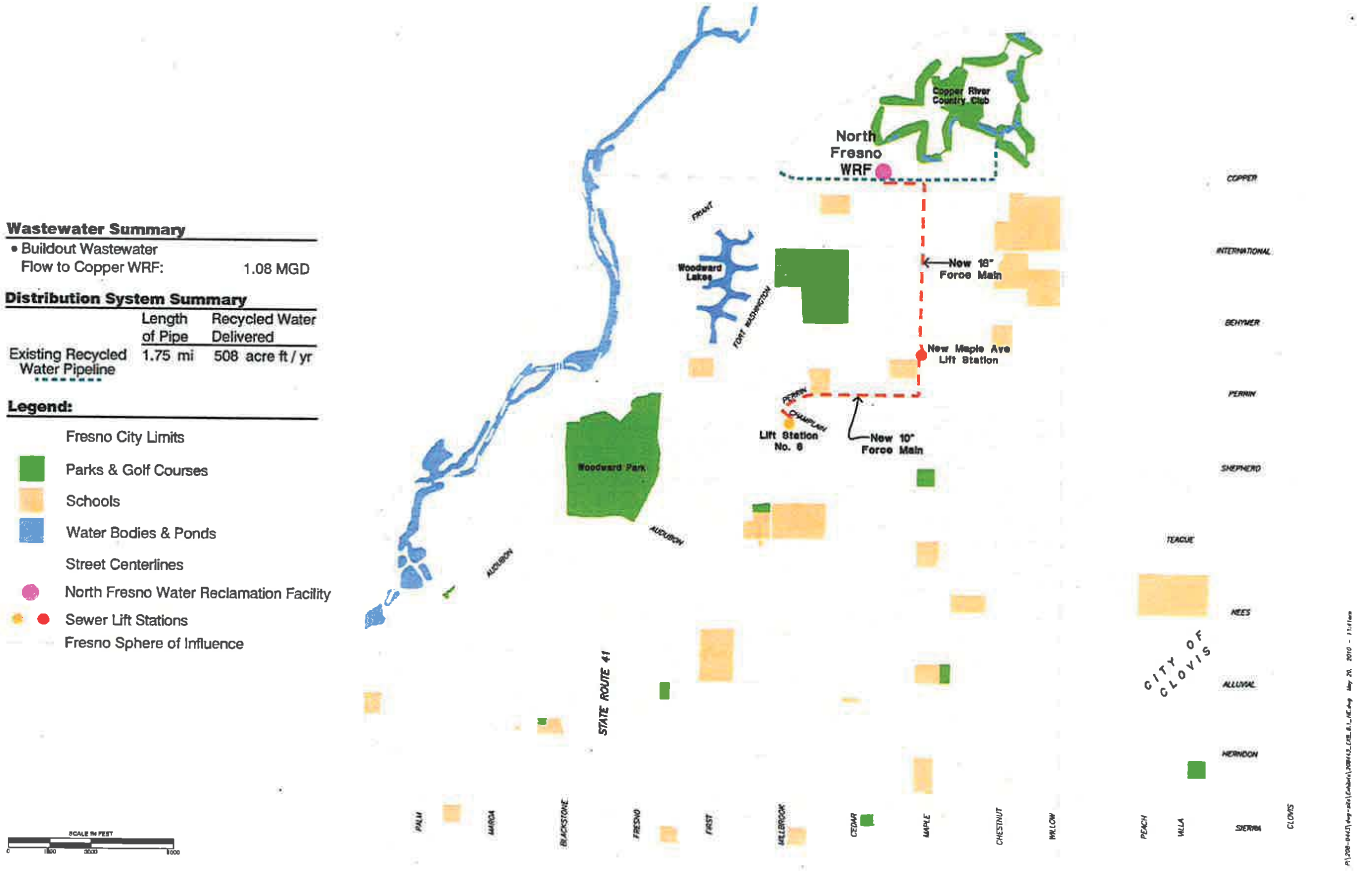


Figure 4.14
NORTHEAST PROJECT ALTERNATIVE 2
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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No land acquisition would be necessary for this alternative, since the SWRF would be constructed on CSUF property.

4.4.5.2.2 *NE 3.B*

Alternative NE3.B, constructed on City owned property at Granite Park, will serve the central area recycled water users including the CSUF campus and its agricultural areas. This SRWF will treat up to 4 mgd of sewer flow which represents the available flow in the Orange Avenue trunk line. Although there is no recent flow monitoring data for the Orange Avenue trunk line in this area, it is anticipated up to one million gallons of influent storage may be required to stabilize the treatment process during low flow periods. Based on estimated demand for recycled water in the central area, up to two million gallons of recycled water storage, (or half days storage) is anticipated. The distribution system supporting this SRWF will service surrounding parks, Freeway 168 landscaping and schools and the CSUF campus and agricultural areas. No land acquisition would be needed for this alternative.

4.4.6 Southeast Alternative (SE2)

Alternative SE 2 would serve the southeast quadrant from a new satellite facility, which could be located at the Fresno Fairgrounds (if the County is willing to cooperate with the project), at a City-owned park, or in the SEGA area on land owned by the City. The users served would be similar to SE 1, including golf courses, parks, schools, Fresno Pacific University, as well as some residential and commercial users. Figure 4.15 shows the users' locations and potential distribution system routes for each alternative, along with the potential locations of the SRWF.

For SE 2, flows are treated at a SRWF sized for 3.0 mgd. Because sewer flows in this quadrant are in excess of the demands of larger users, approximately 140 AFY of residential and commercial demand could also be served.

Based on recent flow monitoring results, the daily minimum sewer flow in the southeast quadrant is estimated to be 3.2 mgd near the proposed SRWF, not including future flows from the SEGA development. Therefore, no influent storage would be necessary for SE2. Approximately one day, or 2.6 MG, of effluent storage would be required as part of this alternative.

Since the SWRF and storage facilities would be built near the Fresno Fairgrounds, at a City-owned park, or in SEGA on land owned by the City, no land would be acquired. An activated sludge facility would occupy approximately 5.6 acres and a MBR would occupy 1.7 acres. Therefore, an MBR facility would be more feasible for small sites or developed areas such as the fairgrounds or a park. If the SRWF was built within SEGA, then a less expensive, more land intensive treatment technology could be used to serve the identified existing users, and expanded as future growth occurs in the SEGA area. Unlike the other

Distribution System Summary

	Length of Pipe	Recycled Water Delivered*
Pipeline No. 1	3.24 mi	488 acre ft / yr
Pipeline No. 2	1.26 mi	330 acre ft / yr
Pipeline No. 3	0.86 mi	111 acre ft / yr
Pipeline No. 4	3.73 mi	22 acre ft / yr
Total:	9.09 mi	951 acre ft / yr

*No agricultural or future demand included in calculations.

Map Legend:

- Fresno City Limits
- Parks & Golf Courses
- Schools
- Southeast Growth Area
- Street Centerlines
- Fresno Sphere of Influence
- New Satellite Recycled Water Facility
- Clovis Water Reclamation Facility
- Heavy Industrial User
- Existing Recycled Water Pipeline

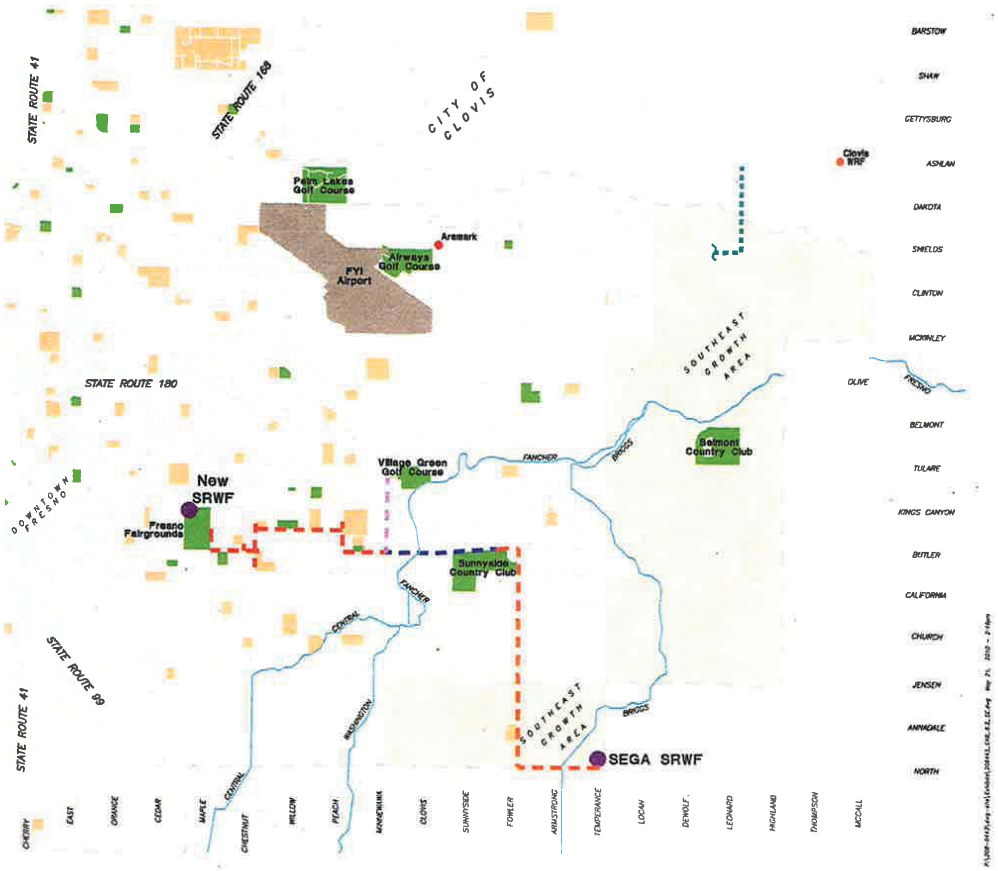


Figure 4.15
SOUTHEAST PROJECT ALTERNATIVE 2
DISTRIBUTION SYSTEM ALIGNMENT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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quadrant SWRF alternatives, the SE quadrant alternative should consider future regional land development plans such as SEGA in its identification of the plant location, capacity, and technology for the proposed SWRF identified as part of this Master Plan.

4.4.7 Costs for Urban Alternative 2 – Served by SRWFs

A conceptual cost estimate for Southeast project alternatives is presented in Table 4.6. These costs are construction costs and include a 30 percent planning level contingency for treatment facilities and 25 percent for distribution system. Treatment costs are based on the most probably treatment trains, as presented in section 4.4.1. Costs are presented in January 2010 dollars (ENR 8660).

Costs are based on the following assumptions:

- Recycled water would serve the City from new SRWFs.
- Each quadrant is independent and SRWFs and distribution systems can be implemented in any order.
- Treatment costs are presented as a range from low to high costs which represent different treatment trains (Note 1 in Table 4.6).
- Feed pump station is included in treatment cost estimate, and recycled water delivery pump station is included in distribution system pump station cost estimate.
- Storage Costs are based on welded steel tanks.
- More detailed cost estimate information is provided in Appendix F.

4.5 GROUNDWATER RECHARGE PROJECT ALTERNATIVES

Groundwater Reuse Recharge Projects (GRRPs), provide a significant opportunity for improving the City's long term sustainable water supply. However, due to a lengthy permitting process, GRRPs will likely be phased in over time to supplement urban reuse projects. The reuse demand (and potable water offset) that can be achieved by implementing GRRPs would be above and beyond the estimated urban irrigation and industrial demand, and is dependent on the land area secured for recharge (discussed in Chapter 3).

Specific GRRP basin sites have not yet been identified. However, it is likely that GRRPs would be operated during the rainy season when there is little recycled water demand. This would take advantage of the distribution system and treatment capacity that would be constructed for urban reuse during the irrigation season while providing a winter discharge option. Therefore, GRRPs would not require significant specific capital investment for treatment or distribution of recycled water. Urban reuse and groundwater recharge reuse would utilize the same distribution system to the extent possible. Although the treatment

Table 4.6 Cost Estimates for Alternative 2 Served by SWRF (in Millions)
Recycled Water Master Plan
City of Fresno

	Alternative	Distribution System			Treatment[2]	Storage	Land Acquisition	Total
		Backbone	Spurs	Total				
Capital Costs ($M)	SW2	25	11	36	37-50	7	Up to 0.8	81-94
	NW2	16	9	25	35-51	3	Up to 0.04	63-79
	NE2	-[3]	1	5[4]	5[5]	-[6]	-	10
	NE3.A	-[3]	2	2	23[7]	-[6]	-	25
	NE3.B	-[3]	6	6	35-50	4	-	45-60
	SE2	3	3	6	26-36	4	-	36-46
O&M Costs ($M/yr)	SW2	-	-	0.2	0.9-1.7	0.2		1.3-2.1
	NW2	-	-	0.1	0.7-1.6	0.1		0.9-1.8
	NE2	-	-	0.06	0.5	-[6]		0.6
	NE3.A	-	-	0.03	0.2-0.3[7]	-[6]		0.2-0.3
	NE3.B	-	-	0.05	0.7-1.6	0.2		0.95-1.85
	SE2	-	-	0.05	0.5-1.0	0.2		0.7-1.2

Notes:
(1) All costs presented in January 2010 dollars (ENR 8660)
(2) High- and low-cost treatment alternatives are presented. Low cost alternative is activation sludge with NdN +media filtration + UV. High cost alternative is MBR + UV.
(3) Distribution system to small to have a segment considered a "backbone".
(4) Distribution system includes $4M for rerouting sewer lift station # 6 to North Fresno WRF.
(5) Includes expanding North Fresno WRF and replacing disinfection facilities with UV.
(6) Storage is provided in existing facilities.
(7) Only MBR+ UV was considered for CSUF SRWF

processes would require different operation with higher operating costs to meet the higher level of treatment required (e.g. nitrogen removal).

Approximately four times as much diluent water as recycled water is required by the DPH for GRRP operation. There are a couple of options for sources of diluent water required for a GRRP: surface water from FID or the US Bureau of Reclamation, and/or stormwater from the Fresno Metropolitan Flood Control District (FMFCD). Where possible, GRRP basins will be located adjacent to FMFCD basins or FID canals, so infrastructure to deliver diluent water would be minimal. The required 6 month travel time between the GRRP and nearest drinking water well also affects the siting of the GRRP basins. Land for potential GRRPs has been identified based on a brief review of empty lands adjacent to FID canals and flood control district facilities, in areas were soils are known to be generally suitable for recharge. These areas are mainly in the northwest and southwest quadrants.

4.5.1 Treatment

Recycled water from either the RWRF or a SWRF must meet Title 22 standards, including filtration and disinfection, as described in Chapter 2. Additionally, projects that include a GRRP component require nitrification/denitrification (NdN) to reduce total nitrogen to less than 10 mg/l. At the RWRF, this means changing the operational parameters of the existing secondary processes to achieve NdN in addition to providing filtration and disinfection.

Nitrogen removal at the RWRF for GRRPs can theoretically be achieved without construction of expensive end-of-pipe nitrification and denitrification filters by modifying existing secondary processes. Although the operation of the secondary treatment facilities is not currently aimed at nitrogen removal, significant removal is already being achieved.

The A Side treatment train at the RWRF has the capability of partially removing nitrogen through operation in simultaneous nitrification-denitrification (Sinn) mode. It will be difficult to implement a more advanced biological nitrogen removal process since this older activated sludge system was not originally designed for this purpose, and therefore lacks the operational flexibility required to reduce nitrogen concentration.

The best opportunity for providing NdN through operational changes is to use the newer activated sludge facilities in Plant B or C. Both the B and C facilities were designed with the flexibility to be operated in a variety of advanced biological nutrient removal processes and were designed to achieve 10 mg/L total effluent nitrogen.

Plant B consists of four aeration basin (Nos. 5 through 8) and eight secondary clarifier (Nos. 6 through 13). The rated capacity is 38 mgd during the summer (9.5 mgd per aeration basin) and 33 mgd during the winter (8.25 mgd per aeration basin). Aeration basin No. 5 was designed to be able to run in a NdN mode, separate from the rest of the basins. This basin could be dedicated to providing denitrified effluent for groundwater recharge (up to

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9.5 mgd) with relatively modest changes to piping and the addition of a stop plate in the effluent channel.

Plant C consists of two aeration basin (Nos. 9 through 10) and four secondary clarifier (Nos. 14 through 17). The rated capacity is 19 mgd during the summer (9.5 mgd per aeration basin) and 17 mgd during the winter (8. 5 mgd per aeration basin). If the groundwater recharge demand exceeds the capacity of aeration basin No. 5, then the entire Plant C could be used to provide up to 19 mgd for groundwater recharge. Piping would be required to convey the Plant C effluent to the filtration facilities.

If groundwater recharge demand exceeded the Plant C 19 mgd capacity, the entire Plant B could be operated in NdN mode for a capacity of up to 38 mgd. The operation of any of the existing facilities in NdN mode will require an increase in operating costs for the additional air required.

4.5.2 Southwest GRRP Basins

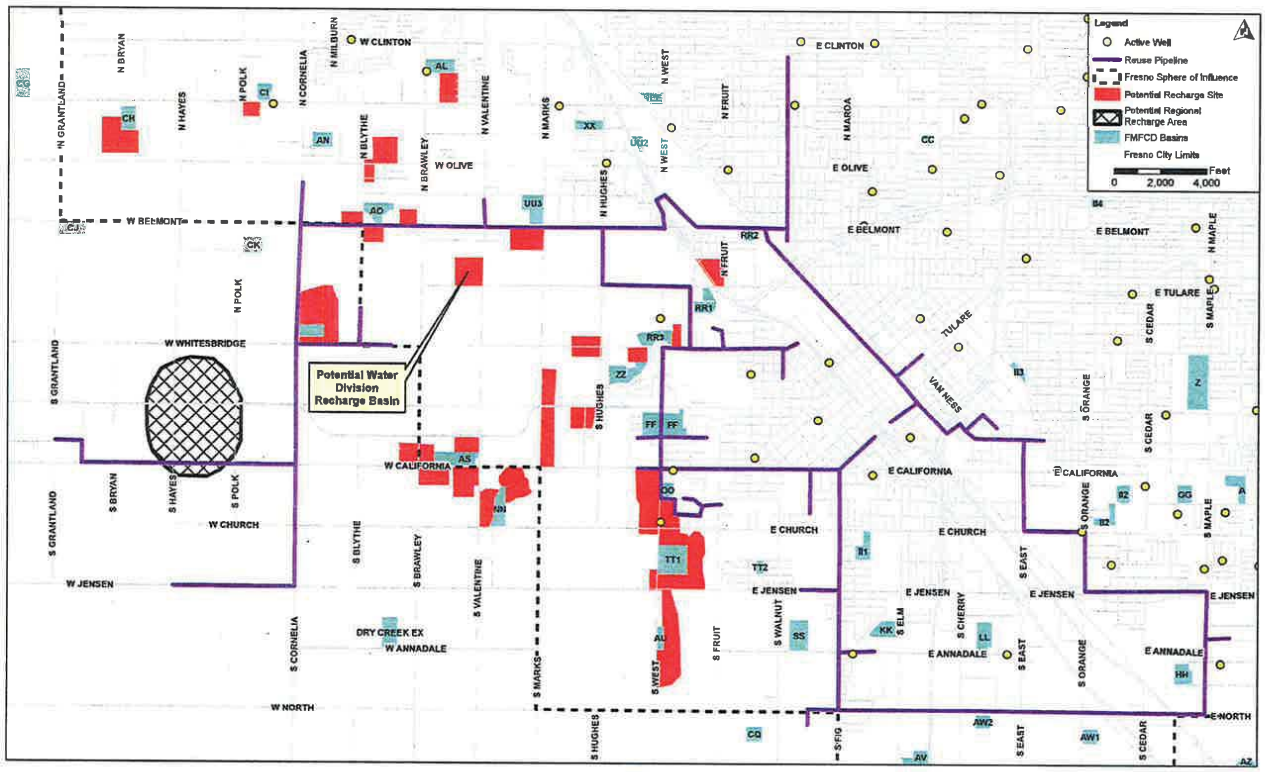
Potential future GRRP basin sites were located through a preliminary identification of empty parcels adjacent to existing flood control basins or near FID supply channels. These potential sites, as well as possible future super-recharge basin sites (identified by the City water division as areas for potential future recharge of surface water) that could receive recycled water in the southwest quadrant are shown in Figure 4.16.

There are 839 acres of land identified for potential recharge in the SW quadrant (not including super-recharge basins), or 1,244 acres including the super-recharge basins. Based on FMFCD data, recharge rates are estimated to be 1.2 to 4.8 inches/day. Using an intermediate value of 2.4 inches/day, and assuming the diluent water is delivered at the same time that recharge is occurring, the potential for recycled water recharge is conservatively estimated to be 13 AFY/acre. Therefore, if all sites identified in the SW quadrant were developed into GRRPs, 10,900 AFY of recycled water could be recharged without the super-recharge basins, or 16,180 AFY with the super-recharge basins.

4.5.3 Northwest GRRP Basins

The potential locations for GRRP recharge basins in the Northwest Quadrant, as well as that of a possible future super-recharge basins that could receive recycled water, are shown in Figure 4.17.

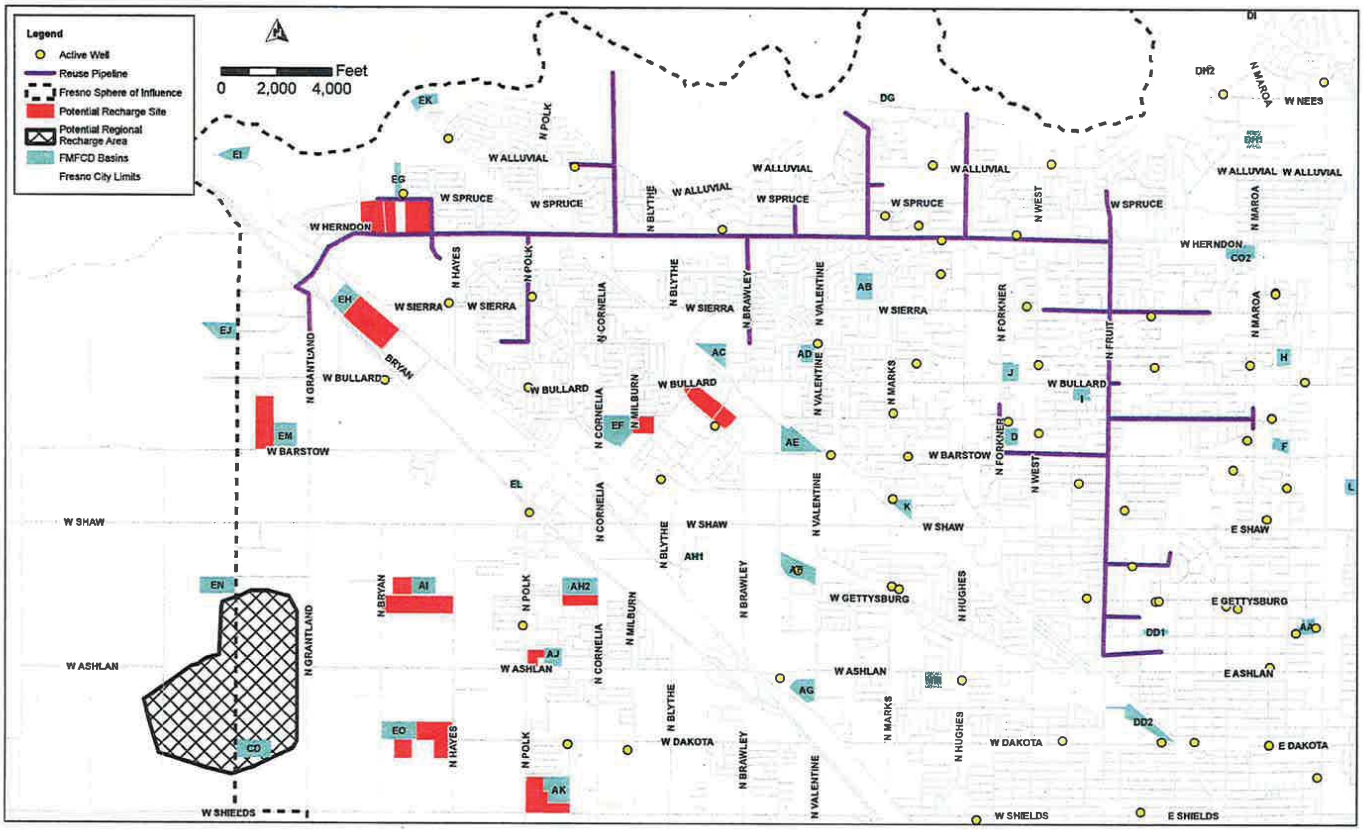
There are 303 acres of land identified for potential recharge in the NW quadrant, not including super-recharge basins, or 883 acres including the super-recharge basins. Using the estimated potential for recycled water recharge of 13 AFY/acre, if all sites identified in the NW quadrant were developed into GRRPs, 3,940 AFY recycled water could be recharged without the super-recharge basins, or 11,480 AFY with the super-recharge basins.



Alternative 1 Pipeline Alignments

Figure 4.16
POTENTIAL FUTURE GRRP BASINS, SOUTHWEST QUADRANT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Alternative 1 Pipeline Alignments

Figure 4.17
POTENTIAL FUTURE GRRP BASINS, NORTHWEST QUADRANT
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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4.5.4 Northeast and Southeast GRRP Basins

The NE quadrant is densely developed. As a result of this, no viable recharge sites were identified in this quadrant.

The City currently recharges surface water at Leaky Acres in the southeast quadrant. The ability to add recycled water to Leaky Acres was considered and dismissed as there are drinking water wells located within a 6-month travel time of the Leaky Acres site. Therefore, hydraulic detention time between recycled water recharge and the nearest well could not be met without abandoning the highly productive existing wells. The City has identified one 320 acre potential future super-recharge basin southeast of the City limits. This basin could also potentially recharge recycled water. Using the estimated potential for recycled water recharge of 13 AFY/acre, 4,160 AFY of recycled water could be recharged at this site.

Many of the undeveloped areas surrounding the southeast quadrant of town have soils that are not amenable to percolation, which leads to difficulty in locating a recharge basin in this quadrant. Additionally, there are known contaminant plumes in the SE quadrant that must be avoided. As a result, other than the super-recharge basin, groundwater recharge was not identified as part of the southeast reuse alternatives, although further investigation may be warranted..

4.5.5 Costs of GRRP

A conceptual cost estimate of a typical 20-acre GRRP basin is presented in Table 4.7. Land acquisition costs assume a land value of $45,000/acre. This value was obtained by gathering the 2009/10 assessed land and improvement values of several of the proposed basin and determining the 90th percentile value. Therefore, using $45,000/acre is a conservative land value estimate. Basin construction costs include an appropriate planning level contingency and are presented in January 2010 dollars (ENR 8660).

Table 4.7 Project Cost Estimate for Example 20-acre Recharge Basin Recycled Water Master Plan City of Fresno

Element	Capital Cost ($M)	O&M Cost ($/yr)
Basin	1.5	25,000
Land Acquisition	0.9	-
Total	**$2.4**	**$25,000**

Note:

(1) Assuming basins are excavated to a depth of three feet, with berm height of six feet. This allows a water depth of seven feet with two feet of freeboard. Excess dirt would be hauled to the RWRF. Unit costs for excavation and hauling were verified with FMFCD.

If all 1,142 acres of identified GRRP basins (not including the super-recharge basins) were developed as part of the City's Recycled Water Program (this would be equivalent to fifty seven (57) 20-acre basins), the construction cost is estimated to be $137 million.

4.6 AGRICULTURAL ALTERNATIVES

There were three alternatives carried forward to increase water reuse for agricultural irrigation. They were:

- AG 1 - Expand the existing system to deliver additional undisinfected secondary effluent to growers of non-food crops.
- AG 2 - Expand deliveries of extracted percolated effluent to FID.
- AG 3 - Upgrade to tertiary treatment and directly deliver recycled water for unrestricted reuse.

These alternatives could each be implemented in addition to the urban reuse alternatives discussed earlier. All of these alternatives involve supplying recycled water from the RWRF, (rather than SRWFs), since only the RWRF is expected to have excess flow above the demands of urban users during the summer time.

4.6.1 Direct Delivery of Undisinfected Secondary Effluent (AG 1)

The RWRF currently delivers approximately 10,000 AFY of undisinfected secondary effluent to nearby growers of non-food crops. City staff conducted a preliminary evaluation of the potential to expand the direct reuse system to new growers in the vicinity of the RWRF able to accept recycled water. Two farms with 1,400 acres, representing an additional 4,200 AF of demand, could be served with undisinfected secondary effluent, provided that piping was available to convey the water. While this alternative would not provide an exchange benefit, it would provide diversification of the City's reuse and effluent management systems and would reduce the hydraulic loading on the percolation ponds. Figure 4.18 shows a conceptual schematic of this alternative.

Increasing deliveries of undisinfected secondary effluent to growers would not require additional treatment or storage, however, a new pipeline to convey recycled water to growers would be necessary.

4.6.2 Delivery of Extracted Percolate to FID (AG 2)

The RWRF currently pumps approximately 30,000 AFY of percolated effluent from extraction wells to FID canals. This alternative would require increasing pumping from the groundwater beneath the percolation ponds from 30,000 AFY to 50,000 AFY, depending on the level of reuse that is agreed upon. This increase in extracted percolate being delivered to FID canals would require the existing agreement with FID to be negotiated to include provisions for increased deliveries to the FID canals. To take advantage of any exchange agreement with FID of recycled water for raw surface water, additional facilities may be

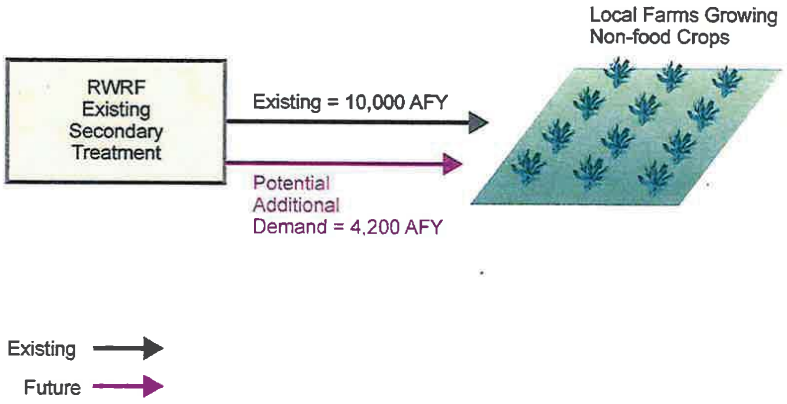


Figure 4.18
DIRECT DELIVERY OF
UNDISINFECTED SECONDARY EFFLUENT (AG 1)
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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needed within the city to convey and treat FID's surface water for potable use, or to recharge it to the groundwater aquifer. A conceptual schematic of this alternative is shown in Figure 4.19.

FID's irrigation season is typically a six-month period between March and August, but can vary from year to year based on rainfall . During the irrigation season, flow rates in FID canals and pipelines are typically lowest during the months of March and April and then peak during the months of June and July. Lower Dry Creek, the Houghton and Herndon Canals have large flow capacity and could provide recycled water to agricultural users downstream of the points of discharge. The City of Fresno currently discharges extracted percolated effluent to both Lower Dry Creek and Houghton Canal.

Expanding the delivery of extracted percolate to the canals would require a number of improvements at the RWRF. A series of new wells would be required to increase extraction pumping. Over the last ten years, the City reused (through direct delivery or extraction) between 25,000 and 40,000 AFY. Based on an effluent flow of 80,000 AFY, between 40,000 to 55,000 AFY may be available for additional reuse. For the purposes of determining facility needs and costs, it was assumed an additional extraction of 20,000 AFY would occur over a nine month period for delivery of extracted percolated effluent. Approximately 12 new wells, each with a capacity of about 1,400 gpm, would be needed. These wells would need to be carefully located to limit impacts on groundwater quality, and to limit extraction of low-quality groundwater. In addition to new wells at the RWRF, a pipeline would be required to convey the additional flows.

4.6.3 Delivery of Tertiary Effluent (AG 3)

This alternative provides treatment for direct delivery of unrestricted reuse water to agricultural users instead of using extracted water. The City would need to upgrade to tertiary treatment at the RWRF for this alternative. While the City could invest in an agricultural distribution system to take the tertiary treated water directly to individual users, a comprehensive agricultural distribution system already exists with the FID canal system and could continue to be utilized for delivery of tertiary treated water.

Delivery to FID also has the advantage of potentially exchanging recycled water for surface water. In order to use the FID canal system for delivery of recycled water, the City would need to renegotiate its agreement with FID to allow delivery of tertiary treated effluent directly to the canals (without percolation and extraction). Also to take advantage of any exchange agreement with FID of recycled water for raw surface water, additional facilities may be needed within the city to convey and treat FID's surface water for potable use, or to recharge it to the groundwater aquifer.

For tertiary effluent deliveries to FID canals, new tertiary treatment facilities, a new pump station and a new recycled water pipeline would be required. The pump station would be located near the tertiary facilities at the RWRF, and the pipeline would extend from the

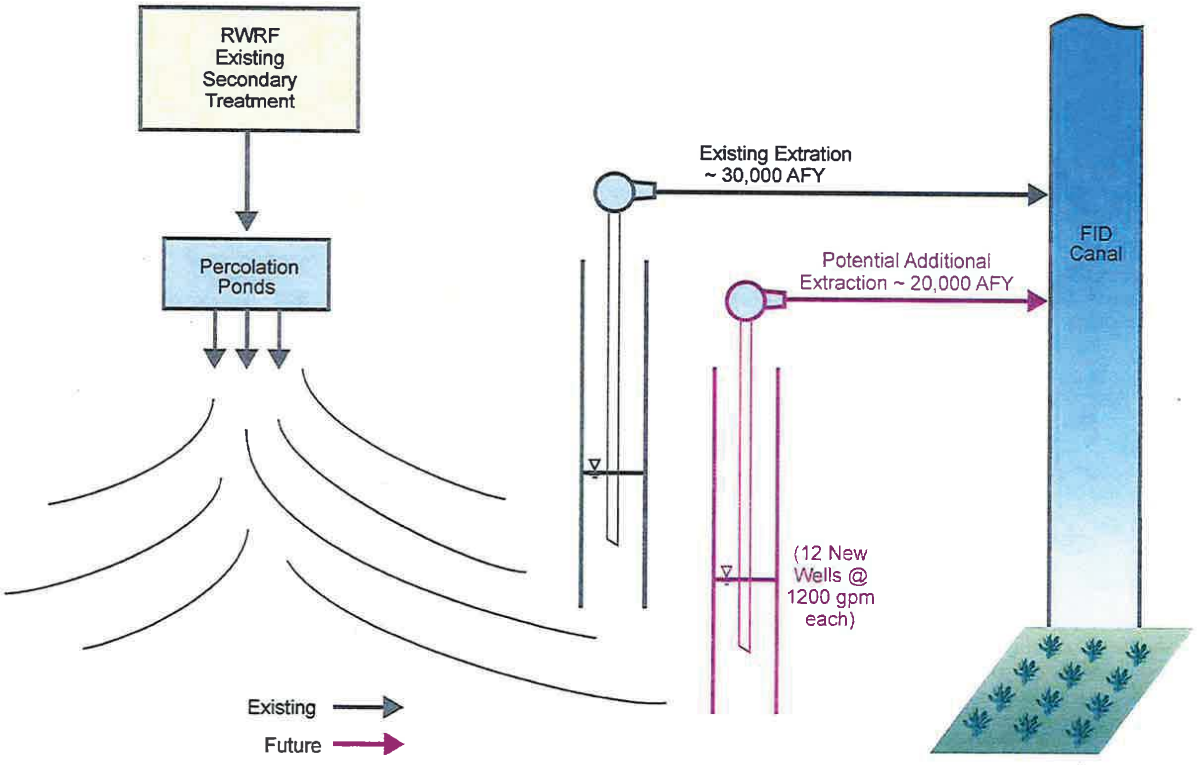


Figure 4.19
DELIVERY OF EXTRACTED PERCOLATE TO FID (AG 2)
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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pump station to each canal. A conceptual schematic of this alternative is shown in Figure 4.20.

The City could invest in developing their own agricultural distribution system to serve tertiary treated recycled water directly to potential users, however it is less likely that the City could get an exchange of recycled water for surface water as individual farmers typically do not possess surface water rights.

This alternative is more expensive than increased pumping of percolated effluent to the FID canal system (AG 2). The two alternatives (AG 2 and AG 3) provide the same amount of additional reuse (approximately 20,000 AFY in the near term), at the same conveyance cost, but AG 3 incurs additional capital and O&M costs associated with construction and operation of a tertiary WWTP. However, it was carried forward in the Master Plan in case the RWQCB does not recognize percolation as equivalent to tertiary treatment in the future (see Chapter 3).

4.6.4 Costs Estimates

A conceptual cost estimate for the agricultural project alternatives is presented in Table 4.8. These costs are project costs which include construction costs (with an appropriate planning level contingency) plus a 20 percent factor for engineering, legal and administration costs. Costs are presented in January 2010 dollars (ENR 8660).

Table 4.8 Cost Estimates for Agricultural Project Alternatives Recycled Water Master Plan City of Fresno

	Alternative	Distribution System	Treatment	Storage	Total
Capital Costs ($M)	AG 1	6	-	-	6
	AG 2[1]	18[2]	-	-	18
	AG 3[1]	13	28[3]	-	41
O&M Costs ($/yr)	AG 1	0.06	-	-	0.06
	AG 2	0.6	-	-	0.6
	AG 3	0.3	1.1[3]	-	1.4

Notes:
(1) Assuming 20,000 AFY agricultural reuse program (above current practices).
(2) Distribution system costs include new extraction wells (based on costs from City of existing extraction wells)
(3) Treatment train is assumed to be media filtration + UV.

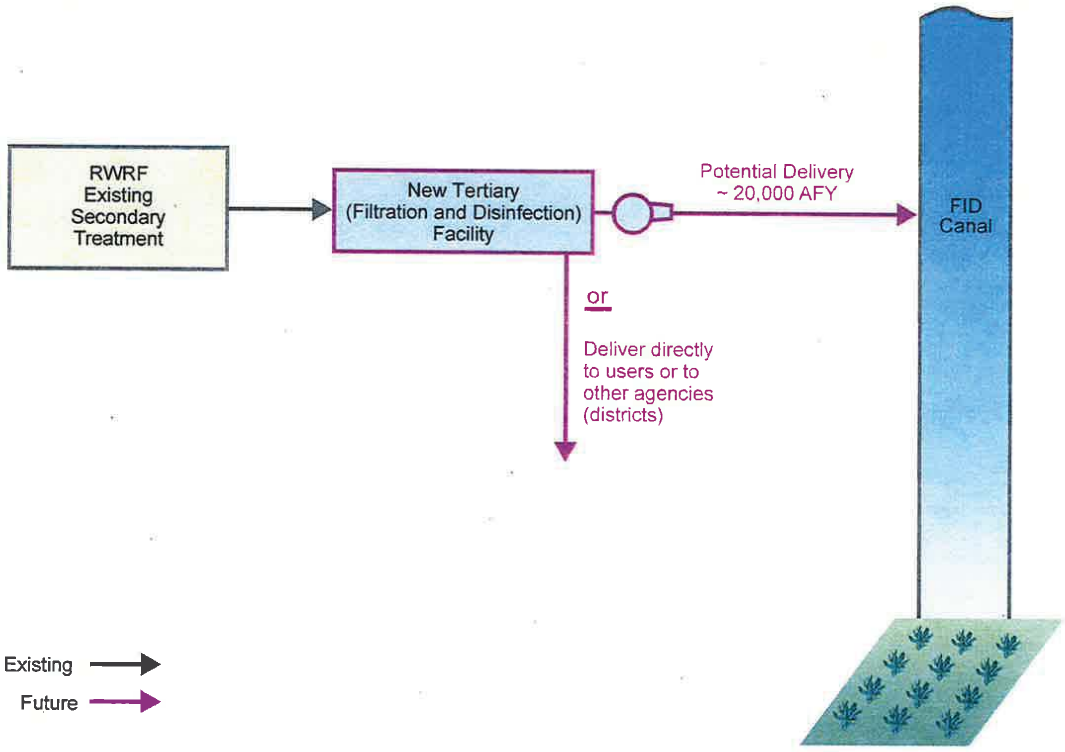


Figure 4.20
DELIVERY OF TERTIARY EFFLUENT TO FID (AG 3)
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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Costs are based on the following assumptions:

- AG 1 is independent of AG 2 and AG 3.
- Only one of either AG 2 or AG 3 would be implemented.
- Distribution system costs for AG 1 include piping secondary effluent directly to farmers, and do not include connections to existing irrigation systems.
- Distribution system costs for AG 2 include installing and operating new extraction wells and piping tertiary disinfected effluent to Dry Creek and Houghton Canals.
- Distribution system costs for AG 3 include piping tertiary disinfected effluent to Dry Creek and Houghton Canals.
- Feed pump station is included in treatment cost estimate.
- More detailed information is provided in Appendix F.

4.7 SUMMARY OF COSTS FOR PROJECT ALTERNATIVES

Table 4.9 presents a summary of the cost information provided in this Chapter. More detailed information about the estimates is provided in Appendix F.

The costs presented in Table 4.9 for the satellite treatment alternatives (Urban Alternative 2) do not reflect the difficulty in siting these types of facilities. The higher cost shown for Alternative 2 represent a more compact and covered treatment train (MBRs) and would likely be required for mitigation of neighbor impacts if siting (area requirements) is an issue.

4.7.1 Cost Model

A spreadsheet cost model was prepared using the costs presented in this chapter for each of the pipeline segments identified. The model allows for selection of pipe segments in creation of a "project". The output is the cost for the selected distribution system and treatment needed to provide flow for the existing large users along the selected pipe segments. This tool was developed for the purpose of CIP planning and can be used by the City to help prioritize implementation of the recycled water distribution system. Figure 4.21 shows a screen capture of the cost model spreadsheet.

Table 4.9 Summary of Costs for Project Alternatives
Recycled Water Master Plan
City of Fresno

Alternative	Demand (AFY)	Capital Costs ($M)					O&M Costs ($M/yr)			
		Distribution System	Treatment	Storage	Land Acquisition[1]	Total	Distribution	Treatment	Storage	Total
Urban Alternative 1 (RWRF)										
SW 1	4,140	49	12[2]	7	-	68	0.3	0.4	0.2	0.9
NW 1	1,951	50	9[2]	6	-	65	0.2	0.3	0.2	0.7
NE 1	2,720	40	11[2,3]	5	-	56	0.2	0.7	0.2	1.1
SE 1	995	17	6[2]	4	-	27	0.1	0.2	0.2	0.5
Existing residential and commercial users[4]	2,984	86	10[2]	-[6]	-	96	0.4	0.3	-	0.7
Future Residential and commercial users[4]	1,586	-[6]	6[2]	-[6]	-	6	-	0.2	-	0.2
Urban Alternative 2 (SRWF)										
SW 2	4,140	36	37-50[2,7,8]	7	Up to 0.8	81-94	0.2	0.9-1.7	0.2	1.3-2.1
NW 2	1,709	25	35-51[2]	3	Up to 0.04	63-79	0.1	0.7-1.6	0.1	0.9-1.8
NE 2	508	5[2]	5[3]	-	-	10	0.06	0.5	-	0.6
NE 3.A	263	2	23[9]	-	-	25	0.03	0.2-0.3	-	0.2-0.3
NE 3.B	4,900	6	35-50	4	-	45-60	0.05	0.7-1.6	0.2	0.95-1.85
SE 2	951	6	26-36[7]	4	-	36-46	0.05	0.5-1.0	0.2	0.7-1.2
Groundwater Reuse Recharge										
20 acre basin	260	-	-	1.5	0.9	2.4	-	-	0.03	0.03
Agricultural Alternatives										
AG 1	4,200	6	-	-	-	6	0.06	-	-	0.06
AG 2	20,000	18[10,11]	-	-	-	18	0.6	-	-	0.6
AG 3	20,000	13[11]	28[2]	-	-	41	0.3	1.1	-	1.4

Notes:
(1) Land acquisitions costs depend on the treatment technology used, and are $45,000 per acre.
(2) Treatment train for RWRF is media filtration + UV. Costs are additive and assume that prerequisite system has already been constructed. (For example, NW 2 assumes that SW 2 already exists)
(3) NE1 includes treatment at the RWRF and the North Fresno WRF.
(4) For serving residential and commercial users, it is assumed that distribution piping backbone, storage facilities, and initial treatment facilities are already in place. Costs include adding 120 miles of distribution laterals and expanding tertiary treatment and disinfection at the RWRF. Future users include indoor dual plumbing along Hwy 41 mid- and high-rise intensification corridor.
(5) Storage for residential/commercial use is accounted for as part of Urban Alternative 1 (SW 1, NW 1, NE 1 and SE 1)
(6) It is assumed that developers will carry the cost for purple pipe for future growth and infill, and build laterals off of existing distribution system.
(7) Low cost alternative for SRWF treatment is activation sludge with NdN +media filtration + UV. High cost alternative for SRWF treatment is MBR + UV.
(8) SW 2 includes treatment at the RWRF and at a new SRWF.
(9) Only MBR was considered for secondary treatment.
(10) Costs include 12 new extraction wells and pumps.
(11) Costs include piping to Dry Creek and Houghton Canals.

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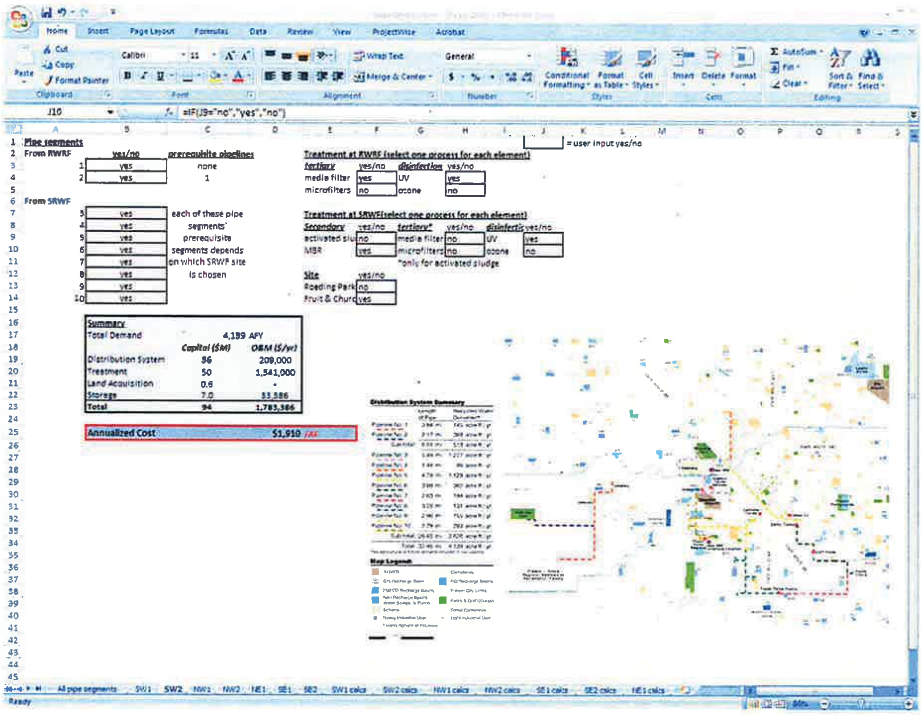


Figure 4.21
COST ESTIMATING TOOL
FOR PIPE SEGMENTS
RECYCLED WATER MASTER PLAN
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Chapter 5

SUMMARY AND RECOMMENDATIONS

5.1 INTRODUCTION

The City of Fresno (City) has embarked on a Recycled Water Master Plan (Master Plan) to serve as a basis to support the City's decision-making process in selecting recycled water projects. The expansion of the recycled water system will enable the City to lessen the burden on the wastewater treatment plant percolation ponds that are currently used for effluent discharge, offset potable water use, and enhance the sustainability of the water supply.

The City currently treats nearly 80,000 AFY of wastewater at the Regional Wastewater Reclamation Facilities (RWRF). Some of this water is directly recycled, but most of it is percolated into the ground via percolation ponds at the RWRF. The City and Fresno Irrigation District (FID) have an agreement whereby the City is contracted to extract 30,000 AFY of percolated effluent for delivery to FID canals for use downstream by local farmers. The remaining effluent is available for other beneficial uses.

The City is required by the Central Valley Regional Water Quality Control Board (RWQCB) to evaluate the quality of the groundwater beneath the percolation ponds. Reducing the hydraulic and constituent loading burden on the percolation ponds by implementing a significant reuse program would minimize salt and nitrogen loading and metals mobilization in the alluvium, lowering the concentrations of these constituents in the groundwater.

In 2009, the State of California adopted a Recycled Water Policy establishing a mandate to increase the use of recycled water in California by 200,000 acre-feet per year by 2020 and by an additional 300,000 acre-feet per year by 2030. The City's expansion of recycled water use is in support of these state-wide goals.

The City relies heavily on groundwater for potable supply. As identified by ongoing water planning efforts, the City needs to diversify its water supply portfolio for long- term sustainability of its water supply. The use of recycled water for non-potable water uses will help meet a significant part of the City's existing and future water supply demands.

Therefore, the intent of the Master Plan is to plan and implement a phased recycled water treatment and distribution system that:

- Protect and improve groundwater quality by reducing the use of percolation ponds currently used as part of the RWRF effluent disposal process;
- Increases the use of recycled water through urban reuse, groundwater recharge and agricultural reuse to help meet State's objectives to increase recycled water use and to meet the increasing water demands in the region;
- Expand the recycled water system to enable the City to offset potable water use, thereby enhancing the sustainability of the water supply;

- Puts into practice a recycled water plan and ordinance that will support implementation of recycled water use in the City for existing and future users.

5.2 SUMMARY OF FINDINGS

The findings presented herein reflect the detailed materials presented in Chapters 1 through 4 of this Master Plan. This chapter presents the recommended projects and project phasing. Factors considered in selection and phasing of project alternatives included:

- Project costs
- Implementation issues and timing
- Institutional considerations such as permitting and environmental review

The City has several key opportunities for implementing reuse, namely:

- Urban reuse
- Unrestricted agricultural reuse/exchange
- Groundwater recharge

Urban reuse provides an opportunity for near-term implementation of recycled water projects and would offset existing uses of the City's potable supplies and some private wells. Unrestricted agricultural reuse and exchange with FID are also near-term opportunities that would provide the City with credit for additional potable water supply. Groundwater recharge with recycled water is a longer-term program that would supplement potable water supplies and provide a barrier to prevent groundwater migration away from the City. A summary of the potential volumes of reuse identified for each type of use is shown in Table 5.1. A schematic of the recommended master plan recycled water elements is shown in Figure 5.1.

Table 5.1 Summary of Potential Reuse Volumes
Recycled Water Master Plan
City of Fresno

	Recycled Water Use (AFY)
Urban Irrigation and Industrial Reuse by Existing Large Users	14,700
Irrigation of Existing and Future Commercial and Residential Users	>4,000
Groundwater Reuse Recharge	Up to 31,000[(1)]
Expand Direct Agricultural Reuse with Secondary Effluent	4,200
Expand delivery to FID for Agricultural Reuse	>20,000[(2)]
Total	>69,000

Notes:
(1) Recycled water for groundwater reuse recharge will be limited by the land available for recharge basins and the availability of diluent water.
(2) Delivery of recycled water to FID is unlimited by potential demand, rather it will be limited by remaining available supply once urban reuse and GRRPs are fully implemented.

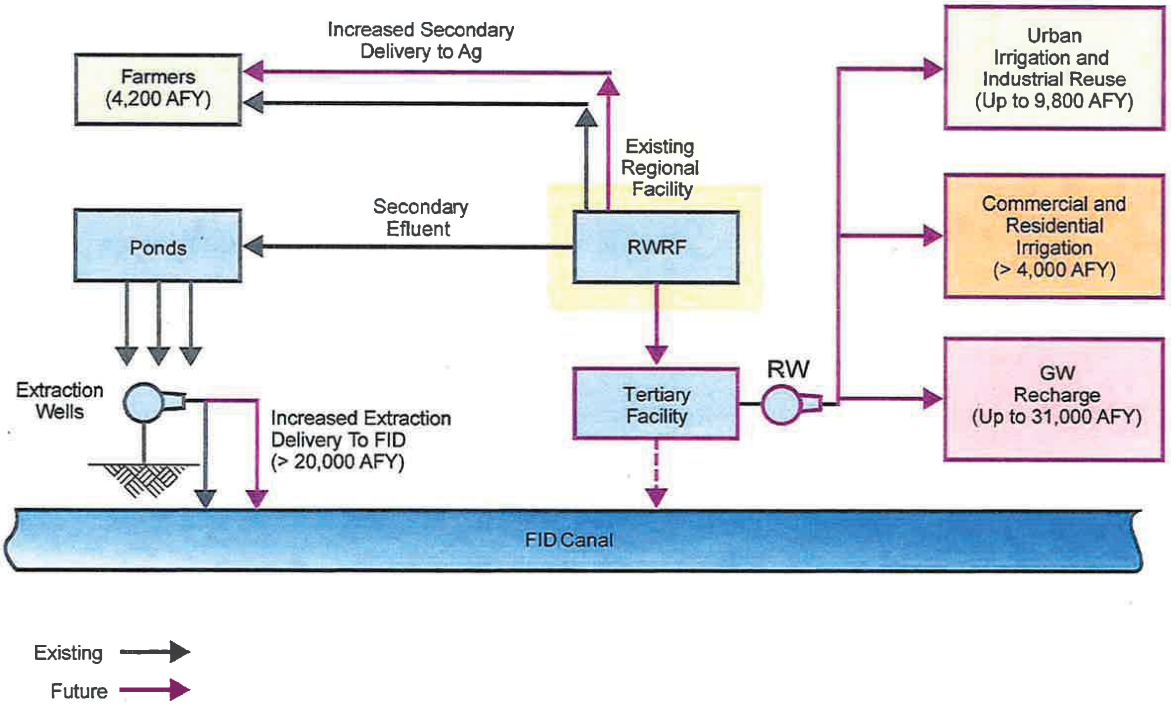


Figure 5.1
SUMMARY OF RECOMMENDED ALTERNATIVES AND POTENTIAL REUSE VOLUMES
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

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5.2.1 Urban Reuse Opportunities

Urban reuse provides an opportunity to implement recycled water projects that directly offset potable water and are highly visible to the community. Urban reuse, however, requires the most intensive distribution system since users are spread out across the City. The recycled water distribution system alignments shown in Chapter 4 were selected based on prioritizing delivery to customers with an estimated demand of 100 AFY or more. These larger users are generally land-intensive parks, cemeteries and golf courses that are located around the outskirts of the City. Smaller users and future development areas were also identified to be served directly off the main distribution pipelines or from "laterals" off the main distribution system pipelines. The proposed distribution system forms a ring around the City, with laterals towards the City center that can be used to serve future infill development. If all the users identified by this strategy are served, the potential urban reuse opportunity for existing large users is over 9,000 AFY. If lateral are constructed to serve existing and future residential and commercial users, more than an additional 4,000 AFY can be served.

There were two major alternatives considered for serving urban users:

1. Delivery of recycled water from at the RWRF, or
2. Delivery of recycled water from at Satellite Recycled Water Facilities (SRWFs) located in each quadrant of the city (near the users).

The advantages and disadvantages of each tertiary treatment siting alternative are presented in Table 5.2. In general, treatment and delivery of recycled water from SRWFs is more expensive than treatment and delivery from the RWRF (particularly where small footprint technologies are required for siting in a densely developed community). Satellite facilities are more likely to generate community opposition due to treatment facilities being constructed in residential areas.

It is the recommendation of this Master Plan to proceed with the first concept, serving customers from the RWRF, for the following reasons:

- Less costly
- Less operationally challenging (North Fresno WRF has been a considerable challenge)
- Less dependant on flows in separate sewer sheds
- Eliminates solids handling concerns (don't have to transport solids away from satellite locations)
- Eliminates need for influent storage
- Minimizes community disruption both during construction and operation

Table 5.2	Comparison of Regional versus Satellite Treatment and Delivery Recycled Water Master Plan City of Fresno	
	Advantages	**Disadvantages**
Regional Treatment and Delivery	• Centralized operations • Existing plant site requires little effort for siting • Greater ability to serve residential/commercial users due to access to greater flows	• Long pipelines required to deliver throughout the City • Multiple booster pump stations and recycled water storage facilities required
Satellite Treatment and Delivery	• Treatment close to point of use reduces piping • Recycles at the point of use and achieves localized groundwater basin benefits	• Multiple treatment plants to site and construct • Potential neighborhood resistance and land use impacts associated with satellite plant site • Less ability to serve residential and commercial users due to lower sewer flows • Potential for odor impacts due to need to provide influent storage • SRWFs are more expensive where low-footprint technologies such as MBR must be implemented to accommodate limited land area

- Utilizes treatment site property already available (is consistent with current land uses)
- Provides more flexibility for meeting diurnal flows (greater capacity to meet daily peaks without storage

5.2.2 Agricultural Reuse and Exchange Opportunities

Agricultural reuse provides the largest opportunity for recycled water use (in terms of volume), since demand is nearly unlimited. The benefit of potable water offset, however, can only be achieved if FID (or another agency) is willing to increase its recycled water use and trade recycled water for substituted surface water. Whether the City can realize this benefit depends on negotiations with FID, and the City having adequate facilities to take advantage of the surface water made available through the exchange.

5.2.3 Groundwater Reuse Recharge Opportunities

Groundwater recharge is an opportunity to directly augment the City's potable supply, and provide a use for recycled water during the winter. Groundwater recharge locations will be influenced by the City's ability to identify and purchase sites for recharge basins that have

six-months of hydraulic separation from drinking water wells. At this time, the west side of the City, closest to the RWRF, appears best to serve recharge opportunities as there are sites available with soils that are conducive to recharge, and there are relatively few wells located nearby. A source of diluent water would be required (at a contribution ratio of 4:1 diluent to recycled water). Diluent water sources include US Bureau of Reclamation (USBR) surface water, FID surface water, or stormwater provided by Fresno Metropolitan Flood Control District (FMFCD). Percolation rates are highest on the west side of town, where it is also cheapest to supply water from the RWRF.

At least 2,450 acres of land were identified through a preliminary site survey as possible sites for recharge basins. If all sites were implemented and an average percolation rate of 2.4 inches/day was assumed (based on experience of FMFCD), approximately 31,850 AFY of recycled water could be percolated. This recharge volume would need to be confirmed with future evaluation of 1) potential available percolations sites; 2) measured percolation rates for those sites; and 3) availability of adequate diluents water volumes.

5.3 COST BENEFIT ANALYSIS

An economic analysis was conducted to explore the environmental, social and economic benefits that may accrue to the City and potential users from implementing a recycled water program. Although recycled water is often more expensive than some traditional options for providing water, recycled water provides some benefits that these other alternatives do not. Therefore, it is important to go beyond cost comparisons by also considering how the benefits of reuse compare to its cost. To do this, a clear distinction must be made between financial and economic analysis:

- A financial analysis of water reuse is based solely on the cash flows of expenses and revenues in and out of the agency
- An economic analysis provides a benefit/cost perspective by considering a broader view of the value of the reclaimed water.

By focusing solely on revenues, a financial analysis provides an overly narrow perspective of the "value" of the waters provided. For example, a financial analysis does not include benefits to the environment and social costs avoided when reuse enables a community to forgo developing alternative water supply options. Therefore, it is important to consider the benefits and costs of each option, rather than considering only costs.

Stratus Consulting was hired for this economic evaluation using a triple bottom line (TBL) approach looks at relevant options and explores how the benefits and costs compare to each other, providing a method of evaluating financial, social and environmental impacts of the project. Table 5.3 summarizes the result of the analysis, including monetized and qualitative benefits, and the stakeholders that accrue those benefits. This table shows that monetized benefits for the project are estimated to outweigh the monetized costs when a 2.5% real discount rate is used. Net monetized benefits are estimated to be $9.4 million,

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Table 5.3 BCA Overview – Using 2.5% Real Discount Rate (millions, 2010 USD)
Recycled Water Master Plan
City of Fresno

Benefit or Cost Category	Present Value	Stakeholder Accruing Cost or Benefit
Costs – Total		
Capital and O&M costs(1)	335.8	City of Fresno
Monetized Benefits		
Avoided alternative water supply costs	77.4	City of Fresno
Avoided water quality treatment costs	252.5	City of Fresno
Avoided agricultural water supply costs	1.7	Farmers
Avoided fertilizer costs for agriculture	8.9	Farmers
Avoided fertilizer costs for urban irrigation	4.7	Urban irrigators
Total monetizable benefits	345.2	
Qualitative Benefits and Costs	**Relative Magnitude***	
Long-term gain in wildlife habitat	++	Public
Demonstration of "green" water use ethic	+	City of Fresno
Improved diversification of water supply portfolio	+	City of Fresno
Public perception of recycled water	–	Public
Short-term construction impacts	–	Public
Total Net Benefits (Monetizable Benefits – Costs)	**9.4**	

All values in millions of dollars.
Assume 2.5% real discount rate and 30-year analysis period.
(1) Costs are based on Alternative 1 costs (not including residential and commercial users) and construction of half the identified areas for groundwater recharge.
O&M = operations and maintenance.
* Magnitude of likely effect on net benefits:
++ = Likely to increase net benefits significantly.
+ = Likely to increase net benefits relative to quantified estimates.
U = Uncertain effect on net benefits relative to quantified estimates.
– = Likely to decrease net benefits.
– – = Likely to decrease benefits significantly.

and total net benefits are believed to be much higher than that when non-monetized benefits and costs are considered. A report detailing the assumptions of the evaluation is in Appendix G.

Major benefits of a recycled water program include avoided costs of alternative water supply, avoided water quality improvements (to reduce salinity at the RWRF for existing percolation ponds), avoided agricultural water supply costs, and avoided fertilizer costs. Other benefits that were not easy to quantify include a gain in bird habitat by creating

groundwater recharge areas, promoting a "green," and improved diversification of the water supply.

5.4 PROJECT RECOMMENDATIONS

5.4.1 Conclusions of Technical Advisory Group

One of the key components for the development of this recycled water Master Plan was to build upon lessons learned by other agencies that have successfully implemented recycled water programs. To accomplish this, a Technical Advisory Group (TAG) was formed to provide input as to "lessons learned" and implementation considerations from other programs. The TAG for this project included:

- Dave Requa – Dublin San Ramon Services District
- James Crook – California Department of Public Health (retired)
- Bob Jaques – Monterey Regional Water Pollution Control Agency (retired)
- Ron Young – Elsinore Valley Municipal Water District
- Robin Saunders – Water and Sewer Utilities, City of Santa Clara (retired)

In August, 2009, members of the TAG convened at the RWRF to discuss options and opportunities for the City of Fresno. The preliminary recycled water demands and use types were presented. The conclusion of the TAG was that agricultural irrigation represented the greatest opportunity for beneficial reuse, with the least amount of regulatory hurdles, process technology or distribution system investment. It was also recognized that this reuse alternative depended on new exchange agreements with FID to optimize the full water supply benefit (i.e. gain agreement for additional raw water in exchange for recycled water).

Other conclusions of the TAG were:

- Regulators and potential users should be involved in project planning.
- Future projects can be funded with fees on development.
- Consideration should be given to a flat charge for recycled water to provide incentive for recycled water use.
- Going to a higher-than-necessary level of treatment helps with public perception of the projects.
- Public outreach should start early.

All the discussion and comments provided by the TAG during the August 2009 meeting are summarized in a meeting memorandum included Appendix H.

5.4.2 Urban Alternatives

As discussed in Section 5.2.1, production and distribution of recycled water from the RWRF offers many advantages over the satellite recycled water facilities. The following are recommendations for implementation of recycled water for existing large users in each quadrant. These recommendations are also summarized in Table 5.4: Pipeline segments are identified in the figures in Chapter 4 along with the demands to be served from each segment.

- ***Southwest*** – The construction of the recycled water distribution system in the Southwest quadrant would begin with the pipeline segments 1 and 2 (Figure 4.6). These two segments mostly serve primarily irrigation customers and some industrial users for a total demand of approximately 1,800 AFY. Pipelines to high-priority visible sites such as City Hall (pipeline 4) and the proposed redevelopment "intensity corridor" in the downtown area should also be implemented in an early phase. Pipeline 1 also sets the stage for expansion into the northwest quadrant.

  The remainder of the southwest pipelines largely deliver recycled water to potential industrial users. After an outreach effort to determine willingness to participate in the recycled water program, the City should choose additional pipe segments to serve industries who wish to participate in the program.

  Northwest – The majority of pipeline segments in the northwest quadrant can be constructed following the construction of the first segments of the southwest quadrant system. Although the majority of the water use in the quadrant is served by pipeline segment 1 north of Herndon Avenue, building the additional pipelines south from Herndon Avenue will facilitate future expansion of the recycled water distribution system to serve infill development and the proposed "intensity corridors" along Highway 41.

- ***Northeast*** –The distribution pipeline from the Northwest Quadrant should be extended to serve users in the Northeast Quadrant as this allows serving a significantly greater reuse demand (Figure 4.8). It is also recommended that sewer flows in the northeast quadrant be diverted from downstream of the North Fresno WRF to supplement flows to that plant and improve its operability and service capabilities.

  Implementing the 0.7 mgd satellite facility at CSUF does not appear practical at this time due to the high cost and small demand for landscape irrigation associated with this alternative.

  Constructing a SRWF at Granite Park will be a more serviceable solution to serve the CSUF campus and agricultural area and the central area. The additional sewer flows in the Orange Avenue trunk will provide greater capacity and allow more reuse possibilities. The distribution system is separate from the backbone pipeline and can be implemented in any phase pending appropriate funding.

Table 5.4 Recommendations for Urban Reuse Recycled Water Master Plan City of Fresno				
City Quadrant	**Pipe Segments and Lengths**	**Major Users Served**	**Demand, AFY**	**Treatment Facilities Required, mgd**
Southwest	Pipe segments 1 and 2 – 15.32 miles	• Roeding Park • Kearney Park • 3 cemeteries • Chandler Airport • 3 industries (laundries) • Highway 180 and 99 • 3 schools	1,800	2.4
	Spur to City Center (part of pipe segment 4) – 2.5 miles	• City Hall/courthouse • Grizzlies stadium • 1 hospital	170	0.2
	Pipe segment 3 – 1.44 miles	• 3 schools	95	0.1
	Industrial users as possible (pipe segments 5 to 9 and remainder of 4) – 17.0 miles	• 14 industries • 7 parks • 10 schools	2,100	2.8
Northwest	All identified pipe segments – 28.1 miles	• Golf Courses: Riverside Golf Course, Islewood Golf Course, San Joaquin Country Club, Fig Garden Golf Course • Lake Van Ness • Highway 99 • 24 schools • 4 parks	1,900	5.3
Northeast	All identified pipe segments - 16.17 miles	• Woodward Park, • Fort Washington Country Club • Woodward Lake • 14 schools • 2 parks	2,720	3.9
	Pipe segment for Granite Park and CSUF – 3 miles	• Granite Park • CSUF • Schools • Parks	4,900	4.0
Southeast	All identified pipe segments - 7.35 miles	• Fairgrounds, • Fresno Pacific University • Sunnyside Country Club • Village Green Golf Course • 9 schools • 4 parks	995	2.8
Total Demand			9,780	

- ***Southeast*** – It is recommended that the pipeline from the southwest quadrant be extended eastwardly into the southeast quadrant to serve recycled water customers there (Figure 4.9). If the General Plan allocates growth in SEGA within the time frame of this Master Plan, then the City should consider building a SRWF in the westerly portion of the SEGA area that would link up with and extend the southeast distribution system. Siting a SRWF in SEGA would allow the City considerable flexibility in choosing a lower-cost treatment process, and land could be set aside to expand the facility in the future when sewer flows and potential recycled water demand increase due to growth. A SRWF in SEGA would also allow the area to be self-sustaining with respect to water management.

Providing recycled water to existing and future residential and commercial customers will be implemented following the adoption of the recycled water ordinance. New developments will be required to implement recycled water. Existing residential areas and home owners associations will be encouraged to use recycled water, but the implementation will likely take more time due to the education and outreach required. Once the "back bone" of the distribution system is established for the larger recycled water users, the City will have the flexibility to extend laterals up existing residential streets and through commercial areas to serve these users.

5.4.3 Agricultural Alternatives

Consistent with the TAG discussions, it is recommended that the City expand delivery of undisinfected secondary effluent to willing farmers adjacent to the RWRF. Delivery of undisinfected secondary effluent would help reduce the burden on the percolation ponds in the short term and requires minimal permitting and investment in infrastructure. Implementation of the reuse alternative would provide up to 4,200 AFY of recycled water supply.

The second agricultural alternative that should be considered is an agricultural exchange with FID. An agricultural exchange with FID would consist of delivery of either increased delivery of extracted percolate water or tertiary water from the RWRF in order to gain the full water supply benefit from an exchange with agricultural users, the City could begin negotiations with FID to establish the details of an updated (revised) exchange agreement. If negotiations are successful, the City could expand deliveries of extracted percolated effluent to FID (beyond the current limitation of 30,000 AFY). Little to no additional treatment would be required for this option. If the RWQCB for some reason revised its current policy of allowing extracted percolated effluent deliveries to FID canals, the plant effluent would have to be filtered and disinfected prior to delivery for unrestricted agricultural reuse.

For a successful potable water exchange agreement with FID, the City would need to have adequate recharge or treatment facilities to take advantage of the raw water "exchange". Additional facilities would be needed within the city to convey and treat FID's surface water

for potable use, or to recharge it to the groundwater aquifer. The City has master planned the expansion of the northeast water treatment plant and construction of another southeast water treatment plant for this purpose.

5.4.4 Groundwater Reuse Recharge Alternatives

It is recommended that groundwater recharge be implemented in the southwest, northwest and southeast quadrants of the City to the extent practical. The first step is to acquire lands for recharge and develop basins that can accept diluent water. These facilities could then be used immediately to take advantage of the City's allotted volume of FID and USBR water (or FMFCD water), even before recharge with recycled water begins. There should be continued coordination with the water division on the potential to recharge recycled water in the super recharge basins as they are developed.

5.4.5 Treatment, Management, and Administration of Recycled Water Program

It is recommended that the Wastewater Management Division of the Department of Public Utilities manage the recycled water system and provide the following services:

- treatment and compliance with Waste Discharge Requirements
- operation
- maintenance
- monitoring and inspection of customer connections
- distribution and sales
- billing and administration

The Wastewater Management Division operates and manages the Regional Wastewater Reclamation Facilities (RWRF). The RWRF will produce the majority of the recycled water that will be distributed city-wide. RWRF staff also operates and maintain the North Fresno WRF and oversee its recycling program. Staff will also operate and maintain any other future satellite plants that may be constructed to implement the recycling program.

Distribution and sales of recycled water should be assigned to the Wastewater Management Division. The costs for the current level of treatment (undisinfected secondary) are covered by the Wastewater Management Division's enterprise fund. This enterprise fund is also funding the RWRF's tertiary treatment upgrades and the recycled water distribution facilities. The Division invoices customers for sewer service. Rates will be set to cover capital and annual expenses. Planned sewer rate increases are intended to support the recycled water project. Billings for the use of recycled water could be administered by the Wastewater Division's current industrial billing group and charges included through the city's existing utility billing system.

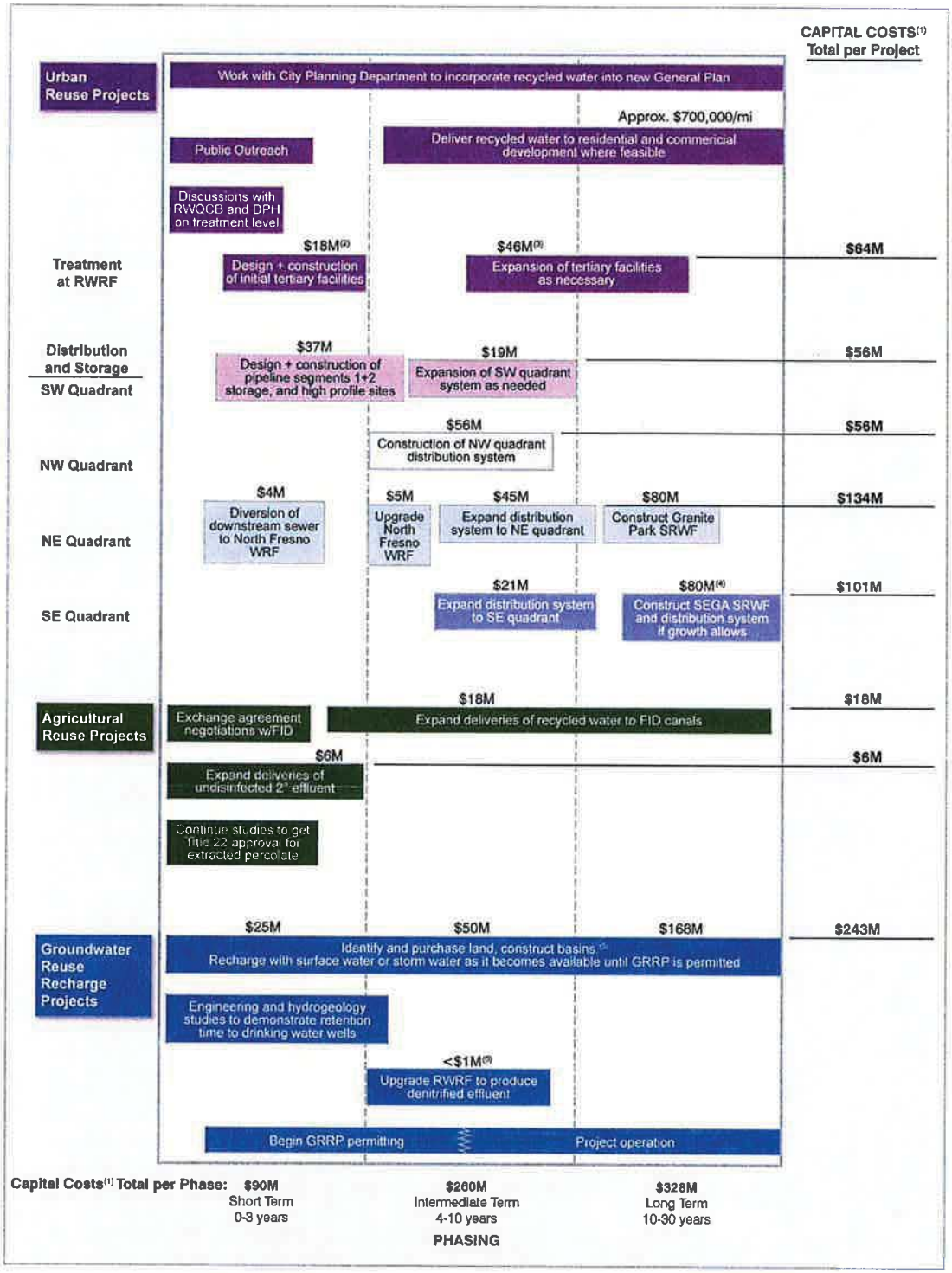
Other considerations that support the above recommendations to consolidate all elements of the recycled water program into the Wastewater Management Division are:

- The Division has a full time reclamation coordinator on staff to oversee implementation, distribution, and sales;
- The Division provides professionals skilled in other services similar to those needed to carry out the program. Customer connections, customer service, and O&M can be assimilated by the Division's staff and crews;
- The Division has developed a set of construction standards for recycled water service connections. Conformance to standards and construction oversight can be assimilated by the Division's staff and crews.
- The Division is responsible for complying with and carrying out the provisions of Waste Discharge Requirements for both the RWRF and the North Fresno WRF;
- The Division will be responsible for future WDRs for possible future satellite plants;
- The Division will be responsible for future Water Reclamation Requirements for the recycling program as well as issuing and administering permits for individual users;
- The Division provides a certified laboratory for water quality analyses of the recycled water;
- The Division is responsible for public outreach and education to promote the program.

5.5 PHASING RECOMMENDATIONS

Included in the section are the phasing recommendations for the recommended alternatives. A schedule for the recommended alternatives was developed based on three implementation periods: 1) short-term (zero to three years); 2) intermediate-term (four to ten years); and 3) long-term (10 to 30 years).

The phasing of the elements of the recommended project alternatives along with the associated costs are presented in Figure 5.2. Figure 5.3 shows a map of the phased pipeline construction for delivery to urban users, including the order in which the pipelines would be installed.



Notes:

(1) Costs are construction costs and are exclusive of design or administrative/legal costs, negotiations and agreements with other agencies, and costs for hydrology studies.

(2) Assume media filters and UV disinfection, 8-mgd initial facilities sized to serve SW segments 1 and 2 and NW quadrant.

(3) Expanded to 32-mgd (assuming tertiary treatment not needed for agricultural reuse).

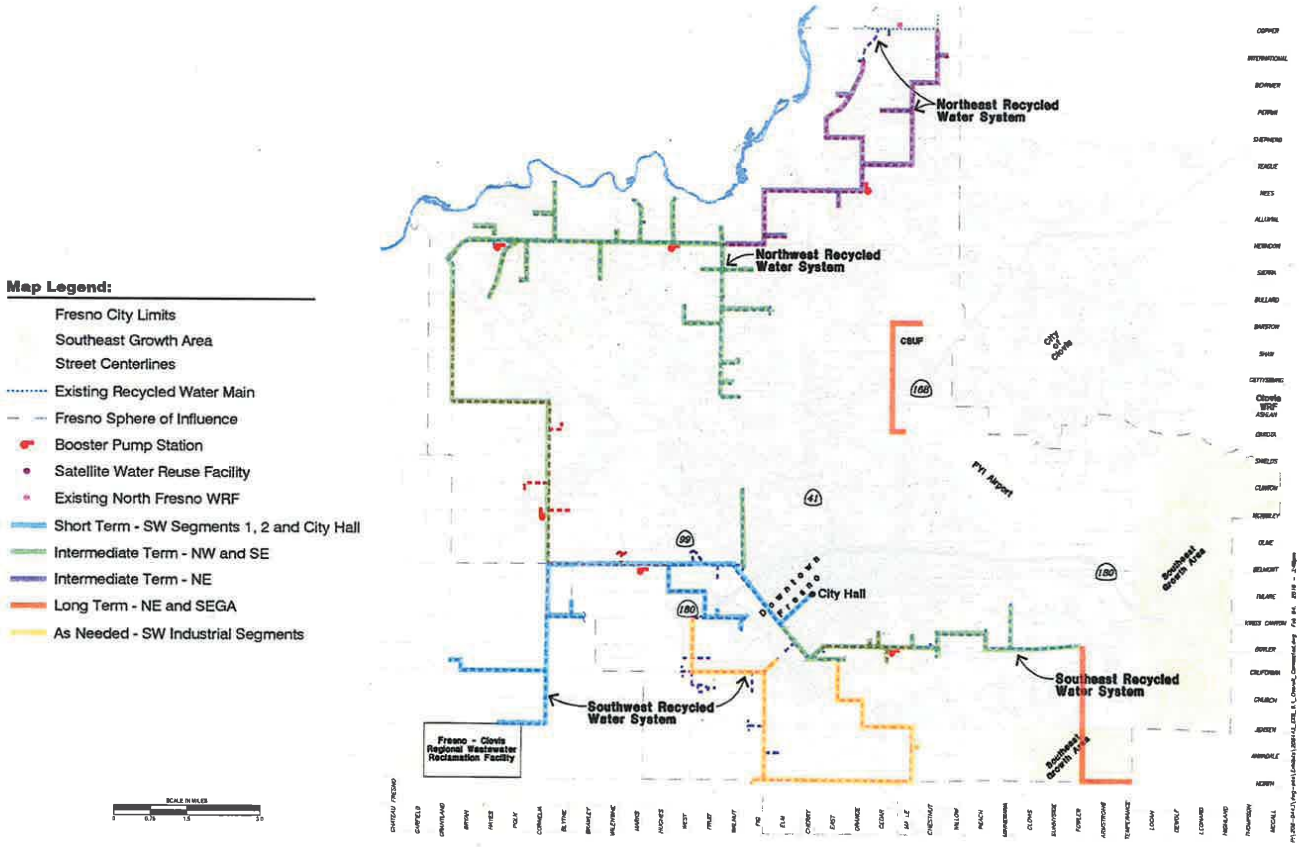
(4) Assuming a 15-mgd activated sludge w/NdN facility, no pipeline costs included. See 2006 Satellite Plant Study Update.

(5) Basin acquisition and construction rate of 70 acres/yr.

(6) Minimal cost since facilities were designed to nitrify/denitrify.

Figure 5.2
RECYCLED WATER PROJECT PHASING AND CAPITAL PROGRAM
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

fr410f1-8230.ai



Note:
Distribution is primarily to serve urban users.
GRRP opportunities will be served from urban distribution system.
System does not accommodate agricultural reuse of exchange projects.

Figure 5.3
SCHEMATIC OF DISTRIBUTION SYSTEM PHASING
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

fr410f2-8230.ai

5.5.1 Short-Term – 0 to 3 Years

The following project elements are recommended to be implemented in the short term:

Urban Reuse Projects

- Adopt program level environmental impact report (EIR) for city recycled water program.
- Adopt recycled water ordinance and rules and regulations to encourage and/or require existing and new users to use recycled water.
- Plan, design and begin construction for three parallel short-term projects.
  - Add tertiary facilities to RWRF
  - Segments 1 and 2 of southwest quadrant distribution system
  - Increase sewer diversion to NFWRF to provide adequate supply for reuse in northeast quadrant
- Irrigate freeways in the vicinity of the Highway 180/99 interchange from pipe segment 1.
- Continue public outreach and education for public and potential users to increase community acceptance of recycled water for irrigation and industrial use.
- Pipeline to high-profile areas such as City Hall. Begin an industrial outreach program to bring industries into the recycled water program, and build additional pipeline segments to serve these industries.
- Tertiary/disinfection facilities should be sized for the short-term projects at 8 million gallons per day (mgd) with a modular approach for future expansion in 4-mgd increments.
- Work with City Planning and Water Division to coordinate efforts for implementing recycled water in the General Plan Update and ongoing water planning documents. .

5.5.2 Agricultural Reuse/Exchange Projects

- Expand deliveries of undisinfected secondary to effluent willing local farmers for restricted use.
- Conduct negotiations with FID on exchange agreement to increase raw water deliveries to City recharge sites.
- Continue studies and discussions with the DPH to obtain approval for extracted percolated effluent as equivalent to Title 22 recycled water.

Groundwater Reuse Recharge Projects

- Identify and purchase land, which in the short term will be used to percolate raw water from FID (under the current agreement).

- Retain the services of a hydrogeologist to help select sites for GRRPs.
- Begin studies necessary for the permitting process and public hearings.
- Begin tracer studies to determine potential basins' hydraulic retention time to drinking water wells.
- Identify diluent water sources.

5.5.3 Intermediate-Term – 4 to 10 Years

The following project elements are recommended to be implemented in the intermediate term:

Urban Reuse Projects

- Expand the recycled water distribution system into the northwest quadrant and southeast quadrant, followed by the northeast quadrant. Begin building laterals for residential and commercial users where feasible.
- Expand the recycled water distribution system to new users in the southwest quadrant.
- Continue to work with City Planning and Water Division for delivery of recycled water to infill growth where feasible.
- Expand the RWRF's tertiary facilities in 4 mgd increments as necessary to serve additional users.

Agricultural Reuse/Exchange Projects

- If negotiations with FID for raw water exchange are successful and DPH and RWQCB allows the continued practice of percolated water extractions, expand deliveries of extracted percolate to FID canals.
- Deliver tertiary disinfected water to FID canals if feasible.

Groundwater Reuse Recharge Projects

- Continue to recharge surface water in the new basins until the recharge project is permitted.
- Continue GRRP permitting and begin project operation.
- Continue to acquire more land for more basins as opportunities arise.

5.5.4 Long-Term – 10 to 30 Years

The following project elements are to be implemented in the long term:

Urban Reuse Projects

- Construct a new SRWF at Granite Park.
- If SEGA is to be developed during this time frame, construct a new SRWF in SEGA.
- Continue to expand the recycled water distribution system to deliver recycled water to residential and commercial development where feasible.

Agricultural Reuse/Exchange Projects

- Continue deliveries and exchange with FID.

Groundwater Reuse Recharge Projects

- Continue to operate and expand the City's GRRP system.

APPENDIX A – CDPH DRAFT REGULATIONS

CITY OF FRESNO INCORPORATED OCT. 12, 1885

This draft reflects the California Department of Public Health (CDPH) Drinking Water Program's current thinking on the regulation of recharge of groundwater with recycled municipal wastewater.

Any comments you have on this draft can be emailed to Jeff Stone at Jeffrey.Stone@cdph.ca.gov and Mike McKibben at Michael.McKibben@cdph.ca.gov .

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Title 22, CALIFORNIA CODE OF REGULATIONS

DIVISION 4. ENVIRONMENTAL HEALTH

CHAPTER 3. RECYCLING CRITERIA

August 5, 2008

ARTICLE 1. DEFINITIONS

Section 60301.080. 24-hour Composite Sample.

"24-hour composite sample" means an aggregate sample derived from no fewer than eight discrete samples collected at equal time intervals or collected proportional to the flow rate over the compositing period. The aggregate sample shall reflect the average source water quality covering the composite of sample period.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.190. Diluent Water.

"Diluent water" means water used to dilute recycled municipal wastewater in a groundwater recharge reuse project.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.370. Groundwater.

"Groundwater" means water below the land surface in the saturated zone.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

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Section 60301.390. Groundwater Recharge Reuse Project (GRRP)

"Groundwater Recharge Reuse Project (GRRP)" means a project that uses recycled municipal wastewater, has been planned and is operated for the purpose of recharging a groundwater basin designated in the Water Quality Control Plan [defined in Water Code section 13050(j)] for use as a source of domestic water supply, and has been identified as a GRRP by the RWQCB.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Sections 13520, 13521, and 13050(j), Water Code.

Section 60301.670. Project Sponsor.

"Project sponsor" means any agency that receives water recycling requirements for a GRRP from a RWQCB and is, in whole or part, responsible for the GRRP meeting the requirements of this Chapter.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.680. Public Water System.

"Public Water System" has the same meaning as defined in section 116275(h) of the Health and Safety Code.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 116275(h), Health and Safety Code.

Section 60301.685. Recharge Water.

"Recharge Water" means either recycled municipal wastewater or the combination of recycled municipal wastewater and diluent water that is applied at a GRRP facility.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 116275(h), Health and Safety Code.

Section 60301.690. Recycled Municipal Wastewater.

"Recycled Municipal Wastewater" means the effluent from the treatment of a wastewater of municipal origin, suitable for a direct beneficial use or a controlled use.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13050, Water Code.

Section 60301.705. Recycled Water Contribution (RWC).

"Recycled water contribution (RWC)" means the quantity of recycled municipal wastewater applied at the GRRP, divided by the sum of the recycled municipal wastewater applied at the GRRP and diluent water meeting the requirements of section 60320.035.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.770. RWQCB.

"RWQCB" means Regional Water Quality Control Board.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.780. Saturated Zone.

"Saturated zone" means an underground region in which all interstices in, between, and below natural geologic materials are filled with water, with the uppermost surface of the saturated zone being the water table.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.810. Spreading Area.

"Spreading area" means a natural or constructed impoundment with a depth equal to or less than its widest surface dimension used by a GRRP to recharge a groundwater basin with recharge water infiltrating and percolating through an otherwise (i.e. without the presence of recharge water) unsaturated zone.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.840. Subsurface Application.

"Subsurface Application" means the controlled application of recharge water to a groundwater basin by a means other than surface application.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.850. Surface Application.

"Surface Application" means the controlled application of recharge water to a spreading area resulting in the recharge of a groundwater basin.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.860. Total Nitrogen.

"Total nitrogen" means the sum of concentrations of nitrogen in ammonia, nitrite, nitrate, and organic nitrogen-containing compounds, expressed as nitrogen.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.870. Total Organic Carbon (TOC).

"Total organic carbon (TOC)" means the concentration of organic carbon present in water that is able to be oxidized to carbon dioxide.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60301.910. Unsaturated Zone.

"Unsaturated Zone" means the volume between the land surface and the saturated zone.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

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ARTICLE 5.1. GROUNDWATER RECHARGE

~~**Section 60320. Groundwater Recharge.**~~

~~(a) Reclaimed water used for groundwater recharge of domestic water supply aquifers by surface spreading shall be at all times of a quality that fully protects public health. The State Department of Health Services' recommendations to the Regional Water Quality Control Boards for proposed groundwater recharge projects and for expansion of existing projects will be made on an individual case basis where the use of reclaimed water involves a potential risk to public health.~~

~~(b) The State Department of Health Services' recommendations will be based on all relevant aspects of each project, including the following factors: treatment provided; effluent quality and quantity; spreading area operations; soil characteristics; hydrogeology; residence time; and distance to withdrawal.~~

~~(c) The State Department of Health Services will hold a public hearing prior to making the final determination regarding the public health aspects of each groundwater recharge project. Final recommendations will be submitted to the Regional Water Quality Control Board in an expeditious manner.~~

Note: ~~Authority cited: Section 208, Health and Safety Code; and Section 13521, Water Code. Reference: Sections 13520 and 13521, Water Code.~~

Section 60320. General Requirements.[1]

(a) Recycled municipal wastewater used for a GRRP shall be from a wastewater management agency that:

(1) administers an industrial pretreatment and pollutant source control program;

(2) implements and maintains a source control program that includes at a minimum:

(A) an assessment of the fate of Department-specified contaminants through the wastewater and recycled municipal wastewater treatment systems,

(B) contaminant source investigations and contaminant monitoring that focus on Department-specified contaminants,

(C) an outreach program to industrial, commercial, and residential communities within the sewage collection agency's service area for the purpose of managing and minimizing the discharge of contaminants of concern at the source, and

(D) an up-to-date inventory of contaminants discharged into the wastewater collection system so that new contaminants of concern can be readily evaluated.

(3) is compliant with the effluent limits established in the RWQCB permit for the GRRP.

[1] The Department is considering the inclusion of a provision for operator certification and/or training.

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(b) Prior to operation of a new GRRP, or during the first year of operation after [*insert effective date*] for an existing GRRP, the GRRP shall have a Department approved plan that provides an alternative source of domestic water supply, or a Department approved treatment mechanism, to any user of a producing drinking water source that, as a result of the GRRP;

(1) violates California drinking water standards,

(2) has been degraded to the degree that it is no longer a safe source of drinking water, or

(3) receives water that fails to meet subsection 60320.010(c)..

(c) A public hearing for a GRRP shall be held prior to the Department's submittal of its recommendations for the GRRP's initial permit to the RWQCB and any time an increase in maximum RWC has been proposed but not addressed in a prior public hearing. Prior to a public hearing, the project sponsor shall provide the Department, for review and approval, the information the project sponsor intends to present at the hearing and on the Internet. Following the Department's approval of the information, the project sponsor shall place the information on the Internet and in a repository that provides at least thirty days of public access to the information prior to the public hearing.

(d) Prior to placing the information required pursuant to subsection (c) in a repository, the GRRP shall:

(1) Notify the public of the following;

(A) the location and hours of operation of the repository,

(B) the Internet address where the information may be viewed,

(C) the purpose of the repository and public hearing,

(D) the manner in which the public can provide comments, and

(E) the date, time, and location of the public hearing.

(2) At a minimum, notify the first downgradient potable water well owner and well owners whose drinking water source is within 10 years from the GRRP based on groundwater flow directions and velocities.

(e) Unless directed otherwise by the Department, the public notification made pursuant to subsection (d)(2) shall be by direct mail and the notification made pursuant to (d)(1) shall be by one or more of the following methods delivered in a manner to reach persons whose source of drinking water may be impacted by the GRRP:

(1) Local newspaper(s) publication;

(2) Mailed or direct delivery of a newsletter;

(3) Conspicuously placed statement in water bills; or

(4) Television and/or radio.

(f) Prior to operation, a new GRRP shall have an Operations Plan submitted to and approved by the Department. An existing GRRP shall maintain, and make available to the Department or RWQCB for review when requested, an

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Operations Plan. An Operations Plan shall describe the operations, maintenance, and monitoring necessary for the GRRP to meet the requirements of this chapter. The project sponsor shall be responsible for ensuring that the Operations Plan is, at all times, representative of the current operations, maintenance, and monitoring of the GRRP.

(g) Prior to operating a new GRRP, the project sponsor shall collect at least two samples from each monitoring well approved pursuant to section 60320.070. The samples shall be representative of water in each aquifer, taking into consideration seasonal variations, and be analyzed for the constituents and characteristics in sections 60320.020, 60320.030, 60320.045 and 60320.47.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.005 Alternatives.

(a) A GRRP may use an alternative to a requirement in this chapter if the GRRP has:

(1) demonstrated to the Department that the proposed alternative would assure at least the same level of protection to public health;

(2) received written approval from the Department prior to implementation of the alternative; and

(3) conducted a public hearing, disseminated information to the public, and received public comments, pursuant to subsections 60320(c) and (d), on the proposed alternative.

(b) Surface application GRRPs that provide reverse osmosis treatment as well as subsequent advanced oxidation treatment to the entire recycled municipal wastewater may apply to the Department for less frequent monitoring than that required in sections **XXXX**[2]. The advanced oxidation treatment shall provide, at minimum, a level of treatment equivalent to a 1.2 log N-nitrosodimethylamine (NDMA) reduction and a 0.5 log 1,4-dioxane reduction.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.007 Laboratory Analyses.

(a) Analyses for contaminants having primary or secondary MCLs shall be performed by laboratories approved to perform such analyses by the Department utilizing Department-approved drinking water methods and,

[2] The applicable reduced monitoring is under discussion.

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(b) Analyses for constituents other than those having primary or secondary MCLs shall be described in the GRRP's Operations Plan prepared pursuant to subsection 60320(f).

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.010. Control of Pathogenic Microorganisms.

(a) For each GRRP, the wastewater to be used as recycled municipal wastewater shall be treated to meet the following:

(1) The definition of filtered wastewater, pursuant to section 60301.320[3]; and

(2) The definition of disinfected tertiary recycled water, pursuant to section 60301.230[3].

(b) If the recycled municipal wastewater being used for surface or subsurface application has not been treated to meet the criteria in sections 60301.230 and 60301.320, pursuant to section 60321 (Sampling and Analysis), the GRRP shall:

(1) Suspend surface or subsurface application of the recycled municipal wastewater until the criteria are met; and

(2) Inform the Department and the RWQCB in the next quarterly report submitted pursuant to section 60321[3].

(c) For each GRRP, the recycled municipal wastewater shall be retained underground for a minimum of six months prior to extraction for use as a drinking water supply.

(d) To demonstrate that the minimum retention time in subsection (c) has been met, prior to the end of the third month of operation (including prior to initial operation), under hydraulic conditions representative of normal GRRP operations the GRRP shall initiate a tracer study utilizing an added tracer (e.g. sulfur hexafluoride). Based the time for two percent of the tracer concentration to arrive at its endpoint from the GRRP location (T_2), the results of the tracer study shall provide evidence of;

(1) A minimum retention time of six months, with the nearest downgradient drinking water well as the endpoint or,

(2) A minimum retention time of three months, with the monitoring well sited pursuant to paragraph 60320.070(a)(1) as the endpoint.

(e) If the retention time to nearest downgradient drinking water well is less than twelve months based on the extrapolation of the results of the tracer study performed pursuant to paragraph (d)(2), the GRRP shall monitor the tracer, with

[3] Refers to existing regulations not shown in this document.

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the nearest downgradient drinking water well as the endpoint, until compliance with paragraph (d)(1) has been demonstrated.

(f) Until a GRRP has demonstrated compliance with subsection (c) pursuant to subsection (d), i.e. for the purpose of siting a GRRP location during project planning, each GRRP shall be located at a distance from drinking water supply wells that ensures that one of the estimated retention times in Table 60320.010-A is met, as indicated by the corresponding method used to determine the estimated retention times.

Table 60320.010-A

Method used to estimate the retention time to the nearest downgradient drinking water well	**Minimum Estimated Retention Time**
Tracer study utilizing an intrinsic tracer based on T_{10} (i.e. the time for 10% of tracer concentration to reach the endpoint) conducted under hydraulic conditions representative of normal GRRP operations.	9 months
Numerical modeling (i.e. calibrated finite element or finite difference models using verified computer codes such as Modflow, Feflow, Sutra, Femwater, etc.)	12 months
Analytical modeling (i.e. Using existing equations such as Darcy's Law to estimate groundwater flow conditions based on simplifying aquifer assumptions)	24 months

(g) A method used to establish the retention times in subsections (d) or (f) shall be approved by the Department.

(h) A GRRP shall provide the Department and RWQCB a map of the GRRP site at a scale of 1:24,000 or larger (1 inch equals 2,000 feet or 1 inch equals less than 2,000 feet) or, if necessary, a site sketch at a scale providing more detail, that clearly indicates;

(A) The location and boundaries of the GRRP,

(B) The boundary representing the six-month retention time required in paragraph (c) as determined in paragraph (d) or (f), whichever is most recent, and

(C) The location of all drinking water supply wells and monitoring wells within three years of the GRRP based on groundwater flow directions and velocities expected under GRRP operating conditions.

(i) The Department may require the GRRP to demonstrate that the underground retention times required in this section are being met if changes in



hydrogeological or climatic conditions have occurred since the most recent demonstration.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.020. Control of Nitrogen Compounds.

To demonstrate control of the nitrogen compounds in the recycled municipal wastewater, the project sponsor shall meet the requirements of one of the methods in subsections (a), (b), or (c). Method 3, described in subsection (c), may only be utilized by a GRRP that has been in operation for a minimum of twenty years. (These requirements are summarized in a table at the end of this document, see ENDNOTE 7)

(a) Method 1:

(1) Each week, at least three days apart as specified in the GRRP's Operation Plan, two samples (grab or 24-hour composite) representative of the recycled municipal wastewater or recharge water applied throughout the spreading area or subsurface application area shall be collected. Samples may be collected before or after surface or subsurface application.

(2) Samples collected pursuant to subsection (a)(1) shall be analyzed for total nitrogen, with the laboratory being required to complete each analysis within 72 hours and have the result reported to the project sponsor within the same 72 hours if the result of any single sample exceeds 5 mg/L.

(A) If the average of two consecutive samples exceeds 5 mg/L total nitrogen, the cause shall be investigated, appropriate actions to reduce the total nitrogen levels shall be taken, and the Department and the RWQCB shall be notified within 48 hours of the GRRP being notified by the laboratory.

(B) If the average of all samples collected during any consecutive four weeks exceeds 5 mg/L, the surface or subsurface application of recycled municipal wastewater shall be suspended. Surface or subsurface application shall not resume until appropriate corrective actions are made and two consecutive total nitrogen samples are less than 5 mg/L.

(b) Method 2:

(1) At a frequency approved by the Department and specified in the operations plan prepared pursuant to section 60320(f):

(A) samples shall be collected and analyzed for dissolved oxygen (DO) in the groundwater that has been blended with the recharge water and;

(B) samples (grab or 24-hour composite) representative of the recycled municipal wastewater or recharge water shall be collected and analyzed for nitrate, nitrite, ammonia, organic nitrogen, DO, and BOD.

(2) The GRRP shall ensure that the laboratory completes each analysis in (b)(1) within 72 hours (one week for BOD) and report the result(s) to the project sponsor within the same 72 hours (one week for BOD) if:

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(A) the total nitrogen exceeds 10 mg/L, or

(B) the concentration of any constituent exceeds the respective limit identified in the engineering report and approved by the Department.

(3) If the average of two consecutive samples exceeds 10 mg/L total nitrogen or a limit identified in the engineering report for another constituent, the cause shall be investigated, appropriate actions to meet the limit(s) shall be taken, the Department and the RWQCB shall be notified within 24 hours of the GRRP being notified by the laboratory, and surface or subsurface application of recycled municipal wastewater shall be suspended until an average of two consecutive samples meets the limit(s).

(c) Method 3:

(1) In the engineering report prepared pursuant to section 60323, evidence shall be provided that:

(A) it is possible to track the movement of recharge water from the GRRP surface or subsurface application facility to downgradient potable water wells located within 20 years of the GRRP based on groundwater flow directions and velocities,

(B) the most recent year's total nitrogen levels in the recycled municipal wastewater is not greater than the most recent 10 years of historical data, and

(C) surface or subsurface application has not resulted in, and would not result in, an exceedance of the nitrate or nitrite MCLs at any downgradient potable water wells located within 20 years of the GRRP based on groundwater flow directions and velocities. At a minimum, the evidence shall consist of at least the most recent 10 years of historical data, and shall demonstrate that no potable water well, as a result of the operation of the GRRP:

1. exceeded the nitrate or nitrite MCLs or

2. has had a trend of increasing concentrations of nitrate or nitrite that would lead to a nitrate or nitrite MCL exceedance utilizing the GRRP's current operations.

(2) At the frequency specified in the operations plan prepared pursuant to subsection 60320(f), two grab samples of groundwater at each sampling location downgradient of the GRRP's surface or subsurface application facility shall be collected and analyzed for nitrite and nitrate. The GRRP shall ensure that the laboratory completes each analysis within 72 hours and shall report any result exceeding the nitrate or nitrite MCL to the project sponsor within the same 72 hours.

(A) If the average of two consecutive samples exceeds an MCL at any sampling location, the Department and RWQCB shall be notified and, unless the GRRP demonstrates to the Department and RWQCB that the groundwater no longer exceeds the MCL, the surface or subsurface application of recycled municipal wastewater shall be suspended.

(d) The GRRP may apply for reduced total nitrogen or nitrate/nitrite monitoring frequencies if all results for the previous two years did not exceed;

(1) 5 mg/L total nitrogen and one-half the nitrate and nitrite MCL for Method 1, or

(2) 10 mg/L total nitrogen and one-half the nitrate and nitrite MCL for Method 2.

(e) If a GRRP implementing reduced monitoring pursuant to subsection (d) exceeds the total nitrogen, nitrate, or nitrite concentrations in (d)(1) or (d)(2), the GRRP shall revert to the monitoring frequencies for total nitrogen, nitrate, and nitrite prior to the frequency being reduced.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.030. Control of Regulated Chemicals and Physical Characteristics.

(a) Each calendar quarter, as specified in the GRRP's operations plan, the GRRP shall collect grab samples representative of the applied recycled municipal wastewater and have the samples analyzed for the contaminants listed below.

(1) The inorganic chemicals in Table 64431-A, except for nitrogen compounds;

(2) The radionuclide chemicals in Tables 64442 and 64443;

(3) The organic chemicals in Table 64444-A;

(4) The disinfection byproducts in Table 64533-A; and

(5) Lead and copper.

(b) Recharge water may be monitored in lieu of recycled municipal wastewater to satisfy the monitoring requirements in paragraph (a)(4) if the fraction of recycled municipal waste water in the recharge water is equal to or greater than the average fraction for the quarter. If the fraction of recycled municipal waste water in the recharge water being monitored is less than the average fraction applied for the quarter, the reported value shall be adjusted to account for any dilution.

(c) Each year, the GRRP shall collect at least one representative grab sample of the recycled municipal wastewater and have the sample(s) analyzed for the secondary drinking water constituents in Tables 64449-A and 64449-B.

(d) If a result of the monitoring performed pursuant to subsection (a) exceeds a contaminant's MCL or action level (for lead and copper), the GRRP shall collect another sample and have it analyzed for the contaminant as confirmation within 72 hours.

(1) For a contaminant whose compliance with its MCL is not based on a running annual average (see Endnote 1), if the average of the initial and confirmation sample exceeds the contaminant's MCL, or the confirmation sample

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is not collected and analyzed pursuant to this subsection, the GRRP shall notify the Department and RWQCB within 24 hours and initiate weekly monitoring until four consecutive weekly results are below the contaminant's MCL.

(A) If the running four-week average exceeds the acute contaminant's MCL, the GRRP shall notify the Department and RWQCB within 24 hours and, if directed by the Department or RWQCB, suspend application of the recycled municipal wastewater.

(2) For a contaminant whose compliance with its MCL is based on a running annual average, if the average of the initial and confirmation sample exceeds the contaminant's MCL or action level, or a confirmation sample is not collected and analyzed pursuant to this subsection, the GRRP shall initiate weekly monitoring for the contaminant until the running four-week average no longer exceeds the contaminant's MCL or action level.

(A) If the running four-week average exceeds the contaminant's MCL or action level, the GRRP shall describe the reason(s) for the exceedance and provide a schedule for completion of corrective actions in the next quarterly report submitted to RWQCB pursuant to section 60321, with a copy provided to the Department.

(B) If the running four-week average exceeds the contaminant's MCL or action level for sixteen weeks, the GRRP shall notify the Department and RWQCB within 24 hours and, if directed by the Department or RWQCB, suspend application of the recycled municipal wastewater.

(e) With the exception of color, if an annual result of the monitoring performed pursuant to (c) exceeds a constituent's secondary MCL in Table 64449-A or the upper limit in Table 64449-B, the GRRP shall initiate quarterly monitoring of the municipal wastewater for the constituent and, if the running annual average of quarterly results exceeds a constituent's secondary MCL or upper limit, describe the reason(s) for the exceedance and any corrective actions taken in the next quarterly report submitted to RWQCB pursuant to section 60321, with a copy provided to the Department. The annual monitoring in (c) may resume if the running annual average of quarterly results does not exceed a constituent's secondary MCL or upper limit.

(f) If four consecutive quarterly results for asbestos are below the detection limit for asbestos, monitoring for asbestos may be reduced to one sample every three years. Quarterly monitoring shall resume if asbestos is detected.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.035. Diluent Water Requirements.

To be credited with diluent water to be used in calculating an RWC to meet the requirements of section 60320.041, the GRRP shall comply with the requirements of this section. For diluent water that is a Department approved

drinking water source, the GRRP is exempt from subsections (a) and (b). The GRRP shall:

(a) Monitor the diluent water quarterly for nitrate and nitrite and, within 72 hours of being informed by the laboratory of a nitrate or nitrite result exceeding an MCL, collect a confirmation sample. If the average of the two samples is greater than an MCL;

(1) notify the Department and the RWQCB within 48 hours of receiving the confirmation sample result,

(2) investigate the cause(s) and implement corrective actions, and

(3) each week, collect and analyze two grab samples at least three days apart as specified in an operations plan. If the average of the results for a two-week period exceeds the MCL, surface or subsurface application of the diluent water shall not be used in the calculation of RWC until corrective actions are made. Quarterly monitoring may resume if four consecutive results are below the MCL.

(b) Conduct a source water evaluation per California-Nevada Section of American Water Works Association watershed sanitary survey handbook, or other Department approved evaluation, of the diluent water for Department review and approval that includes, but is not limited to:

(1) a description of the source of the diluent water,
(2) delineation of the origin and extent of the diluent water,
(3) the susceptibility of the diluent water to contamination,
(4) the identification of known or potential contaminants, and
(5) an inventory of the potential sources of diluent water contamination.

(c) Implement a Department-approved water quality monitoring plan for the purpose of demonstrating that the diluent water meets Department specified primary MCLs and notification levels based on the source water evaluation performed in (b). The plan shall also include:

(1) Monitoring of any constituents listed in section 62320.047, based on the source water evaluation performed in (b), and;

(2) Actions to be taken in the event of non-compliance with a primary MCL or failing to meet a notification level.

(d) Develop a method for accurately determining the volume of diluent water to be credited, including consideration of any temporal variations, and demonstrate that the diluent water will be applied in a manner such that temporal variations in the diluent water volume will not lead to an exceedance of the maximum RWC. The method shall be submitted to the Department for review and approval and be conducted at the frequency specified in the engineering report prepared pursuant to section 60323.

(e) For credit not to exceed 60 months prior to the operation of the GRRP:

(1) demonstrate that the diluent water has met the nitrate and nitrite MCLs and the water quality requirements in sections 60320.030 and 60320.047(a)(1)(A),

(2) provide evidence that the quantity of diluent water has been accurately determined and was distributed such that the proposed or permitted maximum RWC will not be exceeded, and

(3) conduct a source water evaluation of the diluent water pursuant to subsection (c).

(f) In the operations plan prepared pursuant to 60320(f), include a description of:

(1) How the diluent water will be distributed in a manner that ensures that the maximum RWC will not be exceeded during normal operations; and

(2) The actions to be taken in the event the diluent water is curtailed or is no longer available.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.041. Recycled Water Contribution (RWC) Requirements

(a) Each month, for each surface or subsurface application facility used for replenishing a groundwater basin, the GRRP shall calculate its running monthly average (RMA) RWC based on the total volume of the recycled municipal wastewater and diluent water for the preceding 60 calendar months. For GRRPs in operation less than 60 months, calculation of the RMA RWC shall commence after 30 months of operation, based on the total volume of the recycled municipal wastewater and diluent water for the preceding months.

(b) The GRRP's RMA RWC, as determined in (a), shall not exceed the maximum RWC specified by the Department.

(c) The initial maximum RWC will be based on the Department's review of the engineering report and information obtained as a result of the public hearing, but shall not exceed;

(1) 0.50 for subsurface application GRRPs;

(2) 0.50 for surface application GRRPs that provide reverse osmosis treatment as well as subsequent advanced oxidation treatment to the entire recycled municipal wastewater, if the advanced oxidation[4] treatment provides, at minimum, a level of treatment equivalent to a 1.2 log NDMA reduction and a 0.5 log 1,4-dioxane reduction or;

(3) 0.20 for surface application GRRPs not meeting the criteria in paragraph (2).

[4] The requirement for advanced oxidation for all subsurface application GRRPs is under discussion.

(d) A GRRP may increase its maximum RWC, provided that:

(1) the increase has been approved by the Department and RWQCB,

(2) for the previous 52 consecutive weeks, the TOC 20-week running average, as monitored pursuant to section 62320.045, has not exceeded the following:

$$TOC_{max} = \frac{0.5 mg/L}{RWC_{proposed}},$$

Where,
$RWC_{proposed}$ is the proposed maximum RWC

(3) the GRRP has received a permit from the RWQCB that allows operation of the GRRP at the increased maximum RWC, and

(4) the GRRP meets the requirements in subsections (e) and (f).

(e) Prior to operating a GRRP in any of the RWC ranges in Table 60320.041 exceeding the GRRP's initial RWC, the GRRP shall meet the corresponding requirements in Table 60320.041-A or B sequentially, beginning with the range of the approved initial maximum RWC. The approval in subsection (d)(1) will be based on the Department's and the RWQCB's review of the information submitted pursuant to the corresponding RWC range in Table 60320.041-A or B and the GRRP's history of compliance with this chapter.

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Table 60320.041-A
Surface Application Projects

GRRP RWC Operating Range Requirements For Operating Ranges A through E, where A = 0.00 ≤ RWC < 0.20 B = 0.20 ≤ RWC < 0.35 C = 0.35 ≤ RWC < 0.50 D = 0.50 ≤ RWC < 0.75 E = 0.75 ≤ RWC ≤ 1.00	**RWC Operating Range**				
	A	B	C	D	E
1. Provide documentation that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least six months such that the fraction of the GRRP's recycled municipal wastewater in the monitoring well equals a value of at least 0.5 multiplied by $RWC_{proposed}$.		✓	✓	✓	✓
2. The groundwater impacted by a GRRP from a monitoring well and a drinking water well meets all drinking water standards and the requirements of section 60320.020 (Control of Nitrogen Compounds).		✓	✓	✓	✓
3. Provide a proposal to the Department prepared and signed by an engineer licensed in California with at least three years experience in wastewater treatment and public water supply. The proposal shall include:	✓	✓	✓	✓	✓
A. GRRP operations, monitoring, and compliance data;	✓	✓	✓	✓	✓
B. Evidence that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least one year such that the fraction of the GRRP's recycled municipal wastewater in the monitoring well equals a value of at least 0.8 multiplied by $RWC_{maximum}$.;		✓	✓	✓	✓
C. Validation of appropriate construction and siting of monitoring wells pursuant to section 60320.070.	✓	✓	✓	✓	✓
D. A scientific peer review by an independent advisory panel that includes, as a minimum, a toxicologist, a registered engineering geologist or hydrogeologist, an engineer licensed in California with at least three years experience in wastewater treatment and public water supply., a microbiologist, and a chemist.				✓	✓
E. Submittal of an updated engineering report and operations plan.		✓	✓	✓	✓
4. At a minimum, for that portion of the recycled municipal wastewater stream needing additional treatment to meet the TOC limit in section 60320.045, provide reverse osmosis[5]	✓	✓	✓	✓	✓

[5] Performance criteria for reverse osmosis treatment is under discussion.

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treatment as well as subsequent advanced oxidation treatment. The advanced oxidation treatment[6] shall provide, at minimum, a level of treatment equivalent to a 1.2 log NDMA reduction and a 0.5 log 1.4-dioxane reduction, whether NDMA or 1,4-Dioxane are present or not.					

Table 60320.041-B
Subsurface Application Projects

GRRP RWC Operating Range Requirements For Operating Ranges A through C, where A = 0.00 ≤ RWC < 0.50 B = 0.50 ≤ RWC < 0.75 C = 0.75 ≤ RWC ≤ 1.00	**RWC Operating Range**		
	A	B	C
1. Provide documentation that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least six months such that the fraction of the GRRP's recycled municipal wastewater in the monitoring well equals a value of at least 0.5 multiplied by $RWC_{proposed}$.		✓	✓
2. The groundwater impacted by a GRRP from a monitoring well and a drinking water well meets all drinking water standards and the requirements of section 60320.020 (Control of Nitrogen Compounds).		✓	✓
3. Provide a proposal to the Department prepared and signed by an engineer licensed in California with at least three years experience in wastewater treatment and public water supply.. The proposal shall include:	✓	✓	✓
A. GRRP operations, monitoring, and compliance data;	✓	✓	✓
B. Evidence that a groundwater monitoring well located between the GRRP and a drinking water well has received recharge water from the GRRP for at least one year such that the fraction of the GRRP's recycled municipal wastewater in the monitoring well equals a value of at least 0.8 multiplied by $RWC_{maximum}$.;		✓	✓
C. Validation of appropriate construction and siting of monitoring wells pursuant to section 60320.070.	✓	✓	✓
D. A scientific peer review by an independent advisory panel that includes, as a minimum, a toxicologist, a registered engineering geologist or hydrogeologist, an engineer licensed in California with at least three years experience in wastewater treatment and public water supply., a microbiologist, and a chemist.		✓	✓
E. Submittal of an updated engineering report and operations plan.		✓	✓
4. For the entire recycled municipal wastewater stream, provide	✓	✓	✓

reverse osmosis treatment as well as subsequent advanced oxidation treatment[6]. The advanced oxidation treatment shall provide, at minimum, a level of treatment equivalent to a 1.2 log NDMA reduction and a 0.5 log 1.4-dioxane reduction.			

(f) If the RMA RWC exceeds its maximum RWC, the GRRP shall:

a. Notify the Department and RWQCB in writing within 7 days of exceedance and,

b. Within 60 days, implement corrective action(s) and submit a report to the Department and RWQCB describing the reason(s) for the exceedance and the corrective action(s) taken to avoid future exceedances.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.045. Total Organic Carbon Requirements

(a) For each surface or subsurface application facility used for replenishing a groundwater basin, the GRRP shall monitor TOC as follows:

(1) For filtered wastewater, unless subsequently treated with reverse osmosis, two 24-hour composite samples a week, taken at least three days apart. Based on the Department's review of the previous 12 months' results, with approval from the Department, monitoring may be reduced to one 24-hour composite sample each week, and

(2) For recycled municipal wastewater, at least one 24-hour composite sample each week prior to recharge, or

(3) For surface application, at least one sample each week in a manner yielding TOC values representative of the recycled municipal wastewater TOC after infiltration and percolation, and not influenced by diluent water, native groundwater, or other source of dilution as determined by:

(A) measuring undiluted percolating recycled municipal wastewater,

(B) measuring diluted percolating recycled municipal wastewater and adjusting the value for the diluent water effect, or

(C) using recharge demonstration studies to develop a soil treatment factor that can be applied weekly to recycled municipal wastewater measurements leaving the treatment plant.

(b) Grab samples may be taken in lieu of the 24-hour composite samples required in subsection (a) if:

(1) the GRRP demonstrates that a grab sample is representative of the water quality throughout a 24-hour period, or

(2) the entire recycled municipal wastewater stream has been treated by reverse osmosis.

[6] The requirement for advanced oxidation for **all** subsurface application GRRPs is under discussion.



(c) Analytical results of the monitoring performed pursuant to subsection (a) shall not exceed the following TOC limits:

(1) For filtered wastewater, 16 mg/L, based on:

(A) two consecutive samples and

(B) the average of the last four results and,

(2) For recycled municipal wastewater or recharge water, with the running monthly average (RMA) RWC determined pursuant to section 60320.041(a),

$$TOC_{max} = \frac{0.5 mg/L}{RWC}$$, based on:

(A) a 20-week running average of all TOC results and

(B) the average of the last four results.

(d) The TOC_{max} limit specified in subsection (c)(2) may be increased if:

(1) The increased TOC_{max} limit is approved by the Department and RWQCB,

(2) The GRRP has been in operation for the most recent ten consecutive years,

(3) The project sponsor submits a proposal to the Department prepared and signed by an engineer licensed in California and experienced in the fields of wastewater treatment and public water supply. The proposal shall include the following, based on the most recent ten consecutive years of operation:

(A) GRRP operations, monitoring, and compliance data;

(B) Evidence that the GRRP has a history of compliance with the requirements of their RWQCB permit;

(C) Evidence that the water collected at all downgradient drinking water wells and monitoring wells impacted by the GRRP has met all the primary drinking water standards for the parameters specified pursuant to section 60320.070(b)(2);

(D) Analytical or treatment studies requested by the Department to make the determination in subsection (C);

(E) Validation of appropriate construction and siting of monitoring wells pursuant to section 60320.070;

(F) A study defining the water quality changes, including organic carbon characterization, as a result of the impact of the GRRP;

(4) The GRRP has performed a health effects evaluation that assesses the health risks to consumers of water impacted by the GRRP, including any anticipated water quality changes resulting from the proposed increased TOC_{max} limit. The evaluation shall include the following:

(A) An exposure assessment that characterizes the quality of the water consumed and the quantity of contaminants and constituents consumed.

(B) All available human epidemiologic studies of the population that has consumed water impacted by the GRRP.

(C) The results of laboratory animal studies and health risk assessments available in peer-reviewed literature pertaining to water impacted by the GRRP and anticipated water quality changes resulting from the proposed increased TOC_{max}, including studies or assessments where extrapolation of data may be relevant.

(D) A health risk assessment of the potential individual and cumulative effects of the regulated contaminants described in section 62320.030 and the constituents monitored pursuant to subsections 60320.047(a) and (c), in a manner that includes;

(1) lifetime risks of cancer and

(2) risks of non-cancer effects.

(E) A report detailing comments, questions, concerns, and conclusions of a review by an independent scientific peer review advisory panel that includes, as a minimum, a toxicologist, an epidemiologist, an engineering geologist or hydrogeologist registered in California, an engineer licensed in California with at least three years of experience in wastewater treatment and public water supply, a microbiologist, and a chemist.

(e) If the GRRP exceeds the limit in (c)(1)(A), (c)(2)(A), or its approved increased TOC_{max} limit obtained pursuant to subsection (d) based on a 20-week running average, the GRRP shall:

(1) immediately suspend the addition of recycled municipal wastewater until at least two consecutive results, 3 days apart, are less than the limit,

(2) notify the Department and RWQCB within 7 days of suspension,

(3) revert back to the semi-weekly monitoring in (a)(1), if the GRRP had been approved for reduced monitoring, and

(4) within 60 days, submit a report to the Department and RWQCB describing the reasons for the exceedance and the corrective actions to avoid future exceedances. At a minimum, the corrective actions shall include:

(A) a reduction of RWC sufficient to comply with the limit, and/or

(B) the treatment of the filtered wastewater with reverse osmosis.

(f) If the GRRP exceeds the limit in (c)(1)(B), (c)(2)(B), or its approved increased TOC_{max} limit obtained pursuant to subsection (d) based on the last four results, the GRRP shall, within 60 days, submit a report to the Department and RWQCB describing the reasons for the exceedance and the corrective actions taken to avoid future exceedances.

(g) To use one or more wastewater constituents in lieu of TOC, approval from the Department shall be obtained. At a minimum, the constituent(s) used in lieu of TOC shall (see Endnote 6):

(1) Be quantifiable in the wastewater, recycled municipal wastewater, groundwater, and throughout the treatment processes,

(2) Have identifiable treatment performance standards as protective of public health as the TOC standards in this Chapter.



NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.047. Additional Constituent Monitoring

(a) Each quarter, the GRRP shall sample and analyze the recycled municipal wastewater and the downgradient monitoring wells specified by the Department for the following (see Endnote 2):

(1) Priority Toxic Pollutants [chemicals listed in the Water Quality Standards, Establishment of Numeric Criteria for Priority Toxic Pollutants for the State of California, and 40 CFR Part 131, Federal Register 65(97), May 18, 2000, p. 31682] specified by the Department, based on the Department's review of the GRRP's engineering report;

(2) Chemicals with state notification levels that the Department has specified (see Endnote 3), based on a review of the GRRP engineering report and the affected groundwater basin(s); and

(3) Chemicals that the Department has specified (See Endnote 4), based on a review of the GRRP's engineering report, the affected groundwater basin(s), and the results of the assessment performed pursuant to subparagraph 60320(a)(2)(A).

(b) The GRRP may reduce monitoring for the constituents in (a) to once each year following Department approval based on the Department's review of the results of the monitoring in (a).

(c) Annually, the GRRP shall monitor the recycled municipal wastewater for constituents indicating the presence of municipal wastewater, as specified by the Department (See Endnote 5) based on the following:

(1) a review of the GRRP's engineering report,

(2) the contaminant list developed pursuant to section 60320(a)(2)(D),

(3) the affected groundwater basin(s),

(4) a constituent's ability to characterize the presence of pharmaceuticals, endocrine disrupting chemicals, personal care products, and other indicators of the presence of municipal wastewater, and

(5) the availability of a test method for a constituent.

(d) A constituent detected as a result of monitoring conducted pursuant to this section shall be reported to the Department and RWQCB no later than the quarter following the quarter in which the results are received by the GRRP.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.



Section 60320.065. Operation Optimization.

(a) During the first year of operation for new GRRP's, or during the first year of operation after the effective date of this section for existing GRRP's, and at all times thereafter, all treatment processes shall be operated in a manner providing optimal reduction of all contaminants including:

(1) microbial contaminants,

(2) regulated contaminants identified in section 60320.030 and the nitrogen compounds in section 60320.020, and

(3) nonregulated contaminants identified in section 60320.047.

(b) Within six months of optimizing treatment processes pursuant to (a) and anytime thereafter operations are optimized resulting in a change in operation, each GRRP shall update their operations plan to include such changes in operational procedures and submit the operations plan to the Department for review.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.070. Monitoring Between a GRRP and Downgradient Drinking Water Supply Wells.

(a) Prior to operating a GRRP, each GRRP shall site and construct monitoring wells, as follows:

(1) At a location where the GRRP's recharge water has been retained in the saturated zone for 1-3 months but will take at least three months before reaching the nearest domestic water supply well,

(2) At an additional point or points between the surface or subsurface application facility and the nearest downgradient domestic water supply well, and

(3) Such that samples can be obtained independently from each aquifer that will receive water that was recharged by the GRRP.

(b) Monitoring shall be conducted as follows:

(1) Two samples prior to GRRP operation and at least one sample each quarter thereafter, shall be collected at each monitoring well;

(2) Each sample shall be analyzed for TOC, total nitrogen, nitrate, nitrite, the constituents in tables 64449-A and B of section 64449, total coliform bacteria, and any water quality constituents specified by the Department based on the results of the recycled municipal wastewater monitoring conducted pursuant to this chapter; and

(c) Analytical results of monitoring performed pursuant to paragraph (b) shall be reported to the Department and the RWQCB by the GRRP, as follows:

(1) For all chemical analyses completed in a calendar month, the GRRP shall ensure the laboratory submits results no later than the end of the following month using the Electronic Deliverable Format as defined in the Electronic

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Deliverable Format (EDF) Version 1.2i Guidelines & Restrictions dated April 2001 and Data Dictionary dated April 2001.

(2) For any results exceeding an MCL or at anytime coliform bacteria are present, within 48 hours of receiving the results.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

Section 60320.090. Annual and Five-Year Reporting.

(a) By the date specified in the GRRP's RWQCB permit, the project sponsor shall provide a report to the RWQCB and the Department. Public water systems having downgradient sources potentially affected by the GRRP shall be notified by direct mail of the availability of the report. The report shall be prepared by an engineer licensed in California and experienced in the fields of wastewater treatment and public water supply. The report shall include the following:

(1) A summary of compliance with the applicable monitoring requirements and criteria of this Chapter for the previous calendar year;

(2) For any violations of this Chapter during the previous calendar year;

(A) the date, duration, and nature of the violation

(B) a summary of any corrective actions and/or suspensions of surface or subsurface application of recycled municipal wastewater resulting from a violation

(C) if uncorrected, a schedule for and summary of all remedial actions

(3) Any detections of monitored constituents and any observed trends in the monitoring wells, as well as diluent water supplies,

(4) Information pertaining to the vertical and horizontal migration of the recharge water plume,

(5) A description of any changes in the operation of any unit processes or facilities,

(6) A description of any anticipated changes, along with an evaluation of the expected impact of the changes on subsequent unit processes, and

(7) The estimated quantity and quality of the recycled municipal wastewater and diluent water to be utilized for the next twelve months.

(b) Every five years from the date of the initial approval the engineering report required pursuant to section 60323, the project sponsor shall update the report to address any project changes and submit the report to the RWQCB and the Department. The update shall include, but not be limited to:

(1) Anticipated RWC increases, a description of how the RWC requirements in section 60320.041 will be met, and the expected impact the increase will have on the GRRP's ability to meet the requirements of this Chapter,

(2) Evidence that the minimum retention time requirement in subsection 60320.010(c) has been met, and

(3) A description of any inconsistencies between previous groundwater model predictions and the observed and/or measured values, as well as a description of how subsequent predictions will be accurately determined.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

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ARTICLE 7. ENGINEERING REPORT AND OPERATIONAL REQUIREMENTS

Section 60323[7]. Engineering Report

(a) No person shall produce or supply ~~reclaimed water~~recycled municipal wastewater for direct reuse from a ~~proposed~~ water reclamation plant ~~unless he files an~~ without a Department approved engineering report.

(b) The report shall be prepared by a properly qualified engineer ~~registered~~ licensed in California and experienced in the field of wastewater treatment, and shall contain a description of the design of the proposed reclamation system. The report shall clearly indicate the means for compliance with these regulations and any other features specified by the regulatory agency.

(c) The report shall contain a contingency plan which will assure that no untreated or inadequately treated wastewater will be delivered to the use area.

NOTE: Authority cited: Section 100275, Health and Safety Code and Section 13521, Water Code. Reference: Section 13520, Water Code.

[7] Section 60320 is an existing section. The text reflects the proposed amendments.



Endnotes for Draft Groundwater Recharge Reuse Regulations

These Endnotes accompany the draft recharge regulations currently being developed by the California Department of Public Health's Drinking Water Program, *but are not expected to be part of the proposed regulatory package*. The draft recharge regulations address the supplementation of groundwater by surface or subsurface application of treated municipal wastewater prior to eventual extraction via drinking water wells for potable use.

The latest draft is here:

http://www.cdph.ca.gov/healthinfo/environhealth/water/Pages/Waterrecycling.aspx

ENDNOTE 1.

§60320.030. Control of Regulated Chemicals and Physical Characteristics

Examples of contaminants whose MCL compliance is not based on a running annual average include; nitrate, nitrite, and perchlorate.

ENDNOTE 2.

§60320.047. Additional Constituent Monitoring

Analytical Methods for Unregulated Chemicals

Subsection (a) states that the GRRP shall conduct the following and report any detections.

Some of the chemicals will have analytical methods that are available. Some may not.

CDPH views the use of drinking water methods as most appropriate, since they are generally more sensitive than wastewater methods. However, this may not always be possible, since there may be characteristics of the wastewater (e.g., high total dissolved solids) that may make the use of drinking water methods difficult.

GRRPs should select methods for non-regulated chemicals according to the following approach.

1. Use CDPH-approved drinking water methods, when available.

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2. Use CDPH-recommended methods for chemicals if no CDPH-approved drinking water method is available (e.g., 1,2,3-TCP).

3. If there is no CDPH-recommended drinking water method for a chemical, and more than a single EPA-approved method is available, consult with CDPH to determine the appropriate EPA-approved method.

4. If there is no EPA-approved method for a chemical, and more than one method is available from the scientific literature (e.g., peer-reviewed journals), consult with CDPH to determine an appropriate method.

5. If no approved method is available for a specific chemical, the GRRP's laboratory may develop or use its own methods and should provide the analytical methods to CDPH for review.

6. If the only method available for a chemical is for wastewater analysis (e.g., a chemical listed as a priority pollutant only), sample and analyze for that chemical in the treated wastewater immediately prior to reverse osmosis treatment to increase the likelihood of detection. Use this approach until the GRRP's laboratory develops a method for the chemical in drinking water, or until a CDPH-approved or -recommended or EPA-approved drinking water method is available.

7. If no method is available for a specific contaminant, as may be the case for certain endocrine disrupting chemicals, pharmaceuticals, personal care products, or other chemicals indicating the presence of wastewater (see Endnote 5), the GRRP should propose an alternative contaminant that might be used as an indicator or surrogate for the contaminant of interest, or an alternate sampling program that addresses the contaminant of concern, or the category of the contaminant of concern.

ENDNOTE 3.

§60320.047. Additional Constituent Monitoring

Selected chemicals with CDPH notification levels for possible analysis.

Paragraph (a)(2) refers to chemicals with state notification levels that CDPH has specified. These chemicals are selected from CDPH's chemicals with notification levels; chemicals already included in analysis required under other subsections are not included here.

These chemicals have either been detected at least once in drinking water supplies over the past few years, or if not detected, they are of interest for some specific reason [e.g., formaldehyde is of interest because in may be a byproduct

of certain treatment processes]. These would likely include boron, chlorate, 1,4-dioxane, formaldehyde, N-nitrosodimethylamine (NDMA), 1,2,3-trichloropropane, and vanadium.

ENDNOTE 4.

§60320.047. Additional Constituent Monitoring

Additional chemicals for analysis

Paragraph (a)(3) refers to other chemicals that CDPH has specified. These chemicals would likely include: chromium-6, diazinon, and nitrosamines for which US EPA has developed analytical methods.

ENDNOTE 5.

§60320.047. Additional Constituent Monitoring

Pharmaceuticals, endocrine disruptors, and other wastewater indicator chemicals

Subsection (c) refers to pharmaceuticals, endocrine disruptors and other indicators of the presence of municipal wastewater as specified by CDPH.

CDPH is interested in collecting information that relates to the presence of the listed categories of contaminants in municipal wastewater that may be found in recycled municipal wastewater.

The specific contaminants targeted for monitoring will likely vary among GRRPs, depending on their individual engineering reports and characteristics of their groundwater basins, as well as the GRRP's efforts that have been taken to address the presence of endocrine disrupting chemicals, pharmaceuticals, and personal care products in recycled municipal wastewater, and its efforts to assure that their presence in recycled municipal wastewater is at levels that are protective of the public health.

Monitoring for these chemicals—or categories of chemicals—is a diligent way of assessing and verifying recycled municipal wastewater quality characteristics, which can be useful in addressing issues of public perception about the safety of recharge projects.

Further, should there be positive findings of these types of chemicals, the recharge agency and CDPH can give the result due consideration as to whether it is of concern or not. Just what such consideration might entail would depend on

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what is known and what is not known about the particular chemical, including its potential health effects at the given concentration, the source of the chemical, as well as possible means of better control to limit its presence, treatment strategies if necessary, and other appropriate actions.
Such monitoring is not for compliance purposes, but for informational use only.

If a GRRP has additional reports for its own project using prior data that address the types of chemicals discussed in this Endnote, or reports for its own project addressing the effectiveness of the treatment processes in limiting the release of endocrine disruptors, pharmaceuticals, or personal care chemicals into recharge water, those reports should be made available to CDPH to assist in developing an approach that would build upon or supplement the already available information.

A GRRP that has little monitoring information should plan on collecting more analytical data related to endocrine disrupting chemicals, pharmaceuticals, personal care products and other chemicals that are indicators of wastewater in its recharge water.

A GRRP that can demonstrate a history of sampling, analysis, and related research—as well as an on-going program of monitoring and research—on endocrine disrupting chemicals, pharmaceuticals and personal care products, or appropriate indicator or surrogate chemicals in its recharge water will likely be encouraged to continue its research efforts, and likely have no contaminants specified by CDPH for analysis under this section.

GRRPs will not be required to conduct an ongoing monitoring program for contaminants under this section, unless good indicator or surrogate chemicals can be identified through this monitoring, and analytical methods are available to perform that monitoring.

Depending on the results of analyses and other information discussed above, required monitoring may be of short duration (e.g., twice a year for two or three years). If good indicator or surrogate chemicals with available analytical methods can be identified, requirements for their monitoring will be considered. This notwithstanding, CDPH recommends an ongoing monitoring program to address public concerns about the presence in wastewater about these types of chemicals.

A monitoring program could include sampling and analysis for representatives of these categories of contaminants (including surrogates or specific chemicals indicators):

- Hormones. CDPH at this time does not recommend specific chemicals. However, GRRPs should investigate chemicals that could represent either female or male hormones, or surrogates that could represent both.



• "Industrial" endocrine disruptors: CDPH at this time does not recommend specific chemicals. However, GRRPs should investigate chemicals such as bisphenol A, nonylphenol and nonylphenol polyethoxylates, octylphenol and octylphenol polyethoxylates, and polybrominated diphenyl ethers, or surrogates that could represent one or more industrial endocrine disruptors.

• Pharmaceuticals: CDPH at this time does not recommend specific chemicals. However, GRRPs should investigate chemicals such as acetaminophen, amoxicillin, azithromycin, carbamazepine, ciprofloxacin, dilantin, gemfibrozil, ibuprofen, lipitor, meprobamate, sulfamethoxazole, trimethoprin, and salicylic acid, or surrogates that could represent one or more pharmaceuticals.

• Personal Care Products: CDPH at this time does not recommend specific chemicals. However, GRRPs should investigate chemicals such triclosan and DEET, or surrogates that could represent one or more personal care products.

• Other chemicals that may suggest the presence of wastewater: CDPH at this time does not recommend specific chemicals. However, GRRPs should investigate chemicals such as caffeine, iodinated contrast media, fire retardants such as TCEP, or surrogates that could represent one or more chemicals that suggest the presence of wastewater.

There are no drinking water standards for the contaminants listed above and no standards are anticipated. In addition, analytical methods may not be widely available (See Endnote 2).

ENDNOTE 6.

Alternatives to Using TOC

The current draft proposes that GRRPs interested in using an alternative wastewater constituent or constituents in lieu of TOC must demonstrate that the alternative proposed is quantifiable in the wastewater, recycled municipal wastewater, groundwater, and throughout the treatment processes. Further, the alternative must have identifiable treatment performance standards and an overall demonstration that it provides the same level of public health protection as the TOC requirement.

A GRRP that can demonstrate a history of sampling, analysis, and related research to support the use of alternatives should provide this information to CDPH when proposing an alternative.

One alternative that has been suggested to CDPH for consideration is the use of Biodegradable Dissolved Organic Carbon (BDOC) in concert with specific chemical indicators to assure proper removal of unregulated wastewater-derived organics for surface application projects. In this case, indicators are defined as individual compounds occurring at quantifiable levels that can represent certain physical, chemical and biological characteristics that are relevant to fate and transport during treatment (where treatment includes wastewater and soil aquifer treatment (SAT)). BDOC is a measure of dissolved biodegradable organic matter that is consumed or otherwise altered by indigenous bacterial populations. The use of BDOC by measuring differential (delta) TOC (i.e., the differences between recycled municipal wastewater TOC and before and after transport through the soil column) and specific chemical indicators may be able to serve as a surrogate for the absence of biodegradable organic compounds that are not derived from humic (i.e., soil) substances.

The use of BDOC/indicators would likely consist of a number of elements, including the following:

1. For each project, prior to start-up,

    A. The GRRP will select a set of indicator compounds for approval by CDPH that can be reliably measured by approved laboratory methods in recycled municipal wastewater and groundwater that also reflect good and poor removal via SAT. For purposes of this section, "good" is >90 percent, and "poor" is <25 percent removal.

    B. The GRRP will identify the laboratory or laboratories that will be used for BDOC analyses and the federal or state approved or recommended methods that will be used for those analyses. If no approved or recommended method is available for determining BDOC, the GRRP's laboratory may develop or use its own methods and should provide the analytical methods to CDPH for review. Those methods may be used until federal or state approved or recommended methods are available. Where multiple analytical methods exist, the more sensitive method should be used (i.e., that which can measure indicator compounds at a lower concentration).

    C. The GRRP will validate the presence of the proposed indicators in the recycled municipal wastewater, and would also collect baseline data from the project's monitoring wells. The selected indicators and baseline data will be presented in the GRRP's Engineering Report.

    D. The GRRP will establish baseline information on BDOC and TOC in recycled municipal wastewater and groundwater monitoring wells.



The GRRP will also characterize expected SAT performance by conducting batch soil column tests with recycled municipal wastewater and measuring BDOC and delta TOC. This information will be provided in the GRRP's Engineering Report.

2. During start-up, the GRRP, through frequent monitoring and analysis, will validate the expected BDOC performance, delta TOC, and indicator removal performance. If BDOC performs as expected, the delta TOC can serve as the routine parameter that is monitored to validate that the expected biodegradation is occurring, along with the selected indicators, provided that the GRRP also monitors TOC consistent with the regulations for a specific time period established by CDPH and designated in its permit.

3. During routine operation, the GRRP would use delta TOC and the indicators to validate performance of the project. In parallel, the GRRP will also monitor TOC consistent with the regulations for a specific time period established by CDPH, and designated in its permit. This will enable the GRRP to demonstrate the suitability of its alternative approach.

4. The RWC will initially be set at 20%, or some other value, as determined in its permit. The GRRP may be allowed to increase the RWC up to 50% in a phased manner over time (such as five years) as long as BDOC and indicator performance are the same as the performance observed at the 20% or initial RWC. At each increased step, the GRRP will also monitor TOC consistent with the regulations for a specific time period established by CDPH, and designated in its permit.

5. If the BDOC in any monitoring well associated with the GRRP or the indicators begin to perform differently than as observed during startup or previous monitoring events, then a GRRP would have to evaluate its project for the cause and adjust the RWC downward. The GRRP will also monitor TOC consistent with the regulations.

6. As part of the proposal to CDPH, the GRRP will convene an expert panel to provide feedback to CDPH on the proposed approach and, if the proposal is accepted, to meet periodically to provide feedback on its performance and adequacy of BDOC monitoring.

7. Indicator compounds selected will be re-evaluated by the expert panel and by CDPH for continued relevance by the GRRP annually.

ENDNOTE 7. Table summarizing text of Section 60320.020 (Control of Nitrogen Compounds)*

	Method 1	Method 2	Method 3
Compliance point and monitoring	• Anywhere representative of recycled municipal wastewater or recharge water (i.e. including in or above the mound) • Samples analyzed for total nitrogen • Reduced monitoring available	• Anywhere representative of recycled municipal wastewater or recharge water. (i.e. prior to surface or subsurface application or from within a mound or vadose zone prior to reaching the GW table) • Samples analyzed for total nitrogen, nitrate, nitrite, ammonia, organic nitrogen, DO, and BOD • A groundwater sample analyzed for DO • Reduced monitoring available	• Only for projects in operation for ≥ 20 years • Groundwater downgradient of the recharge area • Samples analyzed for nitrate and nitrite
Standard(s)	• 5 mg/L total N as an average	• 10 mg/L total nitrogen and • Limits established in the engineering report for other constituents	MCLs for nitrate and nitrite
Frequency of sampling	2 per week	As established by CDPH and specified in the operations plan	• Specified in the engineering report and operations plan. • Relatively frequent monitoring at locations between the recharge area and downgradient domestic wells is required.
Consequence of failure	• Investigate, correct, and notify if the average of two consecutive samples >5 mg/L • Suspend application of recycled municipal wastewater if the 4-week average of all samples >5 mg/L	• Investigate, correct, and notify if the average of two consecutive samples >10 mg/L total nitrogen standard or exceeds standard for other constituents • Suspend surface and subsurface application of recycled municipal wastewater until the average of two consecutive samples meets all limits	• Notify the Department and RWQCB if > MCLs • Suspend surface and subsurface application unless demonstrated that the groundwater no longer exceeds the MCLs.
Rationale	Method 1 relies on such a low limit for the total N in the recycled municipal wastewater that the chance that the NO_2 or NO_3 MCL could be exceeded is minute.	Method 2 relies on: 1. A low enough limit for the total N in the recycled municipal wastewater that the chance that a NO_2 or NO_3 MCL could be exceeded is low, combined with 2. A set of limits determined for a specific GRRP and explained in the Engineering Report for nitrite, organic nitrogen and/or ammonia necessary to limit oxidation to NO_2 or NO_3, and a set of minimum levels for an excess DO over BOD requirement in the recycled municipal wastewater and/or a DO requirement in the groundwater as necessary to prevent reduction of NO_3 to NO_2	Method 3 relies on: 1. A demonstration that historic recharge with water containing comparable levels of nitrogen has not caused a problem, 2. Evidence that recharge water can be tracked and monitored throughout the flow path, and 3. Monitoring to show that the MCLs for NO_2 and NO_3 are met in the groundwater.

*Note: This table provides a *summary* of the regulatory requirements and is not intended to be comprehensive.

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APPENDIX B – GRRP APPROVAL STEPS

From Jim Crooke



Potable Reuse Project Sequence of events for Approval

Prepare Engineering Report (details of proposed project)

Submit Engineering Report to CDPH, RWQCB, and County Health Agency for review

CDPH, RWQCB, and County Health agency review Engineering Report and request changes, additional information, etc.

CDPH accepts Engineering Report (usually after revisions by the project proponent)

Notice of Public Hearing released at least 30 days before scheduled hearing date

CDPH person is hearing officer at public hearing

Proponent prepares document for CDPH signature that includes a Summary of Public Hearing, Findings of Fact, and Conditions

- Findings of Fact includes all necessary details of proposed project

- Conditions include specific CDPH regulatory requirements for project that conform to draft groundwater recharge regulations

CDPH approves Summary of Public Hearing, Findings of Fact, and Conditions (usually after several revisions)

CDPH sends a letter to the RWQCB stating that the project complies with all CDPH requirements and recommends that the RWQCB incorporate all of the Findings of Fact and Conditions (which are appended to the letter) into the proponent's waste discharge requirements

RWQCB approves Findings of Fact and includes them in the proponent's permit

Total time if starting from scratch is at least 1 year (likely longer, e.g., 2 years) not counting a demonstration study of proposed treatment train, which is not required but is recommended

jc: 072909

APPENDIX C – FRESNO POTENTIAL CUSTOMERS

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Potential Recycled Water Irrigation Customers

Customer Name	Water Zone	Customer Type	Customer ID	Parcel Acres	Estimated Irrigable Acres [1]	Estimated Irrigation Usage [2] (AFY)	Max Month Demand [3] (AFY)	Max Day Demand [4] (AFY)	Peak Hour Demand [5] (AFY)
Clovis Quadrant									
Clovis	Clovis	School	C-1	49.74	29.84	80.15	191	246.5	745.6
Buchanan	Clovis	School	C-2	87.14	52.29	140.42	335	435.4	1306.3
Cemetery	Clovis	Cemetery	C-3	9.10	8.64	23.21	55	72.0	216.0
Northeast Quadrant									
Carter G. Woodson Public Charter School	Northeast	School	NE-3	1.30	0.78	2.10	5	6.5	19.5
Fresno Prep Academy	Northeast	School	NE-12	4.17	2.50	6.72	16	20.8	62.5
Willow International Center	Northeast	School		66.79	40.08	107.63	257	333.7	1001.2
Copper River Country Club	Northeast	Golf Course	NE-49	720.13	684.13	1837.28	4,382	5697.2	17091.7
Fort Washington Country Club	Northeast	Golf Course	NE-48	130.36	123.85	332.60	793	1031.4	3094.1
Woodward Lakes	Northeast	Lake	NE-50	48.14	48.14	129.28	308	400.9	1202.7
Belcher	Northeast	Park	NE-56	5.49	5.21	14.00	33	43.4	130.2
Cary	Northeast	Park	NE-62	8.80	8.36	22.44	54	69.6	208.8
East Rotary	Northeast	Park	NE-53	4.19	3.98	10.68	25	33.1	99.4
Einstein	Northeast	Park	NE-59	7.88	7.49	20.10	48	62.3	187.0
El Dorado	Northeast	Park	NE-57	5.63	5.35	14.36	34	44.5	133.6
Kaiser	Northeast	Park	NE-54	4.70	0.71	1.89	5	5.9	17.6
Keith Tice	Northeast	Park	NE-52	4.06	0.61	1.64	4	5.1	15.2
Large	Northeast	Park	NE-58	6.05	5.75	15.44	37	47.9	143.7
Layne	Northeast	Park	NE-61	8.66	8.23	22.10	53	68.5	205.6
Manchester	Northeast	Park	NE-63	9.49	9.02	12.11	29	37.5	112.6
Robinson	Northeast	Park	NE-55	4.77	4.53	12.17	29	37.7	113.2
Rotary West	Northeast	Park	NE-64	14.23	13.52	36.30	87	112.6	337.7
University	Northeast	Park	NE-51	2.37	2.25	6.05	14	18.8	56.3
Vinland	Northeast	Park	NE-60	8.09	7.68	20.63	49	64.0	191.9
Woodward Regional	Northeast	Park	NE-65	285.71	271.42	728.92	1,739	2260.3	6781.0
Calvary Chapel Christian	Northeast	School	NE-9	2.66	1.60	4.29	10	13.3	39.9
Carden School of Fresno	Northeast	School	NE-40	19.60	11.76	31.58	75	97.9	293.8
Central Valley Christian Academy	Northeast	School	NE-14	6.15	3.69	9.91	24	30.7	92.2
First Church Christian Academy	Northeast	School	NE-11	3.27	1.96	5.28	13	16.4	49.1
Fresno Christian Schools	Northeast	School	NE-8	2.24	1.34	3.60	9	11.2	33.5
La Petite Academy	Northeast	School	NE-5	0.71	0.43	1.15	3	3.6	10.7
Mountain View Christian	Northeast	School	NE-13	4.59	2.75	7.39	18	22.9	68.8
Northpointe Christian Leadership Academy	Northeast	School	NE-36	18.04	10.82	29.07	69	90.1	270.4
Reaching Potentials Educational Institute	Northeast	School	NE-2	0.22	0.13	0.36	1	1.1	3.3
Sierra View Christian Academy	Northeast	School	NE-1	0.17	0.10	0.27	1	0.8	2.5
Truth Tabernacle Christian	Northeast	School	NE-10	2.88	1.73	4.65	11	14.4	43.2
Ahwahnee Middle School	Northeast	School	NE-34	16.67	10.00	26.86	64	83.3	249.8
Centennial Elementary School	Northeast	School	NE-15	7.80	4.68	12.57	30	39.0	116.9
Clovis North	Northeast	School		38.15	22.89	61.47	147	190.6	571.8
Clovis North - Middle School	Northeast	School		58.67	35.20	94.54	226	293.2	879.5
Clovis West High School	Northeast	School	NE-44	56.41	33.85	90.90	217	281.9	845.6
Copper Hills Elementary School	Northeast	School	NE-31	16.38	9.83	26.39	63	81.8	245.5
Eaton Elementary School	Northeast	School	NE-21	9.02	5.41	14.54	35	45.1	135.3
Erma Duncan Polytechnical High School	Northeast	School	NE-35	16.98	10.19	27.36	65	84.9	254.6
Fort Washington Elementary School	Northeast	School	NE-37	18.35	11.01	29.57	71	91.7	275.1
Herbert Hoover High School	Northeast	School	NE-43	46.60	27.96	75.09	179	232.9	698.6
Holland Elementary School	Northeast	School	NE-20	8.70	5.22	14.03	33	43.5	130.5
James S. Fugman Elementary School	Northeast	School	NE-33	16.50	9.90	26.58	63	82.4	247.3
Kastner Intermediate School	Northeast	School	NE-38	18.67	11.20	30.09	72	93.3	279.9
Liberty Elementary School	Northeast	School	NE-29	14.99	8.99	24.16	58	74.9	224.7
Lincoln Elementary School	Northeast	School	NE-41	34.71	20.83	55.93	133	173.4	520.3
Manchester Gate	Northeast	School	NE-16	8.03	4.82	12.95	31	40.1	120.4
Maple Creek Elementary School	Northeast	School	NE-30	15.94	9.57	25.69	61	79.7	239.0
McCardle Elementary School	Northeast	School	NE-18	8.33	5.00	13.43	32	41.6	124.9
Mountain View Elementary School	Northeast	School	NE-28	14.55	8.73	23.45	56	72.7	218.1
Pyle Elementary School	Northeast	School	NE-22	9.08	5.45	14.63	35	45.4	136.1
Riverview Elementary School	Northeast	School	NE-32	16.49	9.89	26.56	63	82.4	247.1
Robinson Elementary School	Northeast	School	NE-23	9.21	5.53	14.84	35	46.0	138.0
Thomas Elementary School	Northeast	School	NE-19	8.68	5.21	13.99	33	43.4	130.1
Tioga Middle School	Northeast	School	NE-39	19.06	11.43	30.70	73	95.2	285.6
Valley Oak Elementary School	Northeast	School	NE-27	14.01	8.41	22.57	54	70.0	210.0
Viking Elementary School	Northeast	School	NE-26	10.91	6.55	17.59	42	54.5	163.6
Vinland Elementary School	Northeast	School	NE-24	9.27	5.56	14.93	36	46.3	138.9
Wolters Elementary School	Northeast	School	NE-25	9.89	5.94	15.94	38	49.4	148.3
Ashlan Park Christian School	Northeast	School	NE-7	2.17	1.30	3.49	8	10.8	32.5
Fresno Christian School	Northeast	School	NE-4	2.12	0.32	0.86	2	2.7	8.0
Fresno Montesori School	Northeast	School	NE-17	8.19	4.92	13.20	31	40.9	122.8
Northwest Quadrant									
Crescent View Charter High School	Northwest	School	NW-39	27.61	16.56	44.48	106	137.9	413.8
KIPP Academy Fresno	Northwest	School	NW-3	0.70	0.42	1.13	3	3.5	10.5
Valley Preparatory Academy	Northwest	School	NW-6	2.22	1.33	3.58	9	11.1	33.3
Fig Garden Golf Course	Northwest	Golf Course	NW-44	133.26	126.59	339.98	811	1054.2	3162.7
Islewood Golf Course	Northwest	Golf Course	NW-42	48.91	46.47	124.79	298	387.0	1160.9
San Joaquin Country Club	Northwest	Golf Course	NW-43	127.80	121.41	326.05	778	1011.1	3033.2
Lake Van Ness	Northwest	Lake	NW-45	28.83	28.83	77.43	185	240.1	720.3
Dante-Alluvial	Northwest	Park	NW-54	6.82	6.48	17.40	42	54.0	161.9
Dog	Northwest	Park	NW-50	2.37	2.25	6.04	14	18.7	56.2
Forkner	Northwest	Park	NW-55	7.03	6.67	17.92	43	55.6	166.7
Grannys'	Northwest	Park	NW-46	1.08	1.03	2.76	7	8.5	25.6
Highway City	Northwest	Park	NW-49	2.03	1.92	5.17	12	16.0	48.1
Holman	Northwest	Park	NW-52	4.58	4.35	11.67	28	36.2	108.6
Lions	Northwest	Park	NW-57	8.56	8.13	21.84	52	67.7	203.2
Logan	Northwest	Park	NW-58	9.02	8.57	23.01	55	71.4	214.1
Oso de Oro	Northwest	Park	NW-51	3.99	3.79	10.18	24	31.6	94.7
Pinedale	Northwest	Park	NW-48	1.64	1.56	4.18	10	13.0	38.9
Quigley	Northwest	Park	NW-56	8.22	7.81	20.97	50	65.0	195.1
Riverbottom	Northwest	Park	NW-59	41.79	39.70	106.61	254	330.6	991.8
Riverpark	Northwest	Park	NW-60	123.02	116.87	313.86	749	973.3	2919.8
Spano	Northwest	Park	NW-47	1.12	1.07	2.87	7	8.9	26.7
Stallion	Northwest	Park	NW-53	5.68	5.40	14.49	35	44.9	134.8
Fairmont Preschool and Kindergarten	Northwest	School	NW-1	0.36	0.21	0.57	1	1.8	5.3
Pathfinders Institute	Northwest	School	NW-7	3.85	2.31	6.21	15	19.3	57.8
Souls Harbor Christian Academy	Northwest	School	NW-2	0.44	0.26	0.71	2	2.2	6.6
St. Anthony	Northwest	School	NW-15	8.69	5.22	25.16	58	57.8	57.8
World Harvest Christian Academy	Northwest	School	NW-29	13.50	8.10	21.75	52	67.4	202.3
Baird Middle School	Northwest	School	NW-19	9.39	5.63	15.13	36	46.9	140.8
Bullard High School	Northwest	School	NW-41	48.41	29.05	78.00	186	241.9	725.7
Bullard Talent Project	Northwest	School	NW-21	9.62	5.77	15.51	37	48.1	144.3
Central High East Campus	Northwest	School	NW-40	46.95	28.17	75.65	180	234.6	703.8



Cooper Middle School	Northwest	School	NW-32	16.54	9.92	26.65	64	82.6	247.9
Del Mar Elementary School	Northwest	School	NW-13	8.37	5.02	13.48	32	41.8	125.4
Figarden Elementary School	Northwest	School	NW-28	12.15	7.29	19.58	47	60.7	182.2
Florence E. Rata	Northwest	School	NW-10	6.66	3.99	10.73	26	33.3	99.6
Forkner Elementary School	Northwest	School	NW-25	10.60	6.36	17.08	41	52.9	158.8
Fort Miller Middle School	Northwest	School	NW-34	17.81	10.69	28.70	68	89.0	267.0
Gibson Elementary School	Northwest	School	NW-9	6.28	3.77	10.13	24	31.4	94.2
Herndon-Barstow Elementary School	Northwest	School	NW-27	11.24	6.75	18.12	43	56.2	168.5
John Steinbeck Elementary School	Northwest	School	NW-36	19.31	11.58	31.11	74	96.5	289.4
Kratt Elementary School	Northwest	School	NW-16	8.78	5.27	14.14	34	43.8	131.5
Lawless Elementary School	Northwest	School	NW-17	8.80	5.28	14.18	34	44.0	131.9
Malloch Elementary School	Northwest	School	NW-12	8.27	4.96	13.32	32	41.3	123.9
Nelson Elementary School	Northwest	School	NW-33	16.71	10.02	26.92	64	83.5	250.4
New Horizon High School	Northwest	School	NW-4	1.62	0.97	2.61	6	8.1	24.3
Norman Liddell Elementary School	Northwest	School	NW-22	9.67	5.80	15.59	37	48.3	145.0
Phoenix Elementary Academy Community D	Northwest	School	NW-5	1.81	1.08	2.91	7	9.0	27.1
Pinedale Elementary School	Northwest	School	NW-24	10.50	6.30	16.92	40	52.5	157.4
Powers-Ginsburg Elementary School	Northwest	School	NW-26	10.62	6.37	17.12	41	53.1	159.3
Rio Vista Middle School	Northwest	School	NW-38	27.13	16.28	43.72	104	135.6	406.7
River Bluff Elementary School	Northwest	School	NW-30	13.85	8.31	22.31	53	69.2	207.5
Roeding Elementary School	Northwest	School	NW-11	7.63	4.58	12.29	29	38.1	114.4
Slater Elementary School	Northwest	School	NW-23	10.24	6.15	16.50	39	51.2	153.5
Starr Elementary School	Northwest	School	NW-20	9.51	5.71	15.33	37	47.5	142.6
Teague Elementary School	Northwest	School	NW-37	24.31	14.58	39.17	93	121.5	364.4
Tenaya Middle School	Northwest	School	NW-31	15.28	9.17	24.63	59	76.4	229.1
Wawona Middle School	Northwest	School	NW-35	18.28	10.97	29.46	70	91.3	274.0
William Saroyan Elementary School	Northwest	School	NW-18	8.94	5.36	14.40	34	44.7	134.0
Wilson Elementary School	Northwest	School	NW-14	8.54	5.12	13.76	33	42.7	128.0
Northwest Elementary School	Northwest	School	NW-8	5.93	3.56	9.55	23	29.6	88.9
Southeast Quadrant									
FYI Airport	Southeast	Airport	SE-36	842.54	210.63	565.68	1,349	1754.1	5262.3
Sierra Charter School	Southeast	School	SE-4	1.73	1.04	2.79	7	8.6	25.9
Belmont Country Club	Southeast	Golf Course	SE-39	109.36	103.89	279.01	666	865.2	2595.6
Hanks Par 3 Golf Course	Southeast	Golf Course	SE-37	24.48	23.26	62.47	149	193.7	581.1
Sunnyside Country Club	Southeast	Golf Course	SE-40	136.65	129.82	348.65	832	1081.1	3243.4
Village Green Golf Course	Southeast	Golf Course	SE-38	45.99	43.69	117.33	280	363.8	1091.5
Airways	Southeast	Park	SE-52	101.29	96.23	258.43	616	801.4	2404.1
Carroza	Southeast	Park	SE-46	8.59	8.16	21.92	52	68.0	203.9
East Fresno Boys/Girls Club	Southeast	Park	SE-43	4.39	4.17	11.21	27	34.8	104.3
Elks Club	Southeast	Park	SE-50	17.01	16.16	43.41	104	134.6	403.8
Fresno Fairgrounds	Southeast	Park	SE-51	93.03	88.38	237.36	566	736.0	2208.1
Melody	Southeast	Park	SE-45	4.82	4.58	12.31	29	38.2	114.5
Mosqueda	Southeast	Park	SE-48	10.13	9.62	25.84	62	80.1	240.4
Oso de Oro II	Southeast	Park	SE-47	9.41	8.94	24.01	57	74.4	223.3
Palm Lakes	Southeast	Park	SE-53	132.30	125.68	337.53	805	1046.6	3139.9
Park	Southeast	Park	SE-41	0.43	0.41	1.11	3	3.4	10.3
Pilibos	Southeast	Park	SE-49	12.86	12.22	32.82	78	101.6	305.3
Sunnyside	Southeast	Park	SE-44	4.71	4.47	12.02	29	37.3	111.8
Willow-Balch	Southeast	Park	SE-42	1.48	1.40	3.77	9	11.7	35.1
Campus Christian Academy	Southeast	School	SE-1	0.36	0.22	0.58	1	1.8	5.4
Cornerstone Christian	Southeast	School	SE-5	2.20	1.32	3.55	8	11.0	33.0
Fresno Adventist Academy	Southeast	School	SE-34	39.54	23.73	63.72	152	197.6	592.8
Fresno Sunnyside Christian Academy, Isp	Southeast	School	SE-2	0.87	0.52	1.41	3	4.4	13.1
St. Helen	Southeast	School	SE-5	7.13	4.28	11.48	27	35.6	106.8
Fresno Pacific University	Southeast	School	SE-3	22.98	13.79	37.02	88	114.8	344.4
Ayer Elementary School	Southeast	School	SE-15	9.26	5.56	14.92	36	46.3	138.8
Aynesworth Elementary School	Southeast	School	SE-10	7.90	4.74	12.73	30	39.5	118.5
Burroughs Elementary School	Southeast	School	SE-9	7.82	4.69	12.60	30	39.1	117.2
Cambridge Continuation High School	Southeast	School	SE-6	4.10	2.46	6.60	16	20.5	61.4
David L. Greenberg Elementary School	Southeast	School	SE-28	17.35	10.41	27.95	67	86.7	260.0
Easterby Elementary School	Southeast	School	SE-12	8.28	4.97	13.35	32	41.4	124.2
Edith B. Storey Elementary School	Southeast	School	SE-29	17.66	10.60	28.45	68	88.2	264.7
Elizabeth Terronez Middle School	Southeast	School	SE-32	24.96	14.98	40.22	96	124.7	374.2
Ericson Elementary School	Southeast	School	SE-11	8.19	4.91	13.20	31	40.9	122.8
Ewing Elementary School	Southeast	School	SE-14	8.87	5.32	14.29	34	44.3	133.0
Ezekiel Balderas Elementary School	Southeast	School	SE-19	10.59	6.35	17.07	41	52.9	158.8
Fancher Creek Elementary School	Southeast	School	SE-25	15.62	9.37	25.17	60	78.0	234.1
Fresno County Court	Southeast	School	SE-16	9.28	5.57	14.95	36	46.3	139.0
Irwin O. Addicot Elementary School	Southeast	School	SE-24	14.20	8.52	22.88	55	70.9	212.8
John S. Wash Elementary School	Southeast	School	SE-23	14.20	8.52	22.88	55	70.9	212.8
Kings Canyon Middle School	Southeast	School	SE-31	18.36	11.02	29.58	71	91.7	275.2
Lane Elementary School	Southeast	School	SE-13	8.35	5.01	13.46	32	41.7	125.2
Lone Star Elementary School	Southeast	School	SE-22	13.41	8.05	21.61	52	67.0	201.0
Molly S. Bakman Elementary School	Southeast	School	SE-20	11.19	6.71	18.03	43	55.9	167.7
Roosevelt High School	Southeast	School	SE-33	34.56	20.73	55.68	133	172.7	518.0
Scandinavian Middle School	Southeast	School	SE-18	10.36	6.21	16.69	40	51.7	155.2
Sequoia Middle School	Southeast	School	SE-27	16.86	10.11	27.16	65	84.2	252.7
Sunnyside High School	Southeast	School	SE-35	49.83	29.90	80.29	192	249.0	747.0
Temperance-Kutner Elementary School	Southeast	School	SE-21	13.00	7.80	20.94	50	64.9	194.8
Turner Elementary School	Southeast	School	SE-17	10.00	6.00	16.11	38	50.0	149.9
Academy for New Americans	Southeast	School	SE-30	17.79	10.67	28.66	68	88.9	266.6
Southwest Quadrant									
Chandler Airport	Southwest	Airport	SW-68	155.24	38.81	104.23	249	323.2	969.6
Cemetery	Southwest	Cemetery	SW-71	197.92	188.03	504.96	1,204	1565.8	4697.5
Cemetery	Southwest	Cemetery	SW-69	18.27	17.35	46.61	111	144.5	433.6
Cemetery	Southwest	Cemetery	SW-70	38.65	36.71	98.60	235	305.8	917.3
Edison-Bethune Charter Academy	Southwest	School	SW-43	9.38	5.63	15.11	36	46.9	140.6
New Millenium Charter School	Southwest	School	SW-7	0.47	0.28	0.76	2	2.4	7.1
Sunset Elementary School	Southwest	School	SW-45	9.67	5.80	15.58	37	48.3	144.9
W.E.B. Dubois Public Charter School	Southwest	School	SW-23	5.31	3.19	8.55	20	26.5	79.6
Bigby-Villa	Southwest	Park	SW-83	2.41	2.29	6.14	15	19.0	57.1
Carver	Southwest	Park	SW-87	4.62	4.39	11.78	28	36.5	109.6
Chandler	Southwest	Park	SW-82	1.98	1.88	5.05	12	15.7	47.0
Courthouse Park	Southwest	Park	SW-99	13.94	13.24	35.55	85	110.2	330.7
Dickey	Southwest	Park	SW-81	1.94	1.84	4.95	12	15.4	46.1
Fink-White	Southwest	Park	SW-94	8.89	8.44	22.67	54	70.3	210.9
Frank H. Ball	Southwest	Park	SW-84	2.95	2.80	7.52	18	23.3	69.9
Fresno Metropolitan Museum	Southwest	Park	SW-76	0.16	0.15	0.42	1	1.3	3.9
Grizzlies Stadium	Southwest	Park	SW-98	10.87	10.32	27.73	66	86.0	257.9
Hinton	Southwest	Park	SW-90	6.03	5.73	15.38	37	47.7	143.1
Hobart	Southwest	Park	SW-79	0.64	0.61	1.64	4	5.1	15.2
Holmes	Southwest	Park	SW-95	9.19	8.73	23.44	56	72.7	218.0
Hyde	Southwest	Park	SW-97	10.82	10.28	27.61	66	85.6	256.8
Ivy	Southwest	Park	SW-88	4.69	4.46	11.97	29	37.1	111.3
Kearney Park	Southwest	Park	SW-102	144.14	136.93	367.74	877	1140.3	3421.0

Lafayette	Southwest	Park	SW-86	4.49	4.27	11.47	27	35.6	106.7
Meux	Southwest	Park	SW-75	0.13	0.12	0.33	1	1.0	3.1
Nelsen	Southwest	Park	SW-85	3.67	3.67	9.87	24	30.6	91.8
Park	Southwest	Park	SW-77	0.28	0.26	0.71	2	2.2	6.6
Park	Southwest	Park	SW-73	0.04	0.04	0.10	0	0.3	0.9
Park	Southwest	Park	SW-72	0.03	0.03	0.08	0	0.2	0.7
Park	Southwest	Park	SW-74	0.04	0.04	0.11	0	0.3	1.0
Pride	Southwest	Park	SW-78	0.32	0.30	0.81	2	2.5	7.6
Radio	Southwest	Park	SW-91	7.32	6.95	18.66	45	57.9	173.6
Roeding Regional	Southwest	Park	SW-101	138.83	131.89	354.20	845	1098.3	3295.0
Romain	Southwest	Park	SW-93	7.88	7.49	20.11	48	62.4	187.1
San Pablo Family	Southwest	Park	SW-80	0.96	0.91	2.46	6	7.6	22.9
Sunset	Southwest	Park	SW-96	9.82	9.33	25.05	60	77.7	233.0
Victoria-West	Southwest	Park	SW-92	7.35	6.99	18.76	45	58.2	174.6
Wills	Southwest	Park	SW-89	5.70	5.41	14.54	35	45.1	135.2
Roeding Regional	Southwest	Park - Water	SW-103	6.10	0.00	0.00	0	0.0	0.0
Armenian Community School of Fresno	Southwest	School	SW-13	1.36	0.82	2.19	5	6.8	20.4
Faith Baptist Academy	Southwest	School	SW-5	0.32	0.19	0.51	1	1.6	4.8
Koinonia Christian	Southwest	School	SW-6	0.44	0.26	0.70	2	2.2	6.6
Our Lady of Victory	Southwest	School	SW-16	4.00	2.40	6.44	15	20.0	59.9
Sacred Heart	Southwest	School	SW-30	7.22	4.33	11.64	28	36.1	108.3
San Joaquin Memorial High School	Southwest	School	SW-32	41.03	24.62	66.12	158	205.0	615.1
FRESNO CITY COLLEGE	Southwest	School	SW-1	51.21	30.73	82.52	197	255.9	767.7
Addams Elementary School	Southwest	School	SW-37	8.38	5.03	13.51	32	41.9	125.7
Akira Yokomi Elementary School	Southwest	School	SW-27	6.50	3.90	10.48	25	32.5	97.5
Ann B. Leavenworth	Southwest	School	SW-50	10.71	6.43	17.26	41	53.5	160.5
Birney Elementary School	Southwest	School	SW-38	8.43	5.06	13.59	32	42.1	126.4
Calwa Elementary School	Southwest	School	SW-40	8.45	5.07	13.61	32	42.2	126.6
Carver Academy	Southwest	School	SW-39	8.43	5.06	13.59	32	42.1	126.4
Central Unified Alternative/Opportunity	Southwest	School	SW-17	4.50	2.70	7.25	17	22.5	67.4
Columbia Elementary School	Southwest	School	SW-36	8.29	4.97	13.35	32	41.4	124.2
Dailey Elementary School	Southwest	School	SW-18	4.59	2.75	7.40	18	22.9	68.8
Dewolf West High School	Southwest	School	SW-19	4.68	2.81	7.54	18	23.4	70.1
Edison Computech	Southwest	School	SW-61	18.81	11.29	30.31	72	94.0	282.0
Edison High School	Southwest	School	SW-66	36.13	21.68	58.22	139	180.5	541.6
El Capitan Middle School	Southwest	School	SW-59	17.28	10.37	27.85	66	86.3	259.0
Fremont Elementary School	Southwest	School	SW-31	7.75	4.65	12.50	30	38.7	116.2
Fresno County Community	Southwest	School	SW-22	5.31	3.18	8.55	20	26.5	79.6
Fresno County Special Education	Southwest	School	SW-10	0.72	0.43	1.16	3	3.6	10.8
Fresno High School	Southwest	School	SW-65	33.99	20.39	54.76	131	169.8	509.5
Fulton Special Education	Southwest	School	SW-42	9.34	5.61	15.05	36	46.7	140.1
Hamilton Elementary School	Southwest	School	SW-58	16.82	10.09	27.10	65	84.0	252.1
Heaton Elementary School	Southwest	School	SW-25	6.43	3.86	10.36	25	32.1	96.4
Homan Elementary School	Southwest	School	SW-34	7.99	4.79	12.87	31	39.9	119.7
J. E. Young Academic Center	Southwest	School	SW-9	0.64	0.38	1.03	2	3.2	9.6
Jackson Elementary School	Southwest	School	SW-14	3.25	1.95	5.24	12	16.2	48.7
James K. Polk Elementary School	Southwest	School	SW-63	19.09	11.45	30.76	73	95.4	286.2
Jefferson Elementary School	Southwest	School	SW-29	6.65	3.99	10.72	26	33.2	99.7
King Elementary School	Southwest	School	SW-51	10.94	6.56	17.62	42	54.6	163.9
Kirk Elementary School	Southwest	School	SW-3	5.19	3.12	8.37	20	25.9	77.8
Lincoln Elementary School	Southwest	School		6.48	3.89	10.44	25	32.4	97.1
Lowell Elementary School	Southwest	School	SW-24	5.32	3.19	8.58	20	26.6	79.8
Madison Elementary School	Southwest	School	SW-60	18.13	10.88	29.22	70	90.6	271.8
Mayfair Elementary School	Southwest	School	SW-28	6.62	3.97	10.67	25	33.1	99.3
McKinley Elementary School	Southwest	School	SW-47	10.01	6.01	16.14	38	50.0	150.1
McLane High School	Southwest	School	SW-41	8.49	5.10	13.68	33	42.4	127.3
Miguel Hidalgo Elementary School	Southwest	School	SW-52	11.03	6.62	17.77	42	55.1	165.3
Muir Elementary School	Southwest	School	SW-35	8.14	4.89	13.12	31	40.7	122.1
Norseman Elementary School	Southwest	School	SW-54	12.40	7.44	19.99	48	62.0	185.9
Orange Center Elementary	Southwest	School	SW-48	10.04	6.02	16.17	39	50.1	150.4
Roosevelt Elementary School	Southwest	School	SW-53	11.63	6.98	18.74	45	58.1	174.3
Rowell Elementary School	Southwest	School	SW-44	9.40	5.64	15.14	36	46.9	140.8
Susan B. Anthony Elementary School	Southwest	School	SW-46	9.85	5.91	15.88	38	49.2	147.7
Tehipite Middle School	Southwest	School	SW-62	19.08	11.45	30.75	73	95.3	286.0
Webster Elementary School	Southwest	School	SW-21	5.10	3.06	8.22	20	25.5	76.4
West Fresno Elementary School	Southwest	School	SW-57	16.46	9.87	26.52	63	82.2	246.7
West Fresno Middle School	Southwest	School	SW-49	10.63	6.38	17.12	41	53.1	159.3
West Park Elementary School	Southwest	School	SW-55	14.17	8.50	22.82	54	70.8	212.3
Winchell Elementary School	Southwest	School	SW-33	7.85	4.71	12.66	30	39.2	117.7
Wishon Elementary School	Southwest	School	SW-67	37.83	22.70	60.96	145	189.0	567.1
Yosemite Middle School	Southwest	School	SW-4	15.71	9.42	25.31	60	78.5	235.5
Armenian Community School	Southwest	School	SW-12	1.29	0.77	2.08	5	6.4	19.3
Fresno Valley High School	Southwest	School	SW-20	4.87	2.92	7.85	19	24.3	73.0
St. Therese School	Southwest	School	SW-8	0.50	0.30	0.81	2	2.5	7.6
TOTAL						12,859	30,671	39,855	119,448

Irrigation Factors

Airport	25%
Cemetery	95%
Golf Course/Country Club	90%
Lake	100%
Park	95%
Park - Water	0%
School	60%

Peak Day Peaking Factor	30%

Notes:
(1) Irrigable acreage is estimated by multiplying parcel acreage by the irrigation factor. This is an adjustment for unirrigated parcel area.
(2) Estimated irrigation usage has been calculated by multiplying the irrigable area by the average irrigation requirement for the Fresno area.
(3) The maximum month irrigation has been calculated by multiplying the average irrigation requirement by the maximum month irrigation requirement (July = 20 percent of annual demand).
(4) Maximum day irrigation demand is assumed to 30 percent larger than the maximum month demand.
(5) The peak hour demand has been estimated assuming an eight hour irrigation period.

Removed Customers

Calif State Univ Fresno Sports Complex	Northeast Southwest	School Park	NE-47	264.26 141.10	158.55 141.10	425.81 378.93	1,016 904	1320.4 1175.0	3961.2 3525.1

APPENDIX D – 1996 RWRF MASTER PLAN – AGRICULTURAL EXCHANGE EVALUATION

Raisin City Water District

In January 1995, Raisin City Water District (RCWD) submitted a proposal to take delivery of secondary undisinfected effluent from the RWRF. Meetings with the RCWD Board of Directors (Spring 1996) confirmed that RCWD is interested in negotiating an agreement with the City based on the original proposal. This proposal includes year round delivery of approximately 45 mgd through pipelines to disposal ponds located in RCWD. Turnouts from the pipelines would also be provided for direct irrigation.

Technical Elements. The RCWD proposal for 45 mgd of RWRF effluent includes an estimated 48,000 ft of pipeline and three 320 acre disposal ponds (total 960 acres assuming a conservative percolation rate of 2 in/day). The pipe sizes required range from 66 inches to 42 inches in diameter. The three pond sites are not located on adjacent property, therefore the pipe size requirements are reduced after each turnout to a pond. Review of the regional topography indicates that the effluent can be delivered to the ponds by gravity flow. This would be confirmed in final design.

Institutional Elements. The RCWD Board of Directors has expressed strong commitment to the proposed project, primarily because the effluent provides a reliable source of water for agricultural use. This project would increase effluent reuse and provide incidental groundwater recharge in a water-short area. Incidental percolation would help to off-set the declining groundwater parts of the District. The District currently relies solely on groundwater for agricultural use.

This project requires a transfer of agricultural land for use as disposal ponds. The proposed locations of the off-site ponds is approximately six to seven miles south of the RWRF, as shown in Figure 4. Approximately one-half of the proposed pond locations is currently planted with vineyards and orchards; the other half is planted with seasonal crops. However, the RCWD Board expects that adequate land is available through willing sellers in the event the proposed locations are not available.

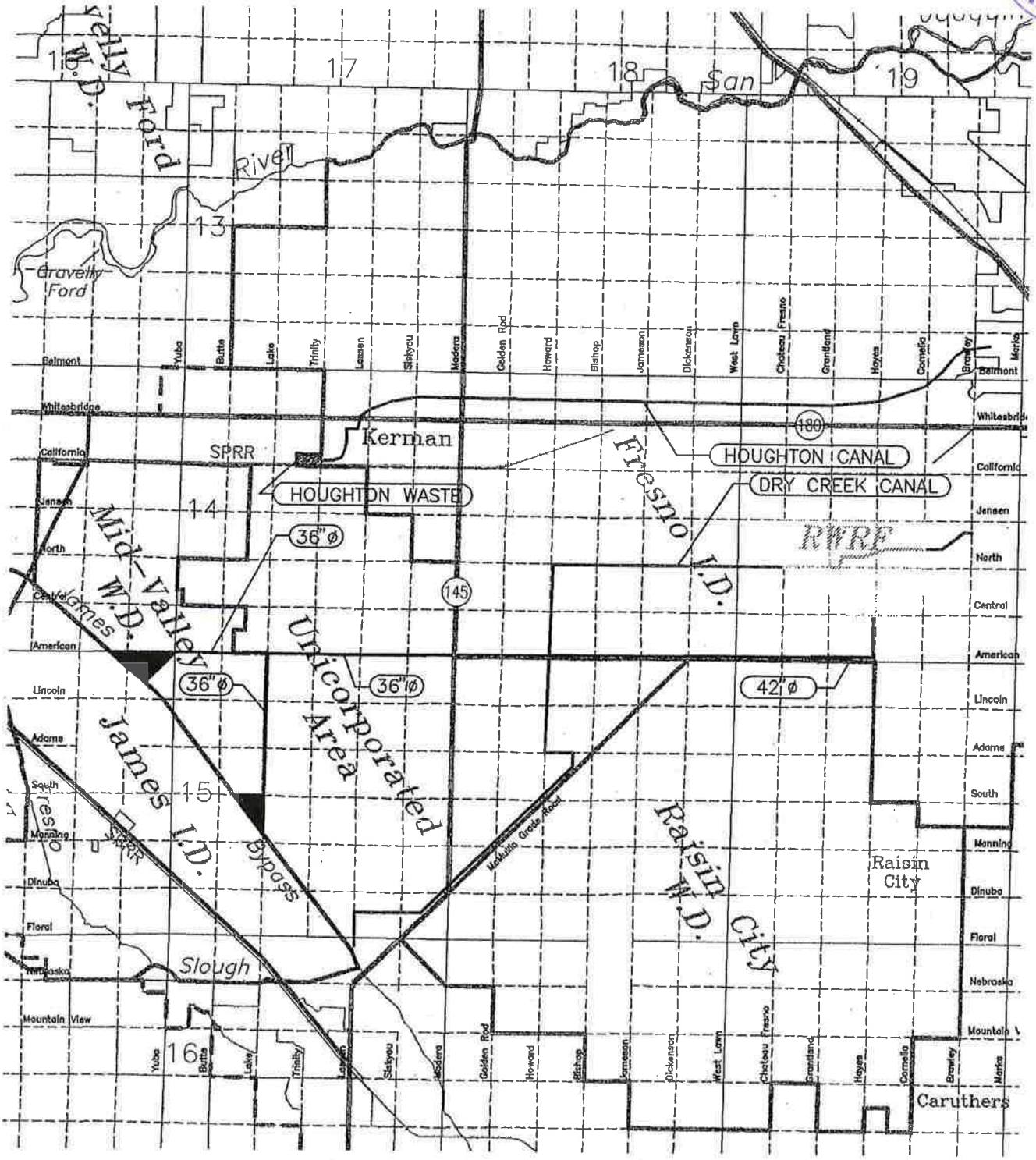


Figure 4
PROPOSED MVWD REUSE/DISPOSAL PROJECT
Fresno Clovis Wastewater Facilities
Master Plan Report

If implemented this project may require mitigation to FID because delivery of effluent to RCWD would occur outside the FID boundary. As noted above, additional hydrogeologic studies and are necessary to determine to what extent, if any, mitigation would be required. The studies must identify the potential benefit of incidental percolation from the disposal operation in RCWD. The incidental percolation should help to offset the declining groundwater levels in the vicinity of RCWD (i.e., flatten the groundwater gradient), thereby reducing the amount of localized incidental groundwater flow out of FID toward RCWD.

The construction of additional disposal ponds is necessary to meet existing and future flow conditions at the plant, and therefore should not be viewed as a "growth inducing project". Moreover, there is a regulatory directive to expand the disposal capacity. The transfer of agricultural land to disposal lands will result in some lost agricultural production; however, the lost agricultural production may be offset by improving area-wide groundwater elevations through incidental percolation.

Cost. The estimated total project cost for the pipeline and land for the three ponds is approximately $37 million (assuming no costs for mitigation). This cost includes approximately $13.6 million for pipelines; $2.4 million for land; $9.6 million for pond construction, and; engineering costs and contingency allowance.

Based discussion the RCWD Board of Directors, it is anticipated that RCWD could share in the costs up to approximately $0.2 - 0.24 million/year. This equates to an assessment of roughly $4 to $5/acre. Total costs to the City would be approximately $3.7 million/yr, or approximately $67/acre-foot. These costs represent the expected maximum project costs. It may be possible to reduce total costs to the City to approximately $25/acre-foot. Cost savings could be realized by reduced land requirements for percolation (e.g., 4 in/day percolation rate), reduced costs for pipeline construction, or economy of scale/shared costs for a joint project with other irrigation districts (ref. J. Boren RCWD September 1996).

Mid-Valley Water District

In January 1995, Mid-Valley Water District (MVWD) submitted a proposal to take delivery of secondary undisinfected effluent from the RWRF. Meetings with the MVWD Board of Directors (Spring 1996) confirmed interest in negotiating an agreement with the City based on the original proposal, which includes year round delivery of 15 mgd through pipelines to disposal ponds. Turnouts from the pipelines would also be provided for direct irrigation.

Technical Elements. The MVWD proposal for approximately 15 mgd of RWRF effluent includes approximately 79,000 feet of pipe for delivery to a 300 acre reservoir. The pipe sizes required range from 36 to 42 inches. Review of the regional topography indicates that the effluent can be delivered to the ponds by gravity flow.

Institutional Elements. The proposed locations of the off-site ponds is approximately fifteen miles west- southwest of the RWRF, as shown in Figure 5. The proposed sites were identified by the MVWD as potentially available for pond construction.

Conversations with MVWD indicate willingness to proceed with the proposal. The farmers within the district consider this to be a beneficial project because of the potential for direct use as well as the incidental percolation. MVWD currently has no surface water rights and relies solely on groundwater pumping.

Potential institutional issues include FID mitigation and the transfer of agricultural land to disposal ponds, as described above.

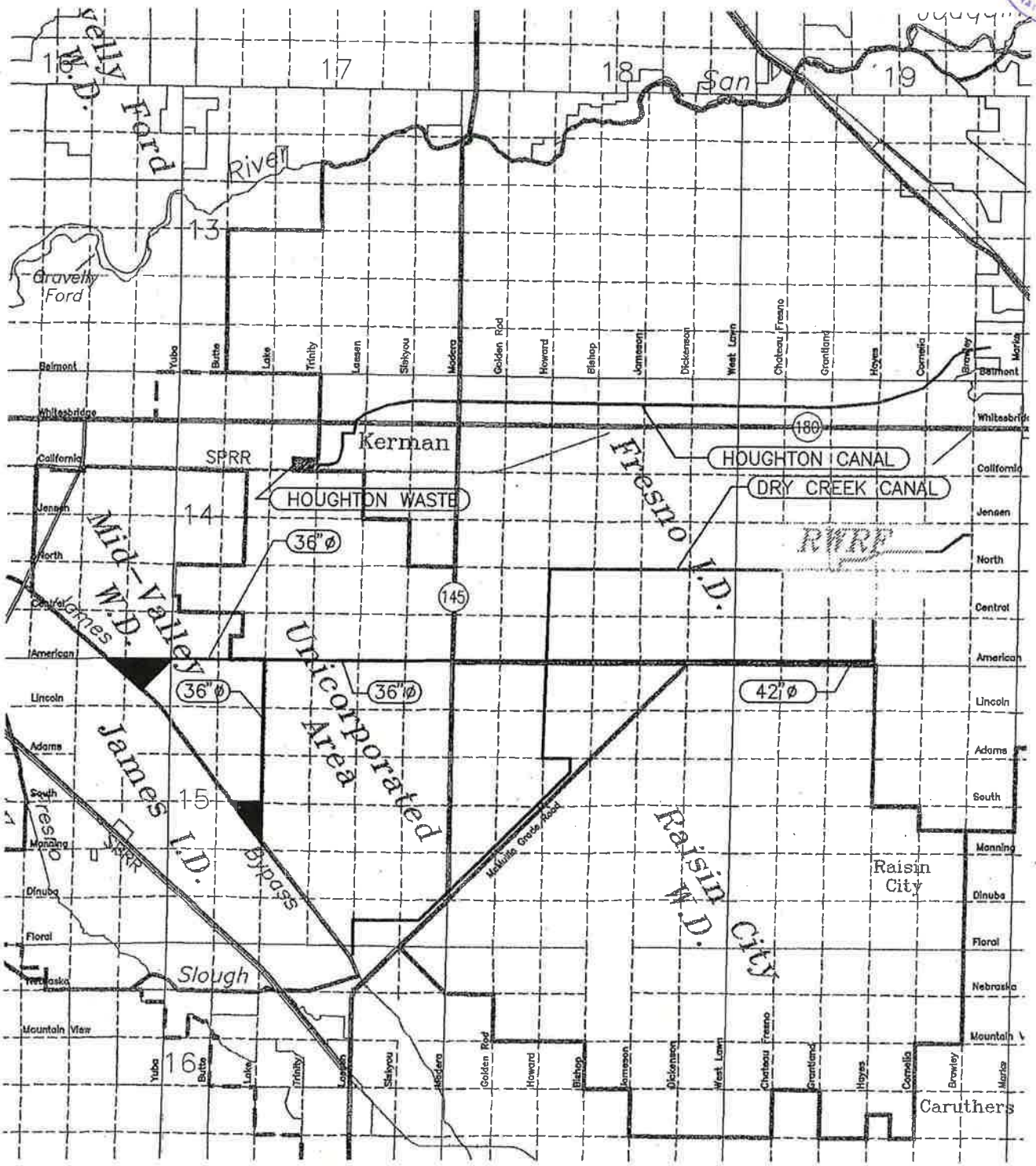
Cost. The estimated total project cost is $28.1 million (assuming no mitigation). This cost includes $15.8 million for pipeline; $0.6 million for land; $3.0 million for pond construction, and; cost allowances for engineering and contingencies.

Based discussion the MVWD Board of Directors, MVWD could share in the costs up to approximately $0.05 to 0.06 million/year. This equates to an assessment of roughly $4 to $5 per acre. Total costs to the City would be approximately $2.6 million/yr, or approximately $152/acre-foot. As noted above for RCWD, this estimate represents the expected maximum cost to the City. It may be possible to reduce total costs to the city to approximately $50/acre-foot (assuming no economy of scale or shared costs for a joint project with other irrigation districts). Like RCWD, total project costs could also be reduced if less land is required for percolation or if pipeline costs can be reduced.

James and Tranquillity Irrigation Districts

James Irrigation District (JID) and Tranquillity Irrigation District (TID) are located approximately 15 miles south-southwest of the RWRF. Both districts receive surface water through contracts with the U.S. Bureau of Reclamation. JID currently operates groundwater extraction wells along McMullen Grade Road (on the border of RCWD and an unincorporated area) and pumps water into Dry Creek Canal. The water flows from Dry Creek to the James Bypass which distributes water throughout JID. JID's canals are interconnected with TIDs distribution system. The two districts have the ability to share water resources and have expressed willingness to enter in a joint venture.

JID is currently coordinating a recharge project with the Kings River Conservation District (KRCD) to build 80 acres of basins in the southwest corner of the unincorporated area (in the northwest corner of Section 35, T15S, R17E). Seasonal flood flow from the Kings River would be diverted to these ponds, approximately one out of every four years. The original intent was that the basins would be farmed the other four years, however, JID is considering a revision of the plan to make the basins a joint project between JID and TID and the City of Fresno, so that secondary



LEGEND:

——— DISTRIBUTION TO MVWD

RWRF–PLANT BOUNDARIES

ALL SHADED AREAS–POTENTIAL POND LOCATIONS

Figure 5
PROPOSED MVWD
REUSE/DISPOSAL PROJECT
Fresno-Clovis Wastewater Facilities
Master Plan Report

undisinfected effluent could be diverted to the basins during the non-flood years. A separate project for disposal of effluent only could also be developed.

Technical Elements. JID has indicated interest in extracting 35,000 ac-ft/yr of effluent and TID indicated interest in extracting 14,000 ac-ft/yr of effluent. These annual extractions rates are roughly equivalent to 45 mgd average annual flow. The districts would be extracting at a greater rate primarily during the summer months, but flow to the basins from the RWRF would remain relatively steady year round at about 45 mgd.

Between 430 and 1,670 acres of ponds would be required for reuse/disposal of 45 mgd of effluent flow, based on percolation rates of 4 in/day and 1 in/day respectively. The soils in the area are sandy so a minimum percolation rate of 2 in/day could be obtained with proper management with regular rehabilitation. For this percolation rate a minimum of 830 acres of ponds would be required. Assuming additional land required for roads and berms is equivalent to 15 percent of the pond acreage, a total of approximately 1,000 acres is needed (approximately equal to one and a half square miles).

Delivery to the basins by gravity would require approximately 79,000 feet of pipeline ranging from 60 to 66-inch diameter. This would be confirmed in final design.

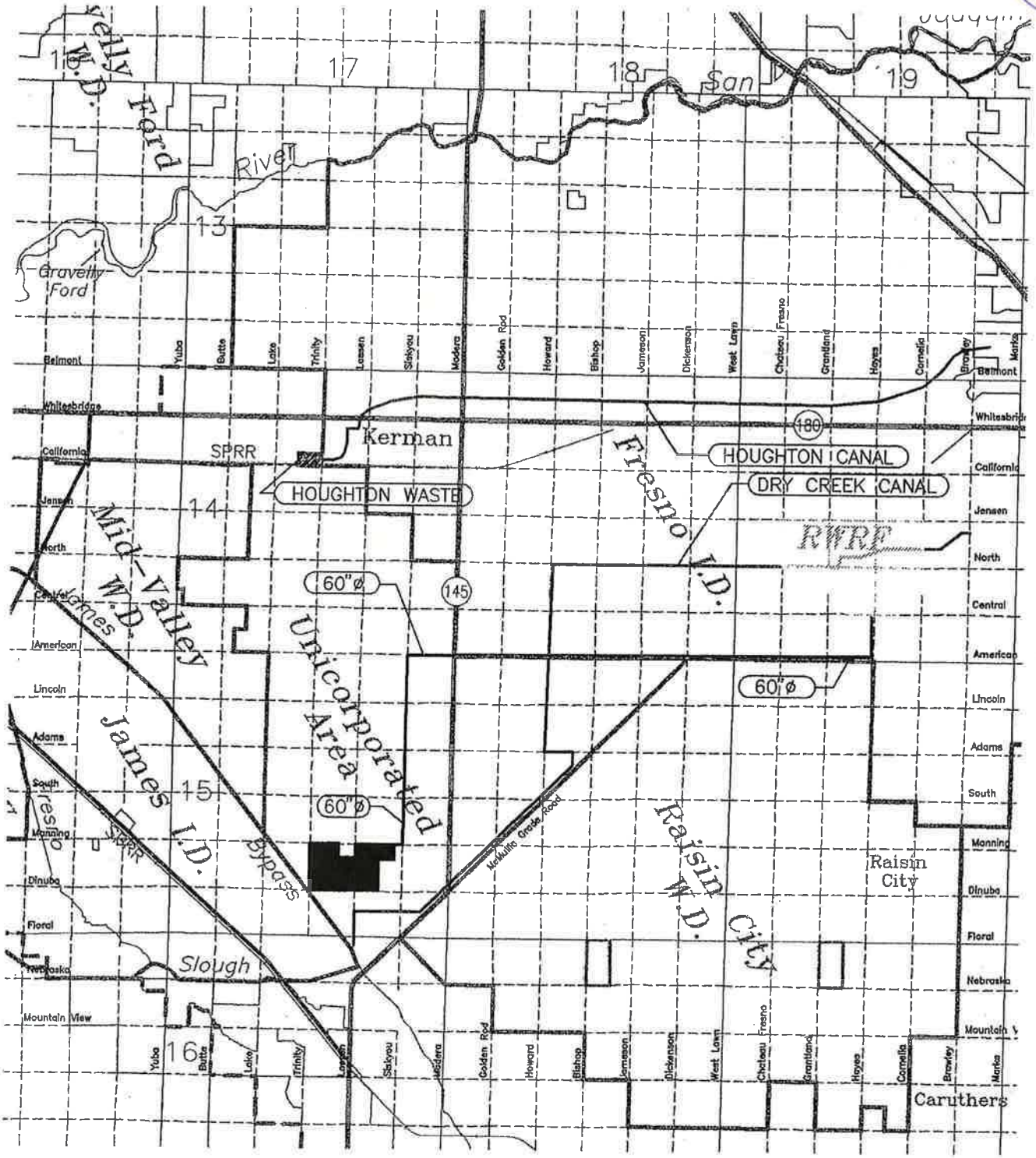
Institutional Elements. JID and TID have indicated a willingness to proceed with the proposal. The farmers within the district consider this to be a beneficial project because of the potential for improving the regional groundwater levels through incidental percolation. Groundwater in the unincorporated area has historically been overdrafted.

Acreage near and around the JID proposed recharge site are currently farmed primarily in seasonal alfalfa and grains. Proposed pond locations which are currently farmed with seasonal crops are shown in Figure 6. These locations are adjacent to the planned recharge basin, and are also in proximity to a possible pipeline route. The current owners have not yet been approached to determine their willingness to sell.

Potential institutional issues include FID mitigation and the transfer of agricultural land to disposal ponds, as described above.

Cost. The estimated total project cost is $51.8 million. This cost includes $23.7 million for pipeline; $2 million for land; $10 million for pond construction, and; cost allowances for engineering and contingencies.

JID/TID have indicated a willingness to share in costs for this project. Assuming a share in the costs up to approximately $0.15 to 0.18 million/year (assessment of roughly $4 to $5 per acre),



LEGEND:

DISTRIBUTION TO JID/TID
RWRF-PLANT BOUNDARIES

ALL SHADED AREAS-POTENTIAL POND LOCATIONS

Figure 6
PROPOSED JID/TID
REUSE/DISPOSAL PROJECT
Fresno-Clovis Wastewater Facilities
Master Plan Report

the total costs to the City would be approximately $4.8 million/yr, or approximately $91/acre-foot. As noted for RCWD and MVWD, this represents the expected maximum project cost.

APPENDIX E – SEWER FLOW CURVES FROM MONITORING DATA

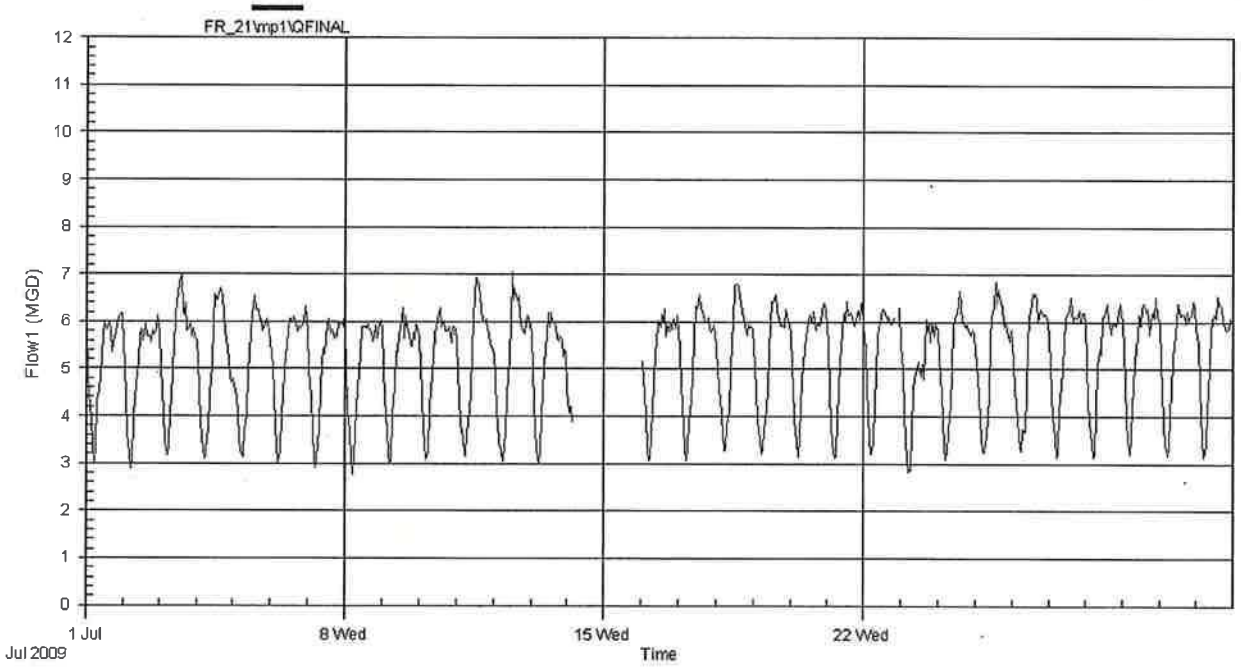
City of Fresno - SOUTHWEST QUADRANT, DOUNSTREAM OF ROEDING PARK
Sewer Monitoring Station No.21
N. Fruit Ave. 990 feet n/o W. Nielsen Ave.
Pipe Height: 40.5"
Pipe Dimensions: 40.5" x 41.5"

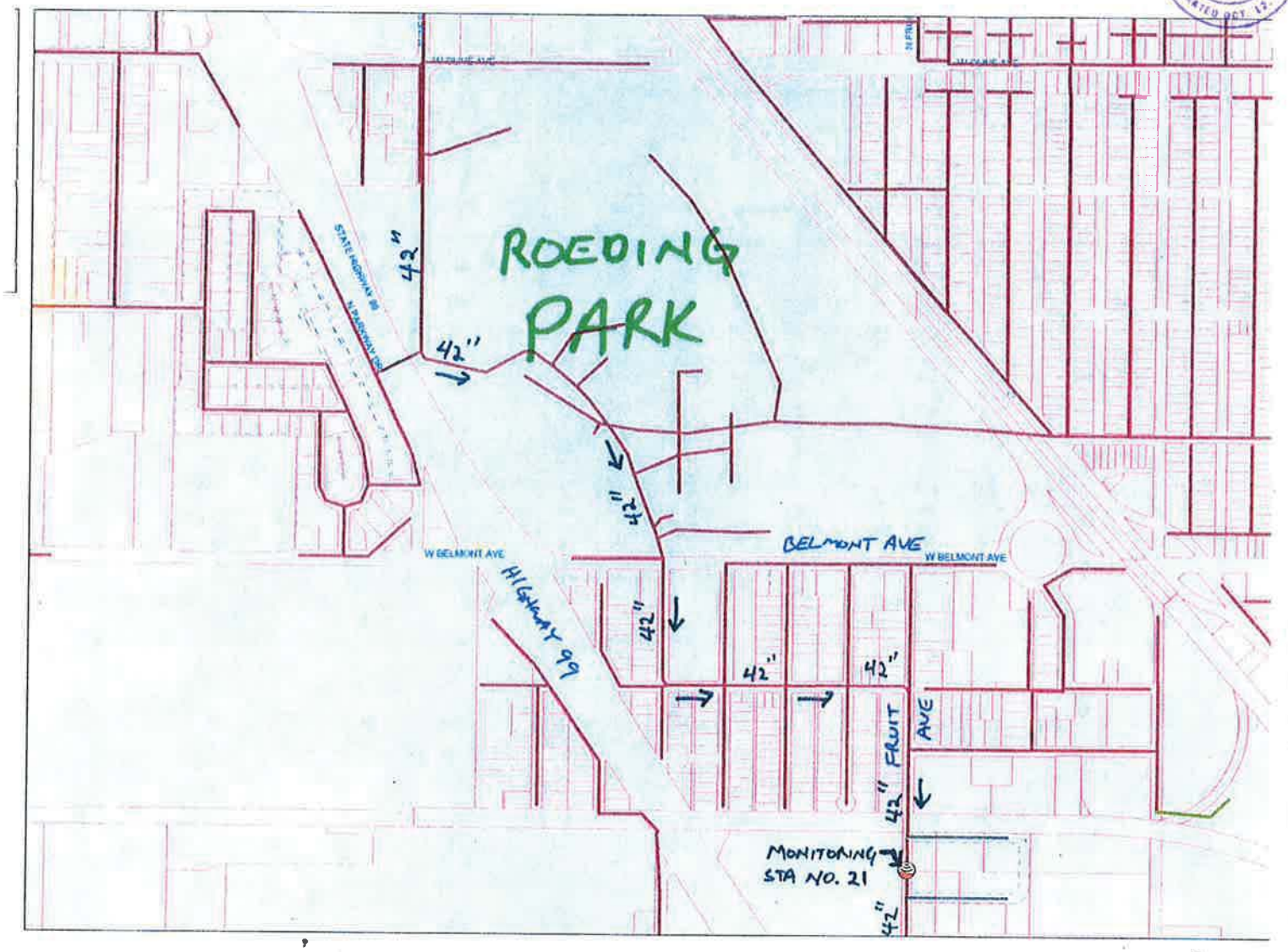
FR21\mp1\QFINAL (MGD - Total MG)

Date	Time	Min.	Time	Max.	Average	Total	Rain
07/01/09	6:00	2.892	23:00	6.319	5.168	5.168	0.00
07/02/09	5:45	2.756	23:00	6.366	5.050	5.050	0.00
07/03/09	6:00	3.061	14:00	7.272	5.391	5.391	0.00
07/04/09	5:30	2.880	14:45	6.984	5.137	5.137	0.00
07/05/09	6:15	3.046	14:00	6.746	5.127	5.127	0.00
07/06/09	5:45	2.843	22:45	6.793	5.209	5.209	0.00
07/07/09	5:45	2.865	23:00	6.365	5.106	5.106	0.00
07/08/09	5:45	2.653	12:30	6.290	5.110	5.110	0.00
07/09/09	6:15	2.834	13:15	6.453	5.127	5.127	0.00
07/10/09	4:45	2.747	13:45	6.520	5.196	5.196	0.00
07/11/09	5:30	2.985	13:00	7.141	5.234	5.234	0.00
07/12/09	6:45	2.890	12:00	7.456	5.235	5.235	0.00
07/13/09	5:30	2.703	11:00	6.607	5.098	5.098	0.00
07/14/09	3:15	3.797	0:15	4.707	4.225	0.616	0.00
07/15/09						–	0.00
07/16/09	6:15	2.863	23:15	6.421	5.237	4.965	0.00
07/17/09	5:15	2.889	13:45	6.749	5.312	5.312	0.00
07/18/09	6:15	3.025	12:45	7.102	5.350	5.350	0.00
07/19/09	6:15	3.009	14:30	7.007	5.268	5.268	0.00
07/20/09	5:15	2.875	23:15	6.769	5.364	5.364	0.00
07/21/09	5:30	3.053	22:45	6.647	5.378	5.378	0.00
07/22/09	5:15	3.087	23:15	6.650	5.355	4.797	0.00
07/23/09	6:00	2.723	16:45	6.168	4.867	4.867	0.00
07/24/09	5:45	2.961	14:30	6.831	5.295	5.295	0.00
07/25/09	6:15	3.041	13:45	7.090	5.293	5.293	0.00
07/26/09	6:15	3.163	13:00	7.006	5.353	5.353	0.00
07/27/09	5:00	3.007	14:15	6.628	5.368	5.368	0.00
07/28/09	6:15	3.036	14:00	6.784	5.339	5.339	0.00
07/29/09	5:15	3.057	22:00	6.700	5.428	5.428	0.00
07/30/09	6:00	3.058	22:45	6.673	5.396	5.396	0.00
07/31/09	5:15	2.860	14:45	6.689	5.378	5.378	0.00
ReportAvg		2.955		6.664	5.213		
ReportTotal						151.955	0.000

ADS Environmental Services

Pipe Height: 40.50





SCALE 1 : 9,958

1,000 2,000 3,000

FEET

City of Fresno - SOUTHWEST QUADRANT - UPSTREAM OF FRUIT & CHURCH SITE
Sewer Monitoring Station No.15
428 W. California Ave
Pipe Height: 48.00"
Pipe Dimensions: 48.00" x 48.00"

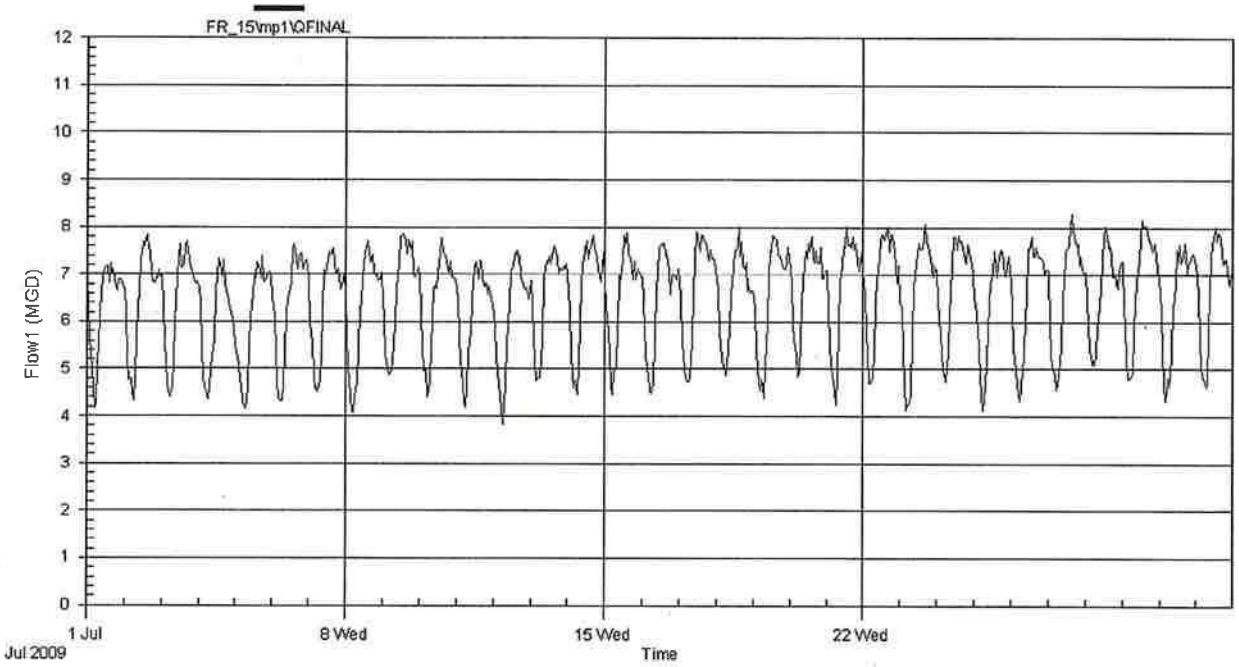
FR_15\mp1\QFINAL (MGD - Total MG)

Date	Time	Min.	Time	Max.	Average	Total	Rain
07/01/09	5:45	3.877	13:00	7.438	6.331	6.331	0.00
07/02/09	6:00	4.066	14:45	7.998	6.468	6.468	0.00
07/03/09	5:15	4.130	12:45	7.915	6.425	6.425	0.00
07/04/09	7:45	4.081	14:15	7.610	6.010	6.010	0.00
07/05/09	7:00	4.057	17:00	7.663	6.048	6.048	0.00
07/06/09	6:15	4.039	14:30	7.965	6.372	6.372	0.00
07/07/09	6:45	4.283	16:30	8.016	6.390	6.390	0.00
07/08/09	5:30	3.750	14:00	7.842	6.284	6.284	0.00
07/09/09	6:00	4.768	14:15	8.041	6.636	6.636	0.00
07/10/09	5:15	4.241	14:30	7.817	6.446	6.446	0.00
07/11/09	6:30	4.115	16:30	7.637	6.214	6.214	0.00
07/12/09	6:30	3.540	14:30	7.759	6.132	6.132	0.00
07/13/09	4:30	4.397	14:45	7.834	6.586	6.586	0.00
07/14/09	6:15	4.219	16:00	7.991	6.619	6.619	0.00
07/15/09	5:15	4.410	14:00	8.296	6.588	6.588	0.00
07/16/09	5:30	4.325	15:15	8.084	6.483	6.483	0.00
07/17/09	5:45	4.646	15:15	8.337	6.706	6.706	0.00
07/18/09	6:00	4.442	14:00	8.113	6.569	6.569	0.00
07/19/09	7:15	4.145	15:30	8.154	6.517	6.517	0.00
07/20/09	5:30	4.424	17:45	8.048	6.787	6.787	0.00
07/21/09	6:00	4.087	13:15	8.206	6.696	6.696	0.00
07/22/09	6:00	4.272	15:30	8.410	6.829	6.829	0.00
07/23/09	4:15	3.816	16:30	8.270	6.530	6.530	0.00
07/24/09	5:30	4.469	14:00	8.012	6.761	6.761	0.00
07/25/09	6:30	3.900	13:30	7.814	6.384	6.384	0.00
07/26/09	5:45	4.142	13:15	8.114	6.491	6.491	0.00
07/27/09	5:30	4.159	16:00	8.469	6.669	6.669	0.00
07/28/09	6:45	4.687	12:00	8.094	6.671	6.671	0.00
07/29/09	7:00	4.198	13:30	8.666	6.809	6.809	0.00
07/30/09	4:45	3.923	11:45	7.929	6.500	6.500	0.00
07/31/09	6:30	4.418	16:00	8.254	6.693	6.693	0.00
ReportAvg		4.194		8.026	6.505		
ReportTotal						201.644	0.000

CITY OF FRESNO
INCORPORATED OCT. 12, 1885

ADS Environmental Services

Pipe Height: 48.00



Sewer

PublicWorks

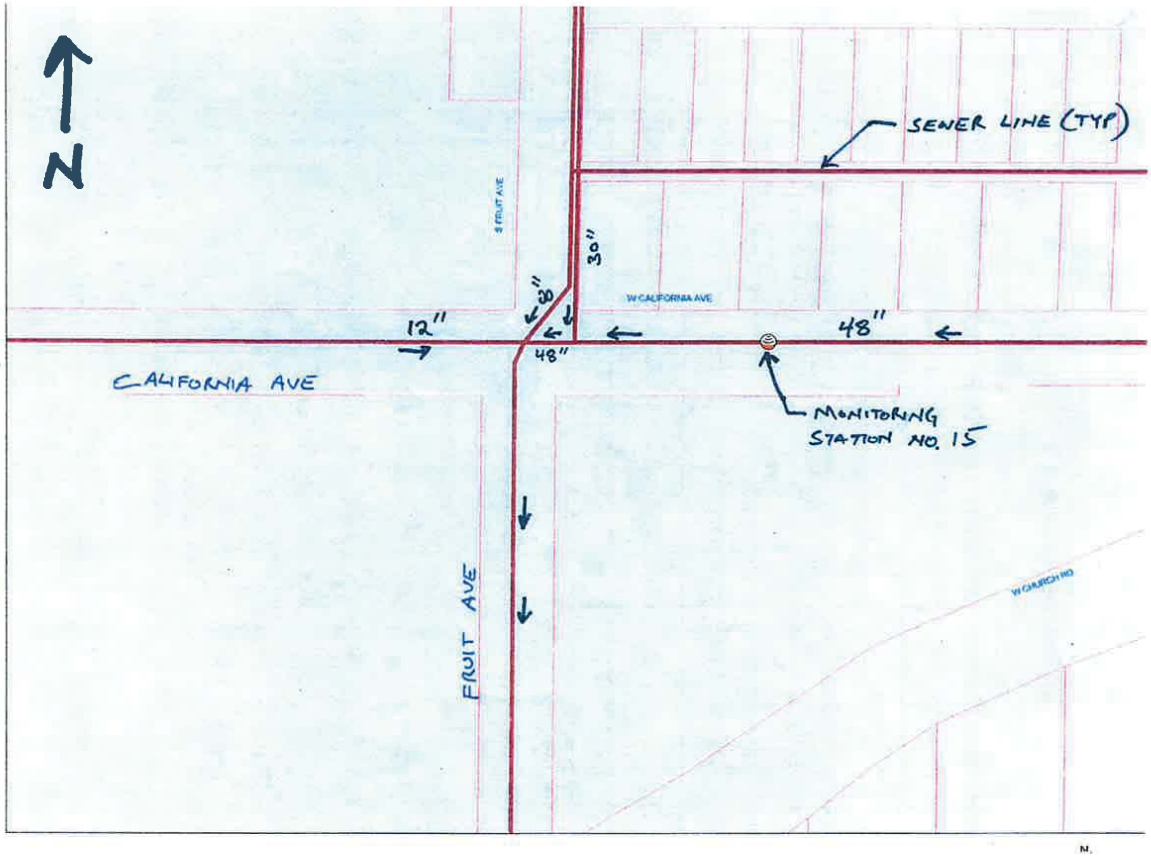
Public Utilities Easments

Parcels

Parcels

City Limits

Fresno County





City of Fresno - NORTHWEST QUADRANT
Sewer Monitoring Station No.2
Intersection of Herndon and Blythe Ave.
Pipe Height: 45.25"
Pipe Dimensions: 44.75" X 45.13"

FR_02\mp1\QFINAL (MGD - Total MG)

Date	Time	Min.	Time	Max.	Average	Total	Rain
07/01/09	6:45	2.525	12:15	9.821	6.824	6.824	0.00
07/02/09	6:30	2.683	12:15	9.909	6.787	6.787	0.00
07/03/09	7:15	2.537	15:00	10.130	6.727	6.727	0.00
07/04/09	7:30	2.473	14:45	10.120	6.352	6.352	0.00
07/05/09	7:15	2.473	15:45	10.080	6.391	6.391	0.00
07/06/09	6:30	2.511	13:15	9.578	6.816	6.816	0.00
07/07/09	7:00	2.427	12:00	9.557	6.726	6.726	0.00
07/08/09	7:15	2.571	12:15	9.788	6.816	6.816	0.00
07/09/09	6:45	2.596	12:30	9.740	6.734	6.734	0.00
07/10/09	6:45	2.474	13:00	10.140	6.778	6.778	0.00
07/11/09	7:15	2.435	13:30	10.330	6.791	6.791	0.00
07/12/09	7:30	2.249	13:45	9.914	6.501	6.501	0.00
07/13/09	7:15	2.332	12:45	9.878	6.757	6.757	0.00
07/14/09	7:15	2.742	11:15	9.545	6.719	6.719	0.00
07/15/09	7:15	2.796	12:15	9.727	6.685	6.685	0.00
07/16/09	6:45	2.595	11:45	9.759	6.763	6.763	0.00
07/17/09	6:45	2.815	12:45	10.220	6.829	6.829	0.00
07/18/09	7:15	2.540	14:00	10.100	6.671	6.671	0.00
07/19/09	7:45	2.361	13:45	9.992	6.575	6.575	0.00
07/20/09	7:15	2.598	11:30	9.954	6.874	6.874	0.00
07/21/09	7:15	2.820	11:30	9.716	6.868	6.868	0.00
07/22/09	6:00	2.884	11:30	9.777	6.862	6.862	0.00
07/23/09	7:00	3.230	11:45	9.599	6.938	6.938	0.00
07/24/09	7:00	2.921	12:15	9.762	6.906	6.906	0.00
07/25/09	7:30	2.600	16:15	10.140	6.780	6.780	0.00
07/26/09	7:45	2.655	14:00	10.090	6.740	6.740	0.00
07/27/09	6:15	2.873	11:45	9.915	6.993	6.993	0.00
07/28/09	7:00	2.945	12:00	9.764	7.003	7.003	0.00
07/29/09	5:30	3.221	12:00	9.689	7.122	7.122	0.00
07/30/09	7:45	3.037	12:00	9.749	7.143	7.143	0.00
07/31/09	6:00	3.114	12:45	9.949	7.085	7.085	0.00
ReportAvg		2.678		9.885	6.792		
ReportTotal						210.556	0.000

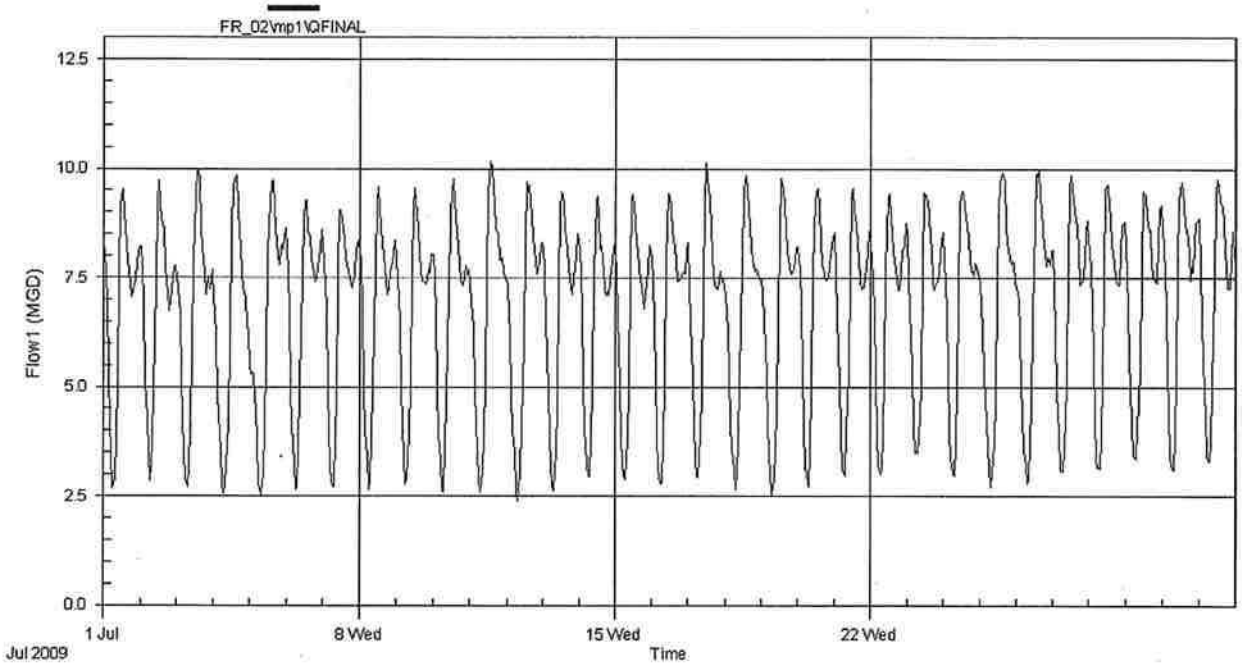
CITY OF FRESNO
INCORPORATED OCT. 12, 1885

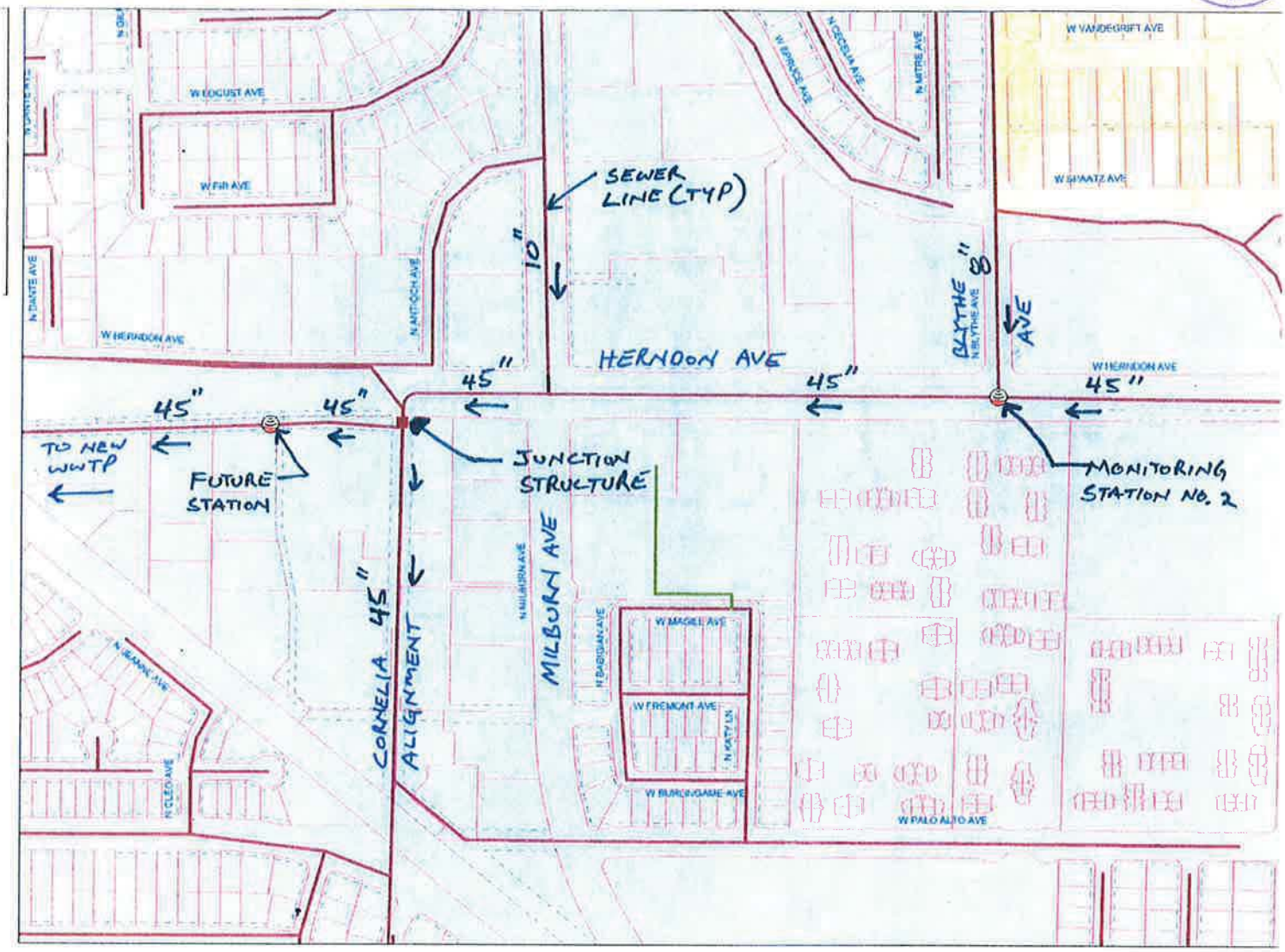
ADS Environmental Services

Pipe Dimensions: 44.75" X 45.13"

Intersection of Herndon and Blythe Ave.

Fresno, CA
Pipe Height: 44.75




N
CITY OF FRESNO
INCORPORATED OCT. 12, 1885
W VANDEGRIFT AVE
W SPRATZ AVE
W LOCUST AVE
W FIR AVE
N THESTE AVE
N ANTIOCH AVE
W HERNDON AVE
W ERRICKS AVE
N CECELIA AVE
N MITRE AVE
SEWER LINE (TYP)
10"
8"
BLYTHE AVE
N BLYTHE AVE
HERNDON AVE
45"
45"
45"
45"
45"
TO NEW WWTP
FUTURE STATION
JUNCTION STRUCTURE
MONITORING STATION NO. 2
CORNELIA AVE
ALIGNMENT
MILBURN AVE
N MILBURN AVE
N BARSTOW AVE
W MAGILL AVE
W FREMONT AVE
N KATY LN
W BUTLER-GARE AVE
W PALO ALTO AVE
N FRANK AVE
N CLEO AVE
SCALE 1 : 5,532
500
1,000
1,500
FEET
N

City of Fresno - SOUTHEAST QUADRANT
Sewer Monitoring Station No.9
Intersection of Chestnut and Madison
Pipe Height: 38.88"
Pipe Dimensions: 38.88" X 38.88"

FR_09\mp1\QFINAL (MGD - Total MG)

Date	Time	Min.	Time	Max.	Average	Total	Rain
07/01/06	3:30	3.096	11:30	8.063	5.911	5.911	0.00
07/02/06	2:45	2.817	10:30	7.815	5.776	5.776	0.00
07/03/06	3:00	2.969	12:00	8.150	6.177	6.177	0.00
07/04/06	3:30	2.915	12:00	8.574	5.845	5.845	0.00
07/05/06	2:45	3.002	11:15	7.969	6.252	6.252	0.00
07/06/06	3:00	2.938	13:00	8.050	6.280	6.280	0.00
07/07/06	3:00	2.851	10:00	8.009	6.197	6.197	0.00
07/08/06	2:45	3.212	11:00	8.539	6.033	6.033	0.00
07/09/06	5:00	3.043	10:00	7.781	5.923	5.923	0.00
07/10/06	3:30	3.120	11:45	8.327	6.448	6.448	0.00
07/11/06	3:45	3.287	11:00	8.030	6.439	6.439	0.00
07/12/06	3:15	3.126	12:30	7.927	6.298	6.298	0.00
07/13/06	3:15	3.028	11:15	8.000	6.335	6.335	0.00
07/14/06	3:15	3.137	10:45	8.407	6.352	6.352	0.00
07/15/06	3:15	3.193	11:45	8.125	5.981	5.981	0.00
07/16/06	3:15	3.144	10:15	8.035	6.018	6.018	0.00
07/17/06	3:15	3.272	11:00	8.312	6.452	6.452	0.00
07/18/06	3:15	3.379	12:30	8.281	6.446	6.446	0.00
07/19/06	3:15	3.160	10:00	8.186	6.419	6.419	0.00
07/20/06	3:30	3.257	9:15	8.000	6.398	6.398	0.00
07/21/06	3:00	3.142	12:00	8.406	6.336	6.336	0.00
07/22/06	4:00	3.347	11:00	8.209	6.079	6.079	0.00
07/23/06	4:15	3.194	10:15	7.998	6.039	6.039	0.00
07/24/06	4:00	3.195	11:00	8.364	6.495	6.495	0.00
07/25/06	3:00	3.363	10:15	8.459	6.593	6.593	0.00
07/26/06	3:15	3.378	11:45	8.150	6.446	6.446	0.00
07/27/06	3:15	3.241	11:00	8.330	6.498	6.498	0.00
07/28/06	3:15	3.467	10:30	8.373	6.455	6.455	0.00
07/29/06	3:30	3.313	11:00	8.449	6.143	6.143	0.00
07/30/06	3:45	3.188	11:30	8.111	6.083	6.083	0.00
07/31/06	3:30	3.119	12:30	8.619	6.477	6.477	0.00
ReportAvg		3.158		8.195	6.246		
ReportTotal						193.624	0.00

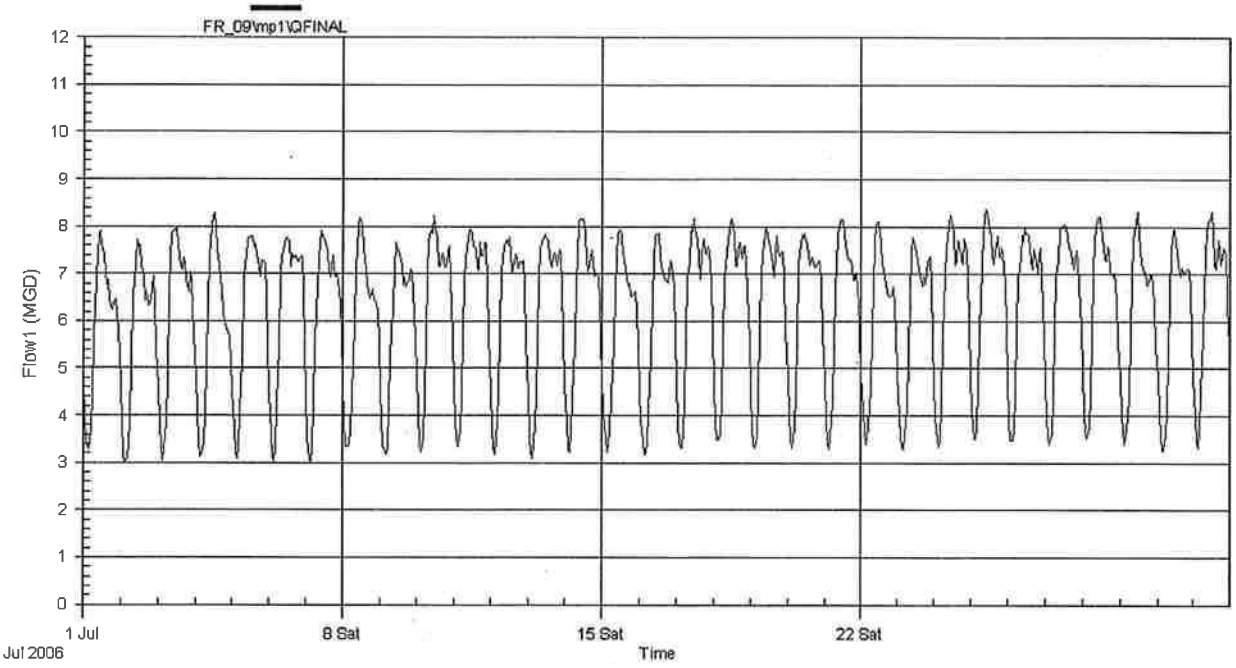
CITY OF FRESNO
INCORPORATED OCT. 12, 1885

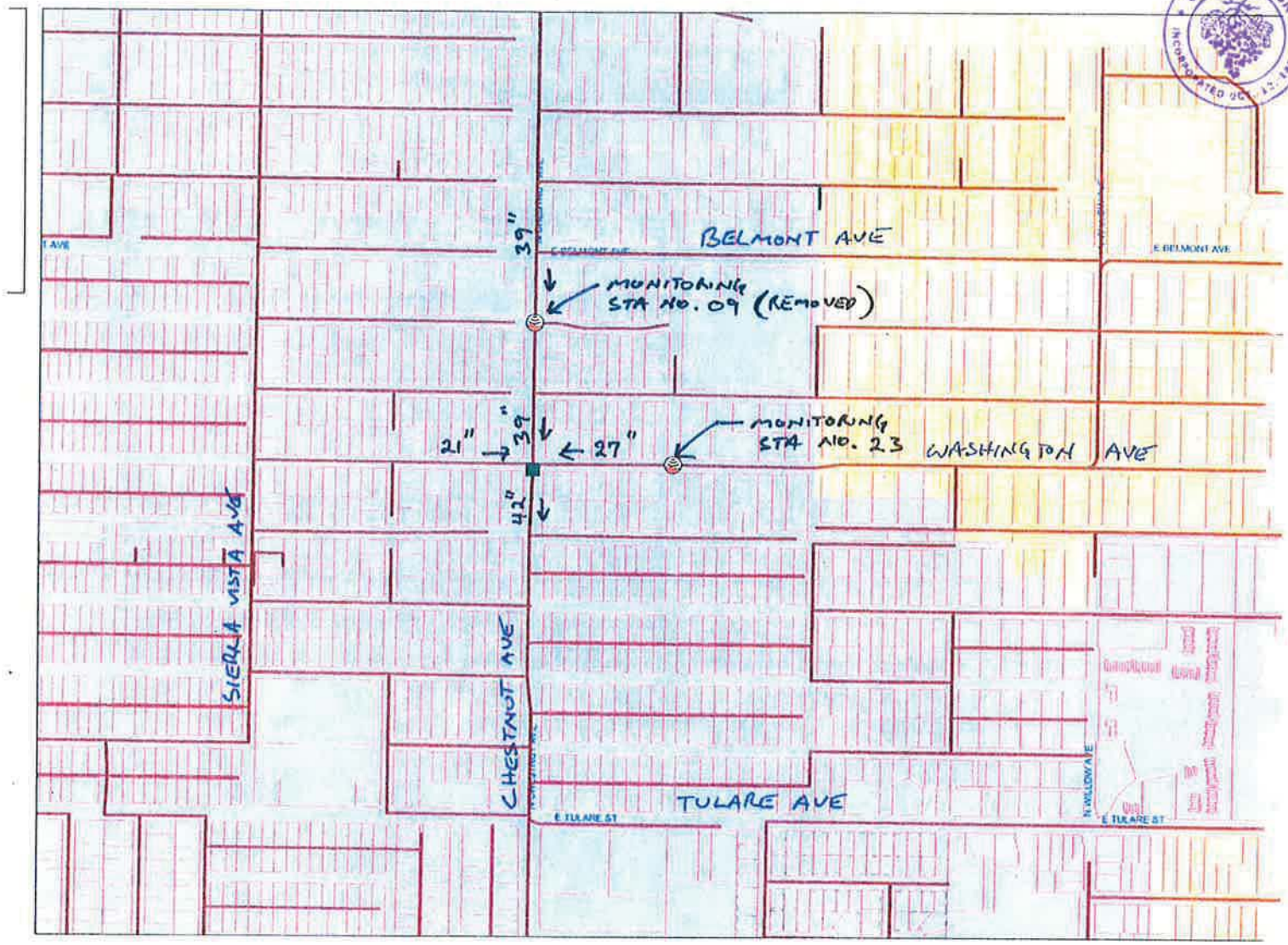
ADS Environmental Services

Pipe Dimensions: 38.88" X 38.88"

Intersection of Chestnut and Madison

Fresno, CA
Pipe Height: 38.88





SCALE 1 : 8,843

500 1,000 1,500

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APPENDIX F – BASIS OF COST MEMORANDUM

1.0 PURPOSE

The purpose of this memorandum is to describe the methodology and assumptions used in developing the Recycled Water Master Plan (RWMP) basis of cost estimate. Cost estimates developed for the RWMP were planning level estimates and utilized for capital planning of future recycled water projects and for estimating the potential impact of those projects on sewer rates.

2.0 PROJECT DESCRIPTION

The RWMP project alternatives consist of water recycling facilities (treatment modifications at the RWRF and/or satellite treatment facilities), and a recycled water distribution system to serve large and small users in the four quadrants of the City (SW, NW, NE, and SE). The project is located within the Sphere of Influence (SOI) of the City of Fresno, including "county islands" and other incorporated areas of Fresno County. The project is anticipated to be constructed in phases and will include modular treatment facilities or satellite treatment plants with an initial total capacity of 8 MGD, expandable to 32 MGD; approximately 500,000 lineal feet of 8-inch through 60-inch pipelines; six booster pump stations; four distribution system storage tanks of 1.0 to 1.5 million gallons each; and customer turnouts.

3.0 METHODOLOGY

The level of accuracy that can be expected for any cost estimate is directly proportional to the level of engineering effort completed. For the RWMP quantity take-offs were performed based on conceptual site plans for the treatment plant alternatives and for distribution system alignment corridors. Construction cost estimates were developed using historical costs from recent Carollo and BCF projects, proprietary cost curves, and vendor quoted information. Past construction cost estimates were adjusted to January 2010 costs for Fresno California using the ENR Construction Cost Index (CCI). The current "location factor" for the City of Fresno is 1.072.

Cost estimates included for the RWMP included:

- Capital cost (costs for construction of facilities)
- Project costs (capital costs plus contingency for engineering, administration and legal associated with implementation of the project)
- O&M costs (annual operating and maintenance costs of proposed projects)

Capital costs included a design contingency appropriate for this planning level of detail and have an accuracy of -30 percent to +50 percent (AACE International Recommended Practices and Standards, No. 18R-97). Because there was more uncertainty associated with the processes and facilities of the treatment alternatives, a 30 percent design contingency was given to the treatment facilities estimates. A 25 percent design contingency was given to the distribution system facilities because more information was available about the cost of pipeline construction in main corridors throughout the City. Costs are in January 2010 dollars (ENR 8660).

Project costs included a placeholder contingency of 20 percent of the capital costs to account for project implementation costs such as design, environmental review, and permitting, legal, administration and construction management.

The following table summarizes the direct cost multipliers used to develop the RWMP cost estimates.

Table 1 Cost Estimate Direct Cost Multipliers
Recycled Water Master Plan
City of Fresno

Multiplier	Percent
Construction costs adjusted to 2010	ENR 8660
Location factor for Fresno California	1.072
Planning level design contingency for treatment facilities	30
Planning level design contingency for distribution system facilities	25
Engineering, Legal and Administration	20

O&M costs were estimated based on historical unit O&M costs of the City's wastewater system operation including costs for power, labor, chemicals, and replacement materials. Table 2 summarizes the unit costs used to develop the recycled water system annual O&M costs.

Table 2	Estimated O&M Unit Costs Recycled Water Master Plan City of Fresno	
Power		$0.20/kWh
Labor		$50/hr
Chemicals		
•	Citric Acid	$0.50 lb
•	Sodium Hypochlorite	$0.12/lb
•	Alum	$0.10/lb
•	Polymer	$1.60/lb
Replacement Materials		5%/yr

4.0 ASSUMPTIONS

4.1 Treatment Plants

Treatment plant cost estimates were developed for each of the treatment alternatives: Alternative 1, delivery of recycled water from the RWRF, and Alternative 2, delivery of recycled water from satellite treatment plants located in the vicinity of users in each quadrant of the City. In addition, costs were developed for expanding treatment at the North Fresno WRF, which is a project that is independent of the main treatment alternative selected. The following assumptions were used to develop facilities costs for construction of recycled water facilities at the RWRF.

1. Media filtration, UV disinfection, and chlorine or chloramines for distribution system disinfection.
2. Secondary processes already exist with A-side and B-side secondary treatment trains.
3. Nitrification/denitrification step was not included because it is possible that future NdN required for potential GRRPs could be achieved though operational changes at the RWRF.
4. Media filtration and disinfection costs were estimated based on recent bid tabs and vendor quotes.

The following assumptions were used to develop facilities costs for construction of satellite recycled water facilities:

1. The total capacity of satellite treatment plants is limited by sewer flows in outlying areas (fewer users can be served from SWRFs).

2. Full primary, secondary and tertiary treatment processes are required.
3. Nitrification/denitrification step was included to meet requirements of future GRRPs.
4. Solids from SWRFs would be sent to the RWRF for treatment.
5. A range of treatment alternatives were considered:
   a. Activated sludge process followed by media filtration and UV (lower cost).
   b. Membrane bioreactor (MBR) followed by ozone or UV (higher cost)
6. Satellite plants would be located on City owned property. Footprint for AS process was estimated to be between 6 to 8 acres. Footprint for MBR process was estimated to be about two acres.
7. MBR costs were estimated based on cost curves developed from bid tabs (see Figure 1 below).
8. Costs for AS process with NdN were scared from SEGA 2006 Satellite study update.

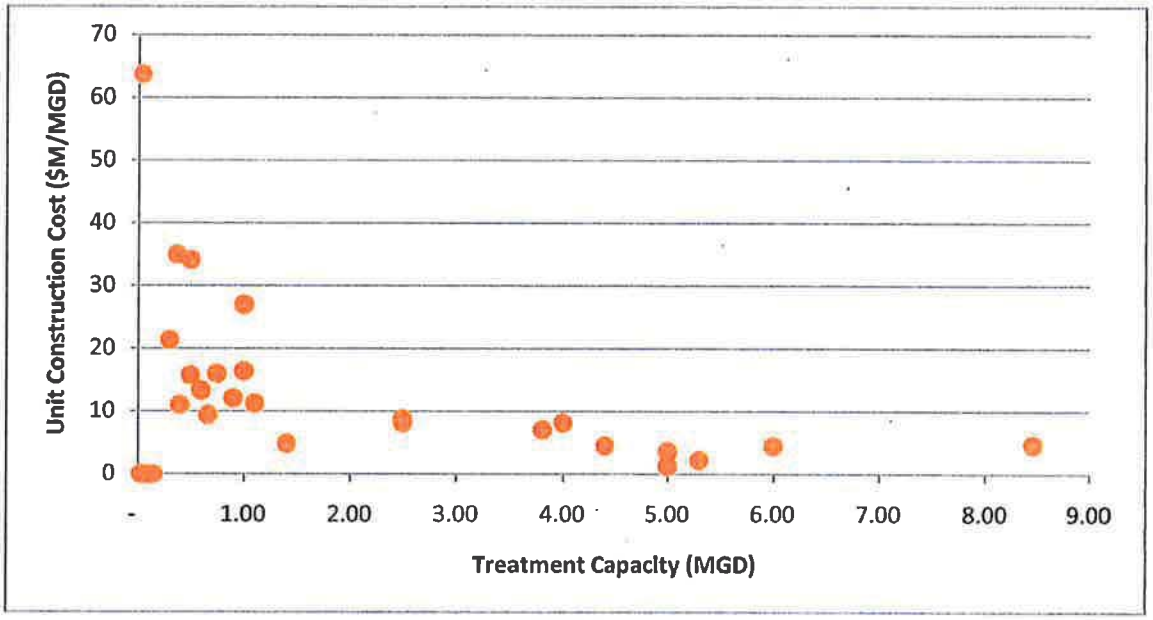


FIGURE 1
MBR SATELLITE TREATMENT PLANT COST CURVE
RECYCLED WATER MASTER PLAN
CITY OF FRESNO

The following assumptions were used to develop facilities costs for expansion of the North Fresno WRF:

1. Capacity of the NRWRD would be expanded from 0.71 MGD average dry weather flow to 1.08 MGD average dry weather flow.
2. SBR process will be maintained.
3. Existing chlorination system will be replaced with UV or ozone.

4. Media filtration and disinfection costs were estimated based on recent bid tabs and vendor quotes.

4.2 Pipelines

The following assumptions were used to develop the distribution system pipeline cost estimates:

1. Open cut installation with a trench section reflecting vertical trench sections.
2. Identification of existing utilities and consideration of alternative construction methods in some locations to avoid interface of existing utilities.
3. Native material will be used as trench backfill.

5.0 COST ESTIMATES

The cost estimates herein are based on our perception of current conditions in the project location. The estimates reflect our professional opinion of accurate planning level costs at this time and will be subject to change as the project matures in the future design phases.

Estimates of facilities were grouped into two alternatives (of which the second alternative has two options) that included:

- Alternative 1 – Treatment at RWRF
- Alternative 2 – Treatment at SWRF utilizing MBR with Ozone and UV (high costs)
- Alternative 3 – Treatment at SWRF utilizing Activated Sludge with UV (low costs)

From these alternatives, total capital costs were calculated for the distribution system (including pump stations), treatment plant, and storage. Capital costs were then "normalized" to $/MGD costs for comparison of alternatives. Shown in Table 3 is a summary of the cost estimates for alternatives identified in the Recycled Water Master Plan.

Table 3 Summary of Construction Cost Estimates for the Master Plan Project Alternatives
Recycled Water Master Plan
City of Fresno

Alternative	Length (mi)	Delivery (AFY)	Distr. Sys. Costs ($M)	Treatment capacity	Treatment Costs ($M) [1]	$/gallon - Treatment	Storage volume (MG) [2,3]	Storage Costs ($M)	$/gallon - Storage	Total Capital Costs ($M)	$/MGD
SW-1	36.28	4,125	48.7	5.5	12	2.15	0/8.1	7	0.86	68	12.3
NW-1	28.1	1,877	49.8	5.3	9	1.70	0/6.9	6	0.87	65	12.2
NE-1	16.17	2,720	39.6	4.8	11	2.29	0/6.1	5	0.82	56	11.6
SE-1	7.35	995	16.6	2.8	6	2.14	0/5.1	4	0.78	27	9.5
total	87.9	9,717	155	18.4	38			22		215	

Alternative 2 Costs (with MBR)

Alternative	Length (mi)	Delivery (AFY)	Distr. Sys. Costs ($M)	Treatment capacity	Treatment Costs ($M) [4]	$/gallon - Treatment	Storage volume (MG) [2]	Storage Costs ($M)	$/gallon - Storage	Total Capital Costs ($M)	$/MGD
SW-2 [5]	32.46	4,139	36.3	5.5	50	9.09	0.4/4.1	7	1.56	93	17.0
NW-2	21.5	1,709	24.8	4.7	51	10.85	0.7/1.2	3	1.58	79	16.8
NE-2 [6]	1.75	508	4.3	1.08	5	4.63	0/0	0	-	9	8.6
NE-3	3	4,900	6.1	4	47	11.75	2-Jan	4	2.11	57	14.3
SE-2	9.09	951	5.4	3	36	12.00	0/2.6	4	1.54	45	15.1
total	67.8	12,207	76.9	18.28	189			18		284	

Alternative 2 Costs (with activated sludge)

Alternative	Length (mi)	Delivery (AFY)	Distr. Sys. Costs ($M)	Treatment capacity	Treatment Costs ($M) [7]	$/gallon - Treatment	Storage volume (MG) [2]	Storage Costs ($M)	$/gallon - Storage	Total Capital Costs ($M)	$/MGD
SW-2 [5]	32.46	4,139	36.3	5.5	37	6.73	0.4/4.1	7	1.56	80	14.6
NW-2	21.5	1,709	24.8	4.7	35	7.45	0.7/1.2	3	1.58	63	13.4
NE-2 [8]	1.75	508	4.3	1.08	5	4.63	0/0	0	-	9	8.6
SE-2	9.09	951	5.4	3	26	8.67	0/2.6	4	1.54	35	11.8
total	64.8	7,307	70.8	14.28	103			14		188	

(1) Alternative 1 treatment costs assume media filtration + UV; include feed pump station
(2) Influent storage/effluent storage
(3) Half of effluent storage provided at RWRF in existing basins
(4) Alternative 2 treatment costs assume MBR + UV; include feed pump station
(5) Partially served from the RWRF and partially served from a new SRWF
(6) Expansion of North Fresno WRF to 1.08 mgd w/ SBR and UV
(7) Alternative 2 treatment costs assume Activated Sludge (with NdN) + UV (include feed pump station)
(8) Includes pipeline from RWRF and expansion of North Fresno WRF to 1.08 mgd w/ SBR and UV

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APPENDIX G – BENEFIT – COST ANALYSIS

City of Fresno Recycled Water System Expansion Economic Analysis

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Under subcontract to:

Carollo Engineers

Contact:

James L. Henderson

July 30, 2010

City of Fresno Recycled Water System Expansion Economic Analysis

This chapter contains an economic analysis of the expansion of the City of Fresno's (the City's) recycled water system, as detailed in the City of Fresno Recycled Water Master Plan, and explores the potential types of environmental, social, and economic benefits that may accrue to the City, agricultural water users in the Fresno Irrigation District (FID), urban irrigation users in Fresno, and the general public.

The analysis starts with an introduction to economic analysis of recycled water projects, and in particular, the Triple Bottom Line (TBL) form of the benefit-cost analysis (BCA). This is followed by a short project summary, followed by a discussion of defining the baseline for the analysis and other assumptions made to set up the analysis. Project costs are then summarized, followed by a detailed discussion of project benefits. After discussion of additional social costs, a section containing sensitivity analysis is included at the end of the analysis. The effect of alternate assumptions regarding the appropriate discount rate and other key assumptions is explored in that section. This is followed by a summary of analysis conclusions.

1. Introduction

Although recycled water is often more expensive than some traditional options for providing water, recycled water provides some benefits that these other alternatives do not. Therefore, it is important to go beyond cost comparisons by also considering how the benefits of reuse compare to its cost. To do this, a clear distinction must be made between financial and economic analysis:

1. A financial analysis of water reuse is based solely on the cash flows of expenses and revenues in and out of the agency

2. An economic analysis provides a benefit/cost perspective by considering a broader view of the value of the reclaimed water.

By focusing solely on revenues, a financial analysis provides an overly narrow perspective of the "value" of the waters provided. For example, a financial analysis does not include benefits to the environment and social costs avoided when reuse enables a community to forgo developing alternative water supply options. Therefore, it is important to consider the benefits and costs of each option, rather than considering only costs.

Water and wastewater programs are typically evaluated using cost-effectiveness (C-E) analysis. Using a C-E analysis, the least expensive alternative is identified for obtaining a specific outcome. This assumes that the level of benefits from the various options is identical and the only important distinction is cost. In contrast, the BCA looks at relevant options and explores how the benefits and costs compare to each other, providing a method of evaluating the full social and environmental impacts of the project. The BCA approach helps identify if an objective is worth pursuing and/or which options provide the greatest net benefit to society. The TBL approach used below is a variant of the BCA approach.

The TBL is a planning tool that helps agencies track their progress toward promoting sustainability and is a streamlined version of a social BCA. Benefits and costs identified in the economic analysis are categorized into one of three bottom lines, which consist of:

1. A **financial** bottom line that reflects the cash flow accounting stance of the agency. In addition to any revenues from deliveries of water to new customers, this category often includes any financial benefits in terms of avoided costs and cost offsets due to avoiding other water resource management options. This might include avoiding development of an alternative water supply, or upgrading a wastewater treatment system to protect water quality.

2. The **social** impacts that reflect impacts on societal values. Social benefits take numerous forms, including adherence to a widely shared "environmental ethic" for recycling and the use of "green" approaches to local resource management challenges. This can also include increasing water supply reliability, thereby promoting societal security.

3. The **environmental** impacts that reflect effects on the natural environment. Environmental benefits can include many of the ecological services and environmental values enjoyed by the public. This can range from the value of wetland habitat and the potential wildlife values associated with it, to the avoided degradation of water quality in water bodies that receive wastewater.

2. Project Summary

The recommendation of the Recycled Water Master Plan is to expand distribution of recycled water from the Regional Wastewater Reclamation Facilities (RWRF). The City currently produces nearly 80,000 acre-feet of wastewater per year at the RWRF. The City and FID have an agreement whereby the City extracts 30,000 acre-feet per year (AFY) of percolated effluent for delivery to FID canals for use by local farmers. The majority of the remaining effluent is available for other beneficial uses.

The overall goal of expanded recycled water use in Fresno is to offset the City's potable water use, enhance the sustainability of the water supply, and lessen the burden on the wastewater treatment plant percolation ponds that are currently used for effluent discharge. Recommended reuse opportunities include urban reuse, agricultural reuse, and groundwater recharge. If all the users identified for urban reuse are served, the potential urban reuse opportunity for existing larger users is over 9,800 AFY. Serving existing and future residential and commercial users would result in additional use of over 4,300 AFY. The potential amount of agricultural reuse is approximately 24,200 AFY, including 4,200 AFY in expansion of undisinfected secondary delivery to farmers adjacent to the RWRF, and 20,000 AFY of expansion of pumping for delivery to FID over the next 30 years. However, agricultural reuse will not generate potable offsets for the City unless FID is willing to trade recycled water for surface water to augment the City's potable supply. This outcome is dependent on negotiations between FID and the City. And, groundwater recharge is recommended to the extent practical in the northwest, southwest and southeast quadrants of the City.

It was assumed for analysis purposes that the project would start in the year 2011, and span 30 years until 2040. Potential phasing of the project is divided into short term (0-3 years), medium term (4-10 years), and long term (greater than 10 years). This phasing was roughly interpreted for economic analysis purposes, and start years were assigned to specific parts of the project based on the master plan recommendations.

Table 1 summarizes the result of the BCA, including monetized and qualitative benefits, and the stakeholders that accrue those benefits. This table shows that monetized benefits for the project are estimated to outweigh the monetized costs when a 2.5% real discount rate is used. Net monetized benefits are estimated to be $9.4 million, and total net benefits are believed to be much higher than that when non-monetized benefits and costs are considered. The costs and benefits shown in this table are discussed in detail in Sections 4 and 5.

Table 1. BCA Overview – Using 2.5% Real Discount Rate (millions, 2010 USD)

Benefit or Cost Category	Present Value	Stakeholder Accruing Cost or Benefit
Costs – Total		
Capital and O&M costs	335.8	City of Fresno
Monetized Benefits		
Avoided alternative water supply costs	77.4	City of Fresno
Avoided water quality treatment costs	252.5	City of Fresno
Avoided agricultural water supply costs	1.7	Farmers
Avoided fertilizer costs for agriculture	8.9	Farmers
Avoided fertilizer costs for urban irrigation	4.7	Urban irrigators
Total monetizable benefits	345.2	

Qualitative Benefits and Costs	Relative Magnitude*	
Long-term gain in wildlife habitat	++	Public
Demonstration of "green" water use ethic	+	City of Fresno
Improved diversification of water supply portfolio	+	City of Fresno
Public perception of recycled water	–	Public
Short-term construction impacts	–	Public
Total Net Benefits (Monetizable Benefits – Costs)	9.4	

All values in millions of dollars.
Assume 2.5% real discount rate and 30-year analysis period.
O&M = operations and maintenance.
* Magnitude of likely effect on net benefits:
++ = Likely to increase net benefits significantly.
+ = Likely to increase net benefits relative to quantified estimates.
U = Uncertain effect on net benefits relative to quantified estimates.
– = Likely to decrease net benefits.
– – = Likely to decrease benefits significantly.

3. Defining the Baseline and Setting Up the Analysis

3.1 Baseline Definition

The baseline for a project reflects the actions or the conditions that are expected in the future if the proposed project is not undertaken. The baseline not only needs to account for current conditions, but also to reflect changes that are likely to occur over time in the absence of the investment in the project. Defining the baseline is especially important because some benefits of the project will follow directly from the definition of the without-project baseline. One benefit may be the result of avoiding alternate projects to supply the amount of water that will be supplied by the project. Another benefit may come from improving the quality of groundwater supplies.

For this project, there are both water quantity and water quality aspects to the without-project baseline. The main driver from a water quality standpoint is that the City is required by the Central Valley Regional Water Quality Control Board (RWQCB) to improve the quality of the groundwater beneath the percolation ponds. Reducing the hydraulic and constituent loading burden on the percolation ponds by implementing a significant reuse program would lower the concentrations of these constituents in the groundwater. The six major pollutants identified were arsenic, manganese, total dissolved solids (TDS), electrical conductivity (EC), sodium, and total nitrogen. Without the proposed project, the City will not be able to follow one of the major recommendations in the "Best Practicable Treatment and Control (BPTC) Comprehensive Evaluation" submitted to the RWQCB in December 2009, which is to reduce the hydraulic and contaminant of concern loading into the percolation ponds by direct effluent recycling. In that case, the City would have to consider other ways to remove the contaminants of concern, including installing a reverse osmosis (RO) plant to treat a similar amount of water as would reliably be removed via the proposed reuse project.

From a water quantity standpoint, the City is planning for recycled water use to help meet growing overall demands for City-supplied water. Without the proposed project, the City would have to seek alternative supplies, mostly from projects that are in various stages of planning and some of which do not yet exist, including local groundwater banks or the proposed Temperance Flat Reservoir on the San Joaquin River. Using more groundwater to meet projected demands is not considered an option because of the City's goal to enhance the long-term sustainability of the City's water supply. This includes reducing groundwater use to be aligned with annual recharge rates in order to stop groundwater level declines that are expected to increase into the future if the current amount of groundwater use is projected into the future.

3.2 Choice of Discount Rate and Analysis Period

Several standard assumptions were made to frame this analysis. The economic analysis is performed in real dollars, meaning that benefit and cost values are shown to change over time only if they are projected to increase or decrease at a rate different from the expected rate of inflation (3%). A real discount rate of 2.5% was used in the analysis, based on a general cost of capital for water utilities of around 5.5%. The real discount rate can roughly be calculated by subtracting the expected rate of inflation (3%) from the nominal cost of capital (5.5%). The

analysis period was set to 30 years in order to match the average expected life of the assets to be installed with the project, and the analysis period set in the Recycled Water Master Plan.

4. Costs

The present value costs of the proposed recycled water project were determined based on the planned timing for development and implementation of the individual alternatives, as outlined in the master plan recommendations. Costs are included for development of urban and agricultural reuse opportunities, as well as for groundwater recharge.

Table 2 presents the present value capital and O&M costs associated with each of the preferred recycled water alternatives. Cost estimates were determined based on a real discount rate of 2.5% over a 30-year project time period. As shown in Table 2, project costs are expected to total $320 million in present value. Detail on expected project costs is explained in the section on project alternatives in the Recycled Water Master Plan.

Table 2. Present Value Costs* for Proposed Reuse Alternatives (millions, 2010 USD)

	Capital Costs	O&M Costs	Total Costs
Low Cost Scenario			
Urban reuse alternatives (Alternative 1 existing larger users)	$208.6	$45.4	$254.0
Agricultural reuse alternatives (Alternatives AG1 and AG2)	$17.8	$11.9	$29.7
Groundwater recharge (assuming 50% of identified basins are constructed)	$45.7	$6.4	$52.1
Total	$272.1	$63.7	$335.8

* Present value costs are calculated by assuming timing of expenditures over the 30-year project life and discounting costs to present value using a real discount rate. Therefore, present value costs will differ slightly compared to the costs upon which they are based that are shown in the master plan.

5. Benefits

5.1 Financial Benefits

Avoided alternative water supply costs

The City is counting on adding recycled water to its portfolio of water supplies starting in 2020 in order to meet projected demand while maintaining more sustainable groundwater withdrawal amounts. Without the projected recycled water supply, the City would not meet the deficit with groundwater withdrawals. Instead, the City would need to develop other potential supply sources that are in various stages of conceptual development at present. Those sources include local water banks to store flood releases on the San Joaquin or Kings River, or the proposed Temperance Flat Reservoir on the San Joaquin River.

It is unclear how the City would participate in water banks it does not directly develop, such as FID's Waldron Pond. No information was available on detailed plans for Fresno's development of water banks, possibly with other jurisdictions. It is uncertain therefore how reliable the supply that might be available to Fresno from a water bank would be, or what the cost will be.

The U.S. Bureau of Reclamation (the Bureau) published an analysis of the proposed Temperance Flat project (U.S. Bureau of Reclamation and California Department of Water Resources, 2008). The preferred option is estimated to cost $3.35 billion, and would provide between 112,000 and 180,000 AFY. The Bureau calculated an annualized cost for this project of $169 million, based on a 100-year amortization time period and a 4.875% interest rate. Simply dividing the annual cost by the annual yield results in water costing roughly $950 to $1,500 per AF per year. The analysis does not clearly specify the share of water yield that will go to municipal and industrial (M&I) use as opposed to agricultural use, nor does it provide the details behind the Bureau's benefits calculations. Analysis by Peter Gleick of the Pacific Institute roughly calculates that the Bureau is assigning a value of $850 per acre foot (AF) to M&I benefits from the project (Gleick, 2009). Analysis by an economist reviewing the Bureau's study calculates an implied value of alternative supplies of over $600 per AF (Michael, 2009). A value of $600 per AF also has generally been mentioned as the willingness to pay for Los Angeles to acquire available supplies from the area (Subcommittee on Water and Power, 2005). We use $600 per AF as a conservative cost of fully developing a project, with a realization that a project such as Temperance Flat would result in much higher costs. However, if a project already developed by another entity would allow Fresno to store excess water, then the cost per AF could be lower.

For this study, the $600 per AF estimate is applied only to the cost to replace the recycled water scheduled for urban use, because this is the portion of recycled water supply that can be relied upon to create a potable water offset. This results in $2.5 million in avoided cost in the intermediate term of the project, jumping to $5.8 million per year as more urban uses are switched to recycled water. The total present value of water supply development costs to serve urban uses that are avoided by recycled water use is $82.5 million over the 30-year project life.

Avoided water quality treatment costs

The City is required by the RWQCB to improve the quality of the groundwater beneath the percolation ponds. Constituents of concern are salts, nitrogen, and metals (arsenic and manganese) that are mobilized from the alluvium by effluent percolation. Reducing the hydraulic and constituent loading burden on the percolation ponds by implementing a significant reuse program would reduce the concentrations of these constituents in the groundwater.

Under the recommended approach for recycled water development, urban reuse would be combined with agricultural reuse and groundwater recharge to expand the use of effluent produced. To the extent that the produced effluent would otherwise have been discharged at the RWRF evaporation ponds, then the constituent and hydrologic loading burden at the ponds will be reduced and the concentrations of these constituents in the groundwater will be reduced.

One way to understand the value of the recycled water program in reducing constituent loading at the RWRF is to consider other possible methods to reduce constituent loading. One possibility that has been explored specifically for reducing concentrations of salts (as measured either by

TDS or by sodium) discharged at the RWRF is the use of a RO plant. The alternatives that have been explored include a 10% removal of TDS, a 10% sodium removal, and a 25% sodium removal. Alternative methods for removal include a pellet reactor system and a brine concentrator.

Under the recommended approach in the Recycled Water Master Plan, urban reuse from larger users alone would remove up to 9,800 AFY from disposal at the RWRF treatment ponds. This volume matches the volume of water that would be treated via RO under the 10% TDS removal target. While serving existing and future residential and commercial users as well as agricultural users may further reduce discharge of constituents at the RWRF ponds, depending on the location of recycled water use production, this urban reuse amount is used as a conservative illustration of the cost to otherwise remove constituents of concern.

Capital costs for the 10% TDS removal alternative range from $180.0 million for the pellet reactor option to $170.2 million for the brine concentrator, after updating to January 2010 dollars (costs updated from September 2007 original estimate using the Construction Cost Index from the Engineering News Record). O&M costs range from $6.3 million per year for the pellet reactor option to $33.6 million per year for the brine concentrator option.

These costs include the brine disposal cost of $45 per ton to remove the brine from evaporation ponds. The brine concentrator option has the advantage of lesser brine production, but at the expense of higher O&M costs. In terms of present value costs of the 30-year analysis time period, the cost of the pellet reactor is significantly lower than the brine concentrator option. Assuming a real discount rate of 2.5%, the total present value cost of the pellet reactor over the 30-year project life is $278 million (vs. $738 million for the brine concentrator).

5.2 Social Benefits

Reduced agricultural irrigation costs

Farmers that switch to the use of recycled water as their primary source of irrigation water will realize substantial cost savings. Recycled water will provide farmers with a reliable supply of water throughout the irrigation season. Farmers that use recycled water will benefit from avoiding costs associated with groundwater pumping in dry years (i.e., in years where surface water supplies from FID are unavailable later in the irrigation season).

After paying a per-acre assessment fee, farmers are allowed to irrigate fully until FID water supplies become unavailable. The irrigation season in Fresno typically runs from March 1 to August 31. The point in the year at which FID water supplies are no longer available depends on the level of Kings River runoff. For example, in a year where Kings River runoff is at 40% of normal, surface water irrigation supplies may be cut off in July. Farmers pay the same per-acre fee at the beginning of each season, regardless of how long surface water is available. In 2010, this charge ranged from approximately $29 to $47 per acre per year, depending on the type of water service.

In years when runoff is below normal (i.e., years when surface supplies become unavailable prior to the end of the irrigation season), most farmers will switch to a secondary source of water

(i.e., groundwater). Groundwater is much more expensive than surface water, and is estimated to cost about $25 to $35 per AF of water (including pumping). Farmers pay their own costs to pump groundwater, in addition to the assessment fee.

To estimate benefits to farmers, we determined the frequency of shortages (i.e., years when Kings River runoff is below normal) in recent years, as well as the average shortage amount during those years (percent below normal). Data back to 1980 show a shortage in 18 of the past 30 years, or a 60% probability of shortage. The average delivery amount in years with below normal deliveries compared to the long-term average normal delivery over the past 100 years was 61%. We used these two measurements to determine an annual average shortage amount of 23% (1 minus the sum of 60% of years at 61% delivery and 40% of years at 100% delivery), meaning that on average, farmers will need to supplement 23% of their irrigation supplies with groundwater. Based on the estimated average cost of $30 per AF for groundwater irrigation, the benefit from avoided supplemental groundwater pumping is estimated to be about $6.97 per acre per year.

Over the next 30 years, when taking into account the timing and implementation of the agricultural alternatives, the total present value of the annual avoided costs amounts to approximately $1.7 million, assuming a real discount rate of 2.5%.

Avoided fertilizer costs for urban reuse

This project also will allow for reduced fertilizer use for municipal irrigation users such as parks, schools, and golf courses that are expected to take recycled water. Nutrients available in recycled water will allow municipal irrigation users to reduce fertilizer treatment applied to the soil. Urban use of recycled water is expected to total up to 9,800 AFY for existing larger users such as golf courses, parks and schools that would typically use lawn fertilizers.

Although exact offset of fertilizer use from use of recycled water is difficult to estimate due to daily and seasonal nutrient variations in the recycled water, an estimate is available from the potential fertilizer value of recycled water produced from the Irvine Ranch Water District. This value is used to calculate the potential benefits from the offset of fertilizer use from this project. Using a fertilizer price index for the United States from the Food and Agriculture Organization of the United Nations (FAO), and after adjusting for existing data on the nitrogen, potassium, and phosphorus values of recycled water produced at the Fresno RWRF, the value of offset fertilizer use per AF of water applied is $36.56, when updated to 2010 dollars (updated from Asano, 1981). When multiplied by the amount of recycled water to be delivered from this project for urban irrigation for larger users (9,800 AFY), the total avoided fertilizer cost is approximately $358,000 per year. Assuming a 2.5% real discount rate, the present value of this benefit over the assumed 30-year life of the project is approximately $4.7 million.

Avoided fertilizer costs for agricultural reuse

This project will allow for reduced fertilizer use for agricultural users expected to take recycled water. Recycled water contains substantial amounts of nitrogen, phosphorus, and potassium (Kopec et al., 1993). Nutrients available in recycled water will allow agricultural users to reduce

fertilizer treatment applied to the soil. Agricultural use of recycled water is expected to total up to 24,200 acre-feet by the end of the project.

Although the exact offset of fertilizer use from the use of recycled water is difficult to estimate due to daily and seasonal nutrient variations in the recycled water, an estimate is available from the potential fertilizer value of recycled water produced from the Irvine Ranch Water District. This value is used to calculate the potential benefit from the offset of fertilizer use from this project. Using a fertilizer price index for the United States from the FAO, and after adjusting for existing data on the nitrogen, potassium, and phosphorus values of recycled water produced at the Fresno RWRF, the value of offset fertilizer use per AF of water applied is $36.56, when updated to 2010 dollars (updated from Asano, 1981). When multiplied by the amount of recycled water to be delivered from this project for agricultural irrigation (up to 24,200 AFY when the project is fully developed), the total avoided fertilizer cost is approximately $884,000 per year. Assuming a 2.5% real discount rate, the present value of this benefit over the assumed 30-year life of the project is approximately $8.9 million.

Demonstration of commitment to "green" water use ethic

In many parts of the United States, there is a growing trend among individuals, local governments, and businesses to promote environmental stewardship and sustainability. The City is committed to being a leader in promoting sustainable water management. Using reclaimed water instead of potable water for irrigation is one way to help demonstrate environmental leadership. By posting the reclaimed water sign ("We're using water wisely by irrigating with reclaimed water"), the City's "green" image would be portrayed to all public park and golf course visitors and other individuals passing these sites.

This benefit cannot be monetized with the information available. However, this benefit was determined to potentially have a positive effect on the net benefits of the project if it could be monetized (a qualitative benefit rating of +).

Improved diversification of water supply portfolio

Adding a significant expansion of reclaimed water to the City's supplies will help diversify the City's supply portfolio. A major advantage of using reclaimed water is its relative insensitivity to droughts. Adding a drought-independent and locally controlled source of water can add important value, especially when other supplies in the portfolio have yields that are highly correlated with drought cycles.

This benefit cannot be monetized with the information available. However, this benefit was determined to potentially have a positive effect on the net benefits of the project if it could be monetized (a qualitative benefit rating of +).

5.3 Environmental Benefits

Long-term gain in wildlife habitat

RWRF is currently one of the most popular birding sites in the region. According to the eBird web site run by Cornell University, 75 different bird species were counted at the RWRF in 2009. The most frequently seen species include the northern shoveler (with a high count of 2,435 individual species at one time), the least sandpiper (high count of 1,500 individuals), and the American coot (high count of 1,100 individuals). Other species that visit the site in large numbers are the ruddy duck, bufflehead, eared grebe, American pipit, cliff swallow, tree swallow, and the long-billed dowitcher. According to the Fresno Audubon Society web site, RWRF is also one of the best places in Fresno County to spot burrowing owls, a California Species of Special Concern (eBird, 2010).

The northwest, southwest and southeast urban reuse alternatives include the development of Groundwater Recharge Reuse Projects (GRRPs). Due to the lengthy permitting processes involved with implementation, GRRPs will likely be phased in over time. These GRRPs are expected to provide wildlife habitat similar to the disposal ponds at the RWRF. As the project is implemented, the total number of acres at the RWRF is expected to decrease as less wastewater is disposed there, but this loss in acreage is expected to be more than made up for by the gain in acreage from the GRRPs.

Groundwater recharge is planned for implementation in the southwest and northwest quadrants. In the southwest quadrant, 839 acres of land have been identified for potential recharge. This does not include areas identified for superrecharge basins. The superrecharge basins could potentially add an additional 405 acres, for 1,244 acres total. In the northwest quadrant, 303 acres of land have been identified for potential recharge, not including superrecharge basins. Including the superrecharge basins, the total potential recharge area amounts to 883 acres for the northwest quadrant. In the southeast a superrecharge basin has been identified with 320 acres. In total for the three quadrants, this amounts to about 1,142 acres of pond/recharge area, or 2,447 total acres with the superrecharge basins. However, it is likely that many of these sites will be found to be unsuitable or not easily acquired. Therefore, the total recharge pond area is likely to be significantly less. The costs assumed for groundwater recharge in this analysis are based on developing half of the additional acres identified for recharge. This implies the addition of 571 acres over the 30-year time period (839 acres + 303 acres, divided by 2). This does not count any acres developed in superrecharge basins, which would be developed by the Water Division.

Although overall acres of pond habitat will increase, pond acreage at the RWRF will decrease due to lower levels of discharge from the treatment facility. Table 3 shows the expected decrease in pond acreage at RWRF as a result of the proposed project at full implementation. It is not clear how the timing of these reductions will be phased. The acreage shown here assumes a future scenario of full development of urban irrigation and agricultural recycled water use as recommended in the master plan over the 30-year planning period, and half of potential total recharge acres identified in the plan.

Thus, the additional pond acreage provided under the GRRPs is expected to offset the reduction in acreage at the RWRF by at least 200 acres. Assuming the GRRP ponds provide similar habitat to those at RWRF, the overall project will result in net benefits. However, there may be temporary negative impacts if the loss of acreage at RWRF starts occurring before the GRRPs are implemented.

Table 3. Projected Change in Wastewater Disposal Pond Area at the RWRF By Month* (values in acres, unless otherwise noted)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
Current ponding area	1,107	1,233	1,160	794	934	973	942	1,063	974	1,076	1,211	1,260
Estimated pond area with project	915	980	897	603	682	635	561	704	732	961	962	1,021
Change in Acres	192	253	263	191	252	338	381	359	242	115	249	239
Percent Change	-17%	-21%	-23%	-24%	-27%	-35%	-40%	-34%	-25%	-11%	-21%	-19%

* Based on assumed future scenario of full development of urban irrigation and agricultural recycled water use as recommended in the master plan over the 30-year planning period, and half of potential total recharge acres.

This benefit cannot be monetized with the information available. However, this benefit was determined to potentially have a significantly positive effect due to increased habitat potential on the net benefits of the project if it could be monetized (a qualitative benefit rating of ++).

6. Additional Social Costs

Public perception of recycled water

Public perception of recycled water use by municipal users may be negative, in some settings and with some members of the public. A key concern for use of reclaimed water in irrigation of public areas is the potential presence of pathogenic microorganisms in the influent wastewater. However, ensuring that the wastewater and recycled water treatment systems are effective and reliable, and controlling the extent of human exposure to reclaimed water, can minimize health risks (Asano, 2001). The treated wastewater standard for unrestricted irrigation of public spaces includes a bacterial concentration of less than 2.2 Most Probable Number (MPN) total coliform per 100 milliliters. This critical parameter for the effluent is currently and will continue to be monitored daily at the RWRF.

This cost of potential negative public perceptions cannot be monetized with the information available. However, it was determined to potentially have a negative effect on the net benefits of the project if monetized (a qualitative benefit rating of –).

Short-term construction impacts

Short-term construction impacts are expected with the proposed project. Any adverse effects have been determined to be temporary or mitigated.

This cost was not monetized, however, it was determined to potentially have a negative effect on the net benefits of the project if it could be monetized (a qualitative benefit rating of –).

7. Sensitivity Analysis

7.1 Discount Rate

The net benefits for the project are not very sensitive to the choice of discount rate. The effect of using a 6% real discount rate instead of a 2.5% real discount rate on the analysis for the proposed project can be seen in Table 4. Rules for recent analyses for Integrated Regional Water Management implementation grants from the State of California have stipulated the use of a 6% real discount rate. This choice of discount rate means that costs and benefits incurred in the early project years are relatively much more highly valued than when the cost of capital for water and wastewater utilities and the prevailing rate of inflation are used to calculate a real discount rate. However, due to the relatively even spread of both project benefits and costs over the 30-year analysis period, use of the 6% discount rate only reduces the present value of net benefits to $4.0 million, down from the $9.4 million value derived with a 2.5% discount rate.

Table 4. BCA Overview – Sensitivity Analysis When Using 6.0% Real Discount Rate (rather than 2.5%) (millions, 2010 USD)

Benefit or Cost Category	Present Value	Stakeholder Accruing Cost or Benefit
Costs – Total		
Capital and O&M costs	247.7	City of Fresno
Monetized Benefits		
Avoided water supply costs	42.2	City of Fresno
Avoided water quality treatment costs	201.2	City of Fresno
Avoided agricultural water supply costs	0.9	Farmers
Avoided fertilizer costs for agriculture	4.9	Farmers
Avoided fertilizer costs for urban irrigation	2.6	Urban irrigators
Total monetizable benefits	251.7	

Qualitative Benefits and Costs	Relative Magnitude*	
Long-term gain in wildlife habitat	++	Public
Demonstration of "green" water use ethic	+	City of Fresno
Improved diversification of water supply portfolio	+	City of Fresno
Public perception of recycled water	–	Public
Short-term construction impacts	–	Public
Total Net Benefits (Monetizable Benefits – Costs)	4.0	

All values in millions of dollars.
Assume 6.0% real discount rate and 30-year analysis period.
* Magnitude of likely effect on net benefits:
++ = Likely to increase net benefits significantly.
+ = Likely to increase net benefits relative to quantified estimates.
U = Uncertain effect on net benefits relative to quantified estimates.
– = Likely to decrease net benefits.
– – = Likely to decrease benefits significantly.
Sum of benefit values do not exactly equal the total shown for monetizable benefits due to rounding.

7.2 Cost of Alternative Water Supplies

A key assumption is the cost of alternative water supplies that would be needed if not for the recycled water supply that will provide potable water offsets. A value of $600 per AF was used in this analysis as a best estimate of the cost of alternative water supplies. Exploration of the sensitivity of the net benefits from the project to the assumption of cost of alternative water supplies shows that the project continues to have positive net benefits until the cost of alternative water supplies is lowered to $527 per AF, assuming a 2.5% discount rate.

On the other end of the spectrum of alternate water supply costs, the high end of the cost per AF cost range for the proposed Temperance Flat Reservoir is approximately $1,500 per AF. If the value of alternate supplies is set to $1,500 per AF for this analysis, the net benefits from the project rise to $125.4 million, assuming a 2.5% discount rate.

8. Conclusions

The expansion of the City recycled water system will provide recycled water to offset some of the City's potable water use, enhance the sustainability of the water supply, and lessen the burden on the wastewater treatment plant percolation ponds that are currently used for effluent discharge.

The net benefits (benefits minus the costs) from the project are $9.4 million, when analyzed using a 2.5% discount rate, and the benefits for the project are approximately 103% of the costs. The largest benefit category is the avoided cost of reducing the hydraulic and constituent loading burden on the percolation ponds at the RWRF by another means besides implementing a significant reuse program to reduce the concentrations of these constituents in the groundwater. The alternate method investigated here for removing those pollutants is construction of a RO plant. The analysis concentrated only on the relief of constituent loading burden that would be provided by urban reuse for larger users, or approximately 9,800 AFY. Avoiding construction and operation of this RO plant would provide a present value of approximately $252 million in benefit from avoided capital and O&M costs during the 30-year analysis period.

The recycled water used for irrigation also is a significant source of water supply for Fresno. Without that water supply, the City would need to find an alternate water source. Using more groundwater is not an option, and Fresno will be making full use of its surface water supplies by 2020. So, the alternative is water banking facilities that are not yet developed or for which Fresno does not have agreements to store water, or other water supply projects that are very uncertain in their cost and potential yield for Fresno. A value of approximately $600 per AF is assumed based on recent analyses of alternative supplies. If the value of offset urban irrigation for larger users alone is counted, the value of avoided alternative water supply totals $77.4 million over the 30-year analysis period in present value. If the costs of alternative supplies is greater than $600 per AF, then the sensitivity analyses reveal that the net benefits of the reuse program would increase significantly.

Additional monetized benefits from recycled water use include avoided agricultural water supply costs, and avoided fertilizer costs for both agricultural and urban irrigation users, due to nutrients

contained in the recycled water. These benefits, over the 30-year analysis period, total approximately $15.3 million in present value.

There are important benefit values that could not be monetized as well. Development of groundwater recharge basins over time is expected to result in a large net gain of ponding area that is a benefit to a wide variety of birds and other wildlife. In addition, use of recycled water allows the City to demonstrate a commitment to environmental stewardship and sustainability. And, the addition of recycled water to the water supply portfolio adds a supply that is not sensitive to droughts, and can better allow the City to cope with drought periods affecting its other supplies. These non-monetized benefits are expected to outweigh the non-monetized costs of short-term construction impacts, and the public perception of recycled water as having a public health risk. This accounting in favor of non-monetized benefits could add significant additional value to the monetized net benefits from the project, if they could be valued monetarily.

Sensitivity analysis showed that the result for the economic assessment was not sensitive to the choice of discount rate. When a 6% real discount rate is used, which is consistent with recent practice for analyzing grant applications for Integrated Regional Water Management implementation grants from the State of California, the net benefits for the project become only somewhat less positive – benefits are greater than costs for the project by $4.0 million with the 6% real discount rate, instead of $9.4 million with the 2.5% real discount rate.

Another key assumption explored with sensitivity analysis was the cost of alternative water supplies, which was assumed to be $600 per AF. Sensitivity analysis shows that the value of the monetized benefits for the project still cover the project costs until the cost of alternative water supplies is lowered to $527 per AF.

References

Asano, T. 1981. Evaluation of Agricultural Irrigation Projects Using Reclaimed Water. Agreement 8-179-215-2. Office of Water Recycling. California State Water Resources Control Board. Sacramento, CA.

Asano, T. 2001. Water from (Waste) Water – the Dependable Water Resource. Stockholm Water Symposium. August 12-18.

eBird. 2010. Welcome to eBird. Cornell Lab of Ornithology and National Audubon Society. Available: http://ebird.org/content/ebird/. Accessed May 2010.

Gleick, P. 2009. Peter Gleick: Temperance Flat Reservoir Falls Flat. Circle of Blue WaterNews. September 5. Available: http://www.circleofblue.org/waternews/2009/world/peter-gleick-temperance-flat-reservoir-falls-flat/. Accessed May 2010.

Kopec, D., C. Mancino, and D. Nelson. 1993. Using Effluent Water on Your Golf Course. USDA Green Section Record. July/August.

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Michael, J. 2009. Temperance Flat Dam Cost-Benefit Analysis. Valley Economy. August 16. Available: http://valleyecon.blogspot.com/2009/08/temperance-flat-dam-cost-benefit.html. Accessed May 2010.

Subcommittee on Water and Power. 2005. The Economic and Environmental Benefits of New Water Storage in the San Joaquin Valley. Oversight Field Hearing before the Subcommittee on Water and Power of the Committee on Resources, U.S. House of Representatives, One Hundred Ninth Congress, First Session. Saturday, June 11, 2005 in Fresno, California. Serial No. 109-19. Available: http://ftp.resource.org/gpo.gov/hearings/109h/21760.txt. Accessed May 2010.

U.S. Bureau of Reclamation and California Department of Water Resources. 2008. Upper San Joaquin River Basin Storage Investigation. Plan Formulation Report. October.

APPENDIX H – TAG MEETING MINUTES

CITY OF FRESNO
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CONFERENCE MEMORANDUM

Project:	Fresno Recycled Water Master Plan	**Conf. Date:**	August 5, 2009
Client:	City of Fresno	**Issue Date:**	August 7, 2009
Location:	Fresno RWRF		
Attendees:	City: Steve Hogg, Reace Fisher, Rick Staggs, Kevin Norgaard, Brock Buche TAC members: Ron Young, Dave Requa, Jim Crook, Robin Saunders, Bob Jaques	Carollo: Lou Carella, Lydia Holmes, Penny Carlo, Tracy Clinton, Lorien Fono BCF: Karl Kienow, Luis Gonzalez Jeffery/Scott: David Bogdanov	
Purpose:	Visioning Workshop		
Distribution:	Attendees, Steve Swanback, Jamel Demir	**File:**	8230A.00

Discussion:
The following is our understanding of the subject matter covered in this conference. If this differs with your understanding, please notify us.

Introduction

Purpose of the meeting is to identify implementation issues associated with developing a 25,000 acre-feet per year (AFY) potable offset with recycled water.

Steve - have opportunity to add new supply - not just offset, but need at least 25k AFY for offset
Priorities:

- Make sure we can make offset goal
- Make sure that we're making best use of water resources, best and highest uses
- Loking to relieve burden on perc ponds and other effluent management issues
- Doing the "green" thing,

Steve - Dept of Public Utilities is responsible for solid waste, water, wastewater and others. Easier because city is both producer and purveyor. City council is extremely supportive of recycled water. Formed water subcommittee made up of 3/7 council people to look at water issues. Good timing for getting projects done. Citizen advisory committees not yet used for recycled water. Found citizen committees to be effective tools on other issues. Anticipate for recycled water. Awareness of water resources is really heightened right now. Makes for prime environment to implement projects.

Brock - 13% surface water only includes treated water, not recharge water. Contract with USBR for 60k AFY and FID 105k AFY for recharge water.

Steve - currently recycling 30-35k AFY total of which 20-30k AFY is from extracted water from below the percolation ponds and 8-10 AFY is direct reuse of undisinfected secondary effluent, piped directly to users. Each off-site use has own WDR. Existing reuse doesn't count toward offset goal. Tulare Lake Basin Plan has goal of 100% reclamation, and goal is reflected in WDR.

Wetlands development has been discussed in Southwest. Audobon Society is active doing bird counts and regularly out at ponds. Recently added island in pond for bird habitat. Stream flow enhancement is not considered reuse but wetlands might be.

Dave asks Jim: are they at risk for more permitting for incidental recharge. Jim: as time goes on, perc ponds will need to meet more restrictive regulations. Steve:CDPH has required City to do SAT study do demonstrate 5-log removal.

Steve: There has been discharge here since 1891. In 1912 ,talked about doing extraction and putting in SJ river. In mid-40s, built 1st primary treatment w/ 600 acres of ponds. In 60s added secondary and 600 more acres of ponds. In 70s, capacity was 54 MGD. In 80s went to current capacity and 1700 acres of ponds.

FID agreements mean that district needs to approve removing percolate from their boundaries. FID may argue that even direct delivery is their purview. Only one user has agreement outside of FID, and FID made City pay them a portion of the proceeds. Technically the agreement has expired and runs on a year-to -year basis, and City can get out. Assimilative capacity beneath perc ponds is approx 45 mgd. FID argues they have more jurisdiction than the City thinks. City thinks they could go directly to landowner. FID complains they don't have enough water, but the city doesn't think so. FID delivers cheap water- $35/af (Federal water is $110/AF). There's no additional use within FID - area is saturated with active crops. Have higher priority on water from the Kings River than downstream irrigation districts.

Ron: There's a concern that if City hasn't exercised water rights from FID, they may lose them.

City of Clovis argues that because they have capacity ownership of facility, they argue that they own portion of effluent. Clovis' water supply is not as reliable as Fresno's . They wanted 10% of 0.46 afy exchange water ratio and FID gave it to them last year. Steve agrees with Ron that Clovis has a reasonable claim.

Steve discussed importance of harmonizing EIRs for different plans (Regional Water Master Plan, Metro Plan and SEGA development plan). SEGA final plan and EIR due in fall 2010.

City delivers all water in the City. FID only delivers irrigation water. FID believes that they are the ones with the water right to water they convey to the City.

Brock: There's a regional groundwater master plan that the City partnered on with FID and others.

Recycling Opportunities

Irrigation Reuse

Dave: Did "back-to-school nights" to help sell projects to the public - for school reuse. Ron: went to school board meetings - showed then how to save money with reuse.

Ron: EID got ordinance to dual plumb front and backyards. Its doable but it's a stretch. Its probably better to do commercially or by HOA managed areas. City would probably work with HOAs. Robin: Implement in parks and public areas first, then go to HOAs.

Bob: Pebble Beach Golf Course ran into problems because of site-specific conditions made

them more sensitive to TDS. Need to check with users as to their specific water quality needs.

Steve: having a hard time selling community that they don't need water softeners.

Dave: why can't scalping plant be turned on and off? (Because there are issues with biological processes)

Use of General permit for landscaping reuse - may not to be able to use permit because of multiple uses. Robin said they had different permits for different uses and each industrial user, but that may be specific to RB2.

Costing strategies - Ron: maybe charge the same amount as what is being charged now for potable water, especially if connection fees are paying for new infrastructure. Need to look at whole picture of city finances (40 year lifecycle cost), not just little picture of the project. In Elsnore, they have recycled water line item in budget. Dave says they charge the same for all kinds of water.

Rick: EC at Copper River is much lower than RWRF (300 micromhos/cm). This could indicate that effluent from north scalping plants is better for turf irrigation.

Haven't yet started outreach to sell recycled water to the community. Need to start now. Different pressures on different groups will help them accept recycled water. Jim wrote a WaterReuse Foundation report on using recycled water in schoolyard playgrounds. For Redwood City, it was a public relations failure - because they didn't get public input from the beginning.

Dave got developer to pay for project - both for dual plumbing and connection fees. Dave: had big new area where they required dual plumbing - but also got federal money to do retrofits. Tracy: Many schools already have separate systems for irrigation and internal use. Robin: once had to replumb a cemetery because there were hose bibs all over the place.

Industrial Use
Group agreed we should screen out washdown water for food processors.

No one thinks that industrial laundries use is a problem, but no one can identify an existing industrial laundries that uses recycled water.

Ron: industrial users are going to decided on a owner-by-owner basis, depending on benefit. Many laundries and car washes treat water internally. In Irvine had carpet dyer who really wanted recycled water and loved it because it was half the price.

Robin: Cement comes out stronger with recycled water.

Bob: algae would be a problem with open storage.

Cooling towers are major use.
Need to start talking to users to see their willingness and water quality needs.

Groundwater Recharge
Existing stormwater basins are managed by different agency (flood control district). Brock: need 800 AF of additional recharge facilities for surface water recharge. FID canals are used in

the winter to remove flood water from the City. Would need separate distribution system to convey wastewater to recharge basins in the winter. City is not fully using their entitlements because they don't have the infrastructure to do so.

Would need to prove buffer distances. Jim: the type of tracer study will lead to different buffer zones. New regulations are not expected anytime soon, especially not an adopted regulations.

Brock: 300 feet from nearest well seems way too low, even has problem with 900 feet. Wants to caution that this could be a larger problem. In the summer, the zone of influence of wells is 1800 feet. Penny: could shut down a well if necessary for a really good reuse site.

Brock: need to have 80% of wells operation at any given time to meet peak day demands. In future as move to more surface supply will still use groundwater system as a backup plan in extreme drought situation.

Penny: also need to consider plumes - don't want to make contamination move due to recharge

Jim: Probably want to do tracer studies before you start projects. Base design on theory, then come back and prove it. This was successful at Inland Empire, Orange County and West Basin. There are also issues with showing TOC reduction. Need to show that you meet all standards (including drinking water standards) at the bottom of the vadose zone. Inland Empire did this by putting in lysimeters.

Jim provided sequence of necessary steps to get a recharge project approved (separate handout). Will probably take a couple years to get a permit. One year at best.

At Inland Empire and Orange County, there was no public opposition to recharge projects, and probably West Basin. However, there have been problems in San Diego, the San Fernando Valley and also DSRSD. Probably going to put in a project in LA.

Dave: Get RWQCB to participate in all DPH meetings.

Agricultural Exchange

City of Fresno is 25% of FID land area.

There's a TMDL for EC in the SJ River.

To use canals as distribution system, need to look at conveyance capacity as well as where the canals go.

Steve: There's opportunity to negotiate for delivering water outside of FID. Only reason to go to unincorporated area is if current disposal operation becomes infeasible, since there is no opportunity for potable exchange.

There are some interconnects between FID and Consolidated Irrigation District.

It's possible that future regulations will be on what's at end of the pipe before percolation, so there would be no benefit to percolation.

There is significantly more capacity to extract percolate.

Can do undisinfected secondary on wine grapes, but not table grapes or raisins.

May expand delivery to Souza (farmer). Is there opportunity to get more water from FID for this? Ron: Could make a deal to get their water rights (eg. Pay for their assessment). Brock: This could be a good long-term new supply.

Corn and alfalfa are great crops because they uptake nitrogen. Need to confirm water use with Mohammad.

Bob: No real public perception issues since most local crops can't be bought in grocery. Most growers wanted to know what the technical issues are for irrigation operations and agronomic rates. Most engineers underestimate clogging problems in spray and drip irrigation due to algae. County health officials can add more requirements on top of Title 22. Signage was a requirement. Concern about farm workers. Needed to do farmworker health study, and there was no difference between before and after recycled water project. Steve: so far county public health hasn't been problem. Had to make sure farmers educate workers on the fact that it's not potable.

Jim: Are there any root crops in the area? Steve: Not immediately adjacent. Penny: Sensitive edible crops are about 1% of land around here.

Bob: why are they growing low value crops? Kevin: to support dairy farmers, because of soil conditions.

Steve: generally rotate between corn and alfalfa

Exchange contractors on the west side of the valley may be interested in getting effluent for opportunities for exchange.

Fisheries/Environmental Enhancement

There's water in Friant Dam that is required to be released. They could release less water from the dam, if City could supply some recycled water.

Robin: Water temperature could be an issue, like in San Jose/Coyote Creek.

Steve: Depends on where flow needs to enter the river. NE plant is overcommitted. Could use canal system to divert water to river.

There's also possibility for new wetlands in the north along the river. This wouldn't be an offset, but an additional disposal opportunity. Would also require an NPDES permit.

Discharge location is important. Could convey water through Houghton or Herndon canal.

Opportunities by Region

Southwest

Concept of locating additional treatment facilities at existing regional plant and running pipeline along Cornelia Corridor to parks/cemeteries, use old winery waste line (replace with pipe

bursting) to take water to industrial users. Provide water to Ag users in vicinity. Could use either extracted percolate or provide tertiary treatment to secondary effluent.

Location of treatment facilities shown on ppt designated for a pole barn - need to move west (A side)

Jim - Use of extracted percolate - DPH would likely want disinfection for multiple barriers
Robin - tried to do no residual - had regrowth
Jim - Santa Ana River - need to disinfect after extraction
Steve H - don't have enough data to make DPH happy, but getting 5 log removal
Jim - talked to Rich Haberman at DPH - agrees not enough info to not add disinfection

Fresno sports complex - old landfill and superfund site - using groundwater remediation for irrigation. Don't assume any reuse potential

Cornelia Corridor - may be able to pick up the irrigation of large yards in area
Crossing of 99 a problem
Some subdivisions already conditioned for reuse - Steve H to get info on which areas

Jensen line - old brick sewer has been abandoned. Goes into middle of SW area

Dave - issues of regrowth in the system. Large pipes an issue if low flow. More than 5 days retention becomes a problem. DSRSD did a gradual rate increase - started out 20 % below water costs and then increased rates over time.

Potential for new AG in this area? Canals are already getting extracted water in this area. Clovis is actually paying FID to discharge to their canals.

Planned recharge area for Metro Plan - actually a depression in the GW in SW area (northeast of plant) due to overpumping.

Tracy - issue that industries can go away.

Ron - Has the City thought about buying more Ag land to do own reuse/growing?
Bob - plant surrounded by Ag - why go all over town with pipelines when could do an Ag program?
Steve H - need to continue to look at Ag - not sure can get the offset needed.
Bob - need to find out now. Most viable program.
Dave - need to have a backup program to compare.

Ron - what happens when water goes out of Ag and into Urban growth?
Brock - if density is low then demands increase because landscape irrigation is water intensive. Until get water meters - can't really determine.

Northwest
Sewer in area of proposed scalping plant (Grantline and Herndon) about 42 inch or greater.
City owned land, adjacent to Herndon Canal for siting facility and maybe recharge - 17 acres.
Outfalls from Herndon Canal to SJ River if wanted
Could irrigate golf courses, schools…
Proposed recharge facility for water proposed west of 99 (from Metro Plan). Potential to combine with wastewater.

Commercial project proposed in Herndon and 99 area - conditioned with purple pipe. Not constructed yet.
Van Ness lakes - man made lakes - water feature - not really used for contact.
Ron: At Lake Elsnore - put all effluent in lake - 5k out of 40k. RWQCB doesn't have any bacterial issues - TMDL issues for nitrogen and P. Terminal lake used for full body contact. In summertime is green - but people fish, swim and waterski.

Northeast
Potential to redirect some wastewater from forcemains to North Fresno WRF
WRF expandable to 2.5 mgd. Maybe more if use different technology (MBR)
Could irrigate golf courses, Woodward Park, potential Ag north of Woodward Lake, wetlands restoration
Potential additional scalping plant at Woodward Park?
Good location for GW recharge
Flood control basin at Chestnut and Sheppard

Southeast
Dave - make developer put in the scalping plant.
Steve - Yes, we will make them pay for it but we want to have control over the treatment plant after our experience with the Copper River plant.

Brock - SEGA proposing multiple scalping plants - not in areas shown here from previous study
Luis - Plant locations next to FID canals for Ag water reuse. Clovis also discharges into one of the canals - need to check capacity.

Satellite locations don't have to be situated where identified in 2006 study.

Brock - planned recharge area for water - some difficulty in even developing GW drinking wells in the SE area. Will know more soon.

SEGA - planned development for 105,000 people - big opportunity for residential reuse, dual plumbing in commercial buildings, recharge. Calthorpe and EDAW planned water features.

Jim - in Florida takes about 5 houses to develop enough wastewater for irrigating one yard.

Wrap-up - key issues to consider from each TAC member

Bob - put together task force of regulators and users (chairman was in charge of health so that after he was satisfied, everything went smoothly). Agricultural reuse seems most promising. Need to work out with FID agreement about what kind of offset they can get. Doesn't see why City has to deal with FID if we deliver water directly to them and they'll stop pumping groundwater. (Kevin - most growers are far away from where we need the groundwater. Brock: can't put drinking water wells in Ag land). Need to evaluate impacts if city puts all eggs in Ag basket. Doesn't see any stumbling blocks. Ag reuse seems to be immediately located (next to plant) and lowest level of treatment.

Ron - Needs to have an overarching blue ribbon panel. Representatives from all major stakeholders (citizens, regulators, elected, FID) to be included in panel. Get prior overarching buy-in and policy / goal statement. This needs to come before engineering. Also need to develop water balance. Need to let gravity do the work. Economics are most important. If the

land costs are cheap enough, then can impose fees on top of that for development. Can't raise the fees so high you can't sell houses. Treatment issue is real - makes best sales pitch.

Dave - Agree about task force, but keep regulators as separate group. Get newspapers on board. Figure out what you're trying to sell. Make a paradigm choice. Cheaper to go to Ag than to add in a billion dollars of irrigation pipeline. Should not shortchange self of treatment quality now, since it's a major part of the public perception issue. In terms of concerns about overuse - using recycled water is the same as using potable water wisely.

Jim - Agree with advisory panel concept because of credibility. Need to narrow alternatives. Agree that Ag may be easiest solutions. None of industrial users have been contacted, so first need to ask them what their needs and willingness are. Keep regulatory agencies in the loop. Some in CDPH think that Title 22 isn't stringent enough for irrigation. Recognize that short-term decisions have long-term consequences. Need to seriously consider undisinfected effluent in perc ponds. Also examine whether other uses are better than recharge due to the regulatory burdens. Remember that when building satellite plants there needs to be enough remaining flow to take solids away to main plant. Recommends applying disinfection before putting in the ground. Need credible experts - not paid consultants - to deal with public outrage.

Robin - Did project w/o task forces, but thinks its necessary for recharge. If you're just doing irrigation, Redwood City is an example of outreach going wrong. Robin started smaller with parks and medians. Later, as projects are developed, people felt that they had a choice about whether to take recycled water. Get horticultural experts onboard. Need to get control over water waste in Fresno. Really need to put meters in this town. Should also have separate irrigation meters to track water use and eventually retrofit. Pricing - for commercial/industrial, maybe have fixed price for irrigation water rather than price per quantity for potable. Must make it cheaper for recycled than potable. Doesn't require cultural change in irrigation practices. Put the sign up early even though recycled water isn't yet there, so if people complain initially, you can tell them it's not there yet.

Dave Requa will send notes on mandatory requirements.

Prepared By:

Lorien Fono

LF:LF

Appendix C

Engineering Report for the Production, Distribution and Use of Recycled Water

CITY OF FRESNO, CALIFORNIA
DEPARTMENT OF PUBLIC UTILITIES
WASTEWATER MANAGEMENT DIVISION

ENGINEERING REPORT FOR THE PRODUCTION, DISTRIBUTION AND USE OF RECYCLED WATER

SEPTEMBER 18, 2015

Prepared Under the Direction of:

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Appendix A Recycled Water Ordinance
Appendix B Rules and Regulations
Appendix C Recycled Water User Agreement
Appendix D TTDF Design Report
Appendix E Standard Specifications and Drawings for Recycled Water Facilities

LIST OF RELEVANT INTERNET-ACCESSIBLE DOCUMENTS

Construction Plans for Recycled Water Transmission Main Project SW1A
https://dl.dropboxusercontent.com/u/79172/215138_RWTM_SW1A_Plans.pdf

Construction Plans for Recycled Water Transmission Main Project SW1B
https://dl.dropboxusercontent.com/u/79172/215138_RWTM_SW1B_Plans.pdf

Industrial Pretreatment Program
https://dl.dropboxusercontent.com/u/79172/Industrial%20Pretreatment%20Program%202009.pdf

Recycled Water Master Plan
http://www.fresno.gov/NR/rdonlyres/7B22E4E4-29CF-4C10-B3BE-F32C141CBB4B/0/RecycledWaterMasterPlan2013.pdf

Recycled Water Ordinance
http://www.fresno.gov/NR/rdonlyres/7AB20689-3E0B-4C1C-A01B-67BF9D0B8305/0/RecycledWaterOrdinance.pdf

Recycled Water-Related Statutes
http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/Documents/Lawbook/RWstatutes2014-05-01a.pdf

Recycled Water-Related Regulations
http://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/documents/lawbook/RWregulations_20150716.pdf

Recycled Water User Map for Initial Contacts
https://dl.dropboxusercontent.com/u/79172/Fresno%20RecWat%20User%20Map.pdf

TTDF Design Report
https://dl.dropboxusercontent.com/u/79172/TTDF%20Schematic%20Design%20Final%20Tech%20Memo.pdf

TTDF Construction Drawings
https://dl.dropboxusercontent.com/u/79172/TTDF%20Conformed%20Plans.pdf

TTDF Construction Specifications Volume I
https://dl.dropboxusercontent.com/u/79172/TTDF%20Conformed%20Specs%20Vol1.pdf

TTDF Construction Specifications Volume II
https://dl.dropboxusercontent.com/u/79172/TTDF%20Conformed%20Specs%20Vol2.pdf

TTDF Construction Specifications Volume III
https://dl.dropboxusercontent.com/u/79172/TTDF%20Conformed%20Specs%20Vol3.pdf

ACRONYMS AND ABBREVIATIONS

AFY	Acre-Feet per Year
BOD	Biochemical Oxygen Demand
CRWQCB	California Regional Water Quality Control Board, Central Valley Region
CFS	Cubic Feet per Second
Clovis ST/WRF	Clovis Sewage Treatment / Water Reuse Facility
FID	Fresno Irrigation District
FMFCD	Fresno Metropolitan Flood Control District
FSE	Fine Screen Effluent
GFD	Gallons per Square Foot per Day
GPM	Gallons per Minute
GRRP	Groundwater Replenishment Reuse Projects
KVA	Kilovolt-Amp
KW	Kilowatt
MGD	Million Gallons per Day
MVA	Megavolt-Amp
MW	Megawatt
NFWRF	North Fresno Wastewater Reclamation Facility
OIS	Operator Interface Station
PGE	Pacific Gas & Electric Company
RAS	Return Activated Sludge
RWPA	Recycled Water Project Area
RWRF	Fresno / Clovis Regional Wastewater Reclamation Facility
RWTM	Recycled Water Transmission Main
SCADA	Supervisory Control and Data Acquisition
TSS	Total Suspended Solids
TTDF	Tertiary Treatment and Disinfection Facility
TTRW	Tertiary Treated Recycled Water
UV	Ultra-Violet
WAS	Waste Activated Sludge
WDRs	Waste Discharge Requirements

DEFINITIONS

1974 Agreement: The 1974 agreement between the City of Fresno and FID to establish a groundwater reclamation system consisting of on-site extraction wells at the RWRF and piping that delivers extracted groundwater to FID's Dry Creek and Houghton Canals.

1976 Agreement: The 1976 agreement between the City of Fresno and FID that provides for the agencies to use FID's distribution system to satisfy their respective water supply rights, and to work together to protect and preserve the groundwater basin.

Guidelines: The California Department of Water Resources March 2001 “Guidelines for the Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water”

Master Plan: The City of Fresno's 2010 "Recycled Water Master Plan"

Metro Plan Update: The City of Fresno's 2011 "Metropolitan Water Resources Management Plan Update, Phase 2"

Recycled Water Ordinance: The City of Fresno Recycled Water Ordinance, adopted July 17, 2014 as Ordinance 2014-32

Rules and Regulations: The City of Fresno "Rules and Regulations of Recycled Water Use"

TTDF Design Report: "Tertiary Treatment and Disinfection Facility Technical Memorandum", August 2011

TTDF Construction Plans: "Drawings for the Construction of Tertiary Treatment and Disinfection Facility - Phase I", Conformed Drawings, September 19, 2013

TTDF Construction Specifications: "Fresno-Clovis Regional Wastewater Reclamation Facility, Tertiary Treatment And Disinfection Facility, Specifications", Conformed, Volumes I - III, September 2013,

Waste Discharge Requirements: California Regional Water Quality Control Board, Central Valley Region, "Order No. 5-01-254, Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County", 19 October 2001

1.0 INTRODUCTION

The City of Fresno is located in the County of Fresno, in California's Central Valley, approximately 220 miles north of Los Angeles and 180 miles south of Sacramento. In partnership with the City of Clovis, the City owns and operates the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF), which receives and treats the majority of wastewater generated within the Cities of Fresno and Clovis and some unincorporated areas of Fresno County. The RWRF site is located in the area generally bounded by Jensen, Chateau Fresno, Central, and Cornelia Avenues, and its on-site Administration Office building is located at Lat 36°42'14.63" N, Long 119°53'33.50" W. The RWRF is currently operated under California Regional Water Quality Control Board, Central Valley Region, "Order No. 5-01-254, Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County", dated 19 October 2001 (Waste Discharge Requirements).

The City also owns and operates the North Fresno Wastewater Reclamation Facility (NFWRF), which receives and treats wastewater generated within a small area of the City generally bounded by Copper, Friant, and Willow Avenues. The NFWRF is located on the north side of Copper Avenue, between Cedar and Maple Avenues, at Lat 36°53'46.35" N, Long 119°45'8.01" W. Recycled water produced by the NFWRF is used for irrigation of a golf course at Copper River Country Club, which is situated within the area served by the NFWRF.

The City of Clovis owns the Clovis Sewage Treatment / Water Reuse Facility (Clovis ST/WRF), which is operated under contract by CH2M Hill. The Clovis ST/WRF is located at the northeast corner of Ashlan and Loma Vista Avenues, at Lat 36°47'39.77" N, Long 119°36'50.71" W. The Clovis ST/WRF receives and treats wastewater generated within certain areas of the City of Clovis that are not tributary to the RWRF, and currently has an average daily flow capacity of 2.8 MGD. Recycled water produced by the Clovis ST/WRF is used for landscape irrigation in certain areas of the City of Clovis, and for agricultural irrigation via limited elements of the Fresno Irrigation District distribution system.

Figure 1-1 provides a location map showing the approximate locations of the RWRF, NFWRF and Clovis ST/WRF facilities.

The City of Fresno's 2011 Metropolitan Water Resources Management Plan Update (Metro Plan Update), Phase 2, recommended that the City incorporate tertiary-treated recycled water into its future water supply portfolio to meet non-potable demands in new development areas and existing parts of the City, to offset potable water demands. The Metro Plan Update called for the use of up to 25,000 AFY, approximately equivalent to an average of 22.3 MGD, of tertiary-treated recycled water by 2025. The City's 2010 Recycled Water Master Plan (Master Plan), although completed prior to the Metro Plan Update, Phase 2, incorporated the same Metro Plan Update recommendation taken from a draft edition, as a minimum. The Recycled Water Master Plan implementation recommendations included the construction of a tertiary-treated recycled water production facility at the RWRF, and a network of recycled water transmission and distribution pipelines to convey recycled water to use areas.

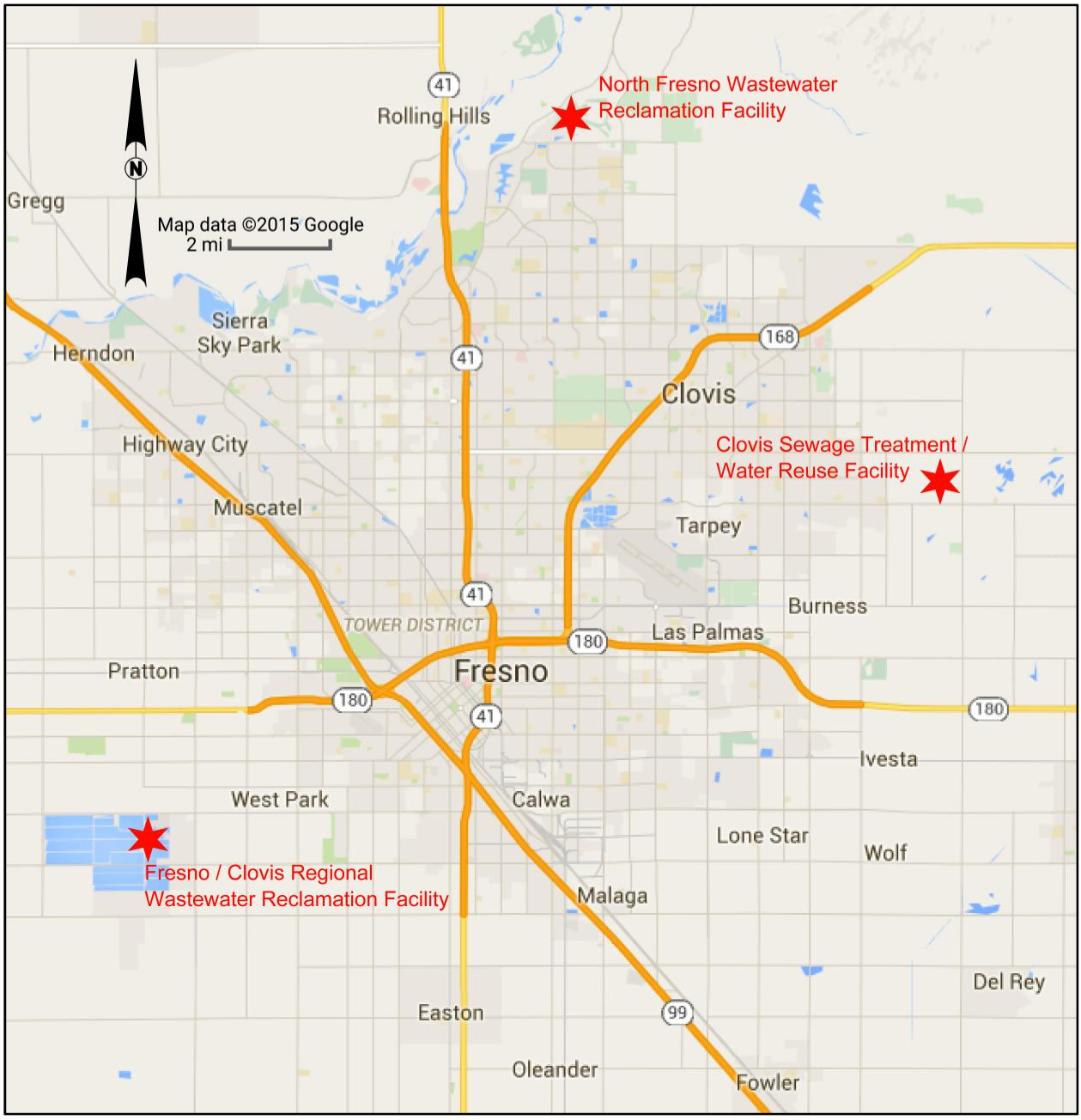


FIGURE 1-1
LOCATION MAP

The City of Fresno is currently constructing a Tertiary Treatment and Disinfection Facility (TTDF) at the RWRF. It will be a Phase 1 facility having an initial recycled water production capacity of 5 MGD. Subsequent Phase 2 and Phase 3 expansions are planned to provide additional capacity of 10 MGD and 15 MGD, respectively, to result in a Phase 3 capacity of 30 MGD. The TTDF will receive primary effluent from one of the existing RWRF treatment trains, and will produce disinfected tertiary-treated recycled water. A recycled water transmission and distribution pipeline network is planned to convey recycled

water from the TTDF to recycled water use areas in the City of Fresno. Figure 1-2 provides an overview of the planned distribution system, taken from the Master Plan.

As generally described in the Master Plan, the City's objectives for its planning and development of a recycled water production and distribution system are:

- Protect and improve groundwater quality by reducing the use of the RWRF percolation ponds that are currently used for effluent disposal.
- Increase the use of recycled water through urban reuse, groundwater recharge and agricultural reuse to help meet increasing water demands in the region.
- Offset potable water use, enhancing the sustainability of the City's water supply.

This Engineering Report for the Production, Distribution, and Use of Recycled Water describes the City of Fresno's planned recycled water production and distribution facilities, and describes how those facilities and the planned uses of recycled water will comply with the State of California Water Recycling Criteria, which are contained in Sections 60301 through 60355, inclusive, of the California Code of Regulations, Title 22, Division 4. The format and content of this report conform to the March 2001 "Guidelines for the Preparation of an Engineering Report for the Production, Distribution, and Use of Recycled Water" (Guidelines).

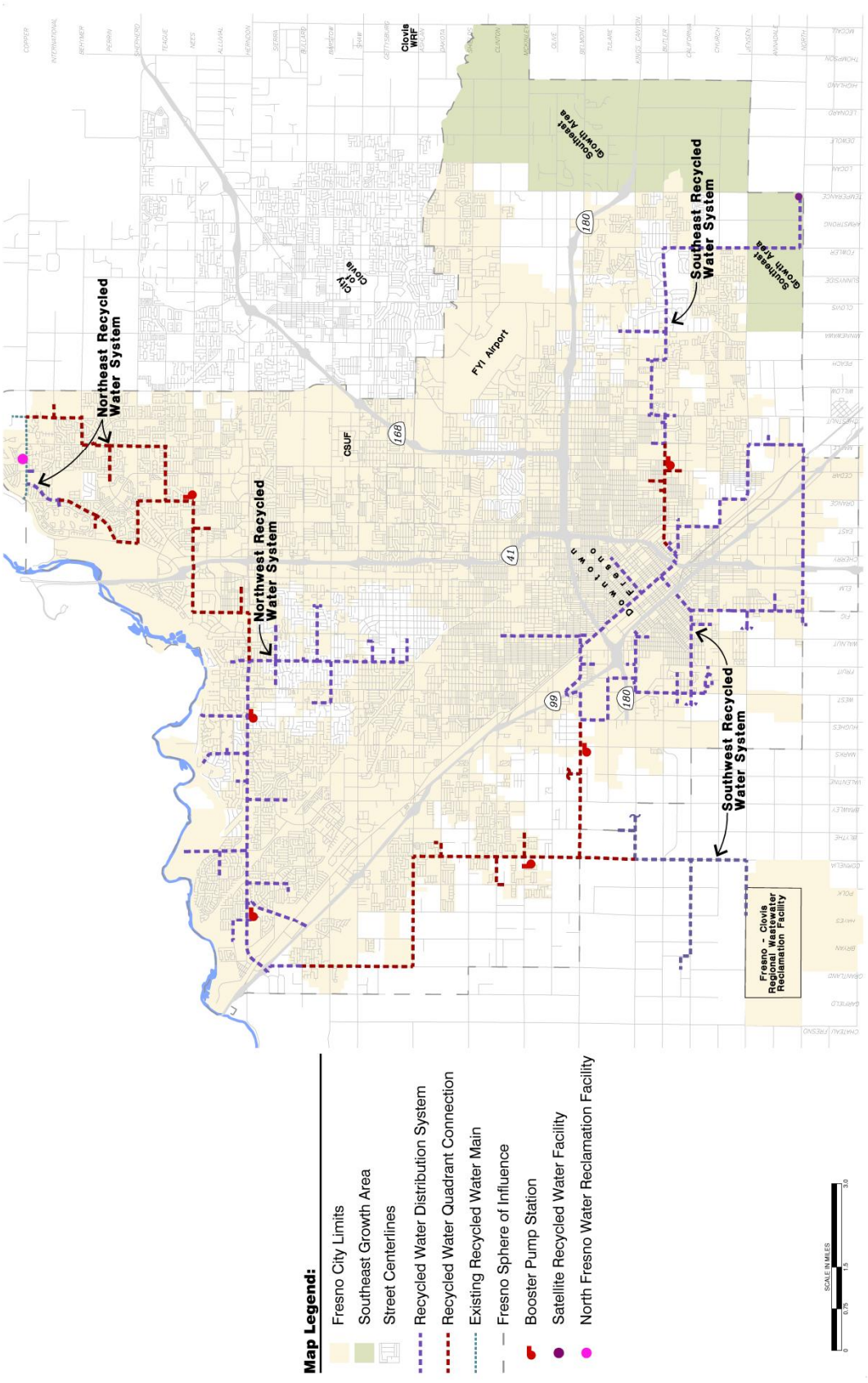


FIGURE 1-2
OVERVIEW OF PLANNED DISTRIBUTION SYSTEM

2.0 RECYCLED WATER PROJECT

2.1 General

The City of Fresno, Department of Public Utilities, Wastewater Management Division, is the lead agency and project sponsor for this project, and is ultimately responsible for the design, construction, operation and maintenance of the recycled water production and distribution facilities. Although the City of Fresno owns and operates the RWRF, in partnership with the City of Clovis, the City of Clovis has no ownership in or responsibility for the City of Fresno's planned recycled water production and distribution facilities.

Other agencies that have, or could potentially have, an interest in the City's production, distribution and use of recycled water are Fresno Irrigation District (FID) and Fresno Metropolitan Flood Control District (FMFCD).

2.1.1 Fresno Irrigation District

In 1974, the City entered into an exchange agreement (1974 Agreement) with Fresno Irrigation District (FID) to establish a groundwater reclamation system consisting of on-site extraction wells at the RWRF and piping that delivers extracted groundwater to FID's Dry Creek and Houghton Canals. The extracted ground water typically mixes with a variable amount of surface water prior to use on crops, including fodder, fiber, and food for human consumption (e.g., almonds, beans, peaches, raisins, and wine grapes, etc.). The extracted groundwater is discharged to the canals during the growing season for agricultural use on the western side of FID's service area. Each canal can convey up to 200 cubic feet per second (CFS). There are currently no regulatory restrictions on the use of extracted groundwater.

The 1974 Agreement stipulates the following:

- The City must discharge a minimum of 100,000 AF of extracted groundwater to FID during any ten-year period.
- The City may discharge a maximum of 30,000 AF of extracted groundwater to FID in any given year.
- For every acre-foot of extracted groundwater the City discharges to FID, the City is entitled to receive 0.46 acre-foot of surface water from FID.
- Any increase in the discharge of extracted groundwater to FID beyond that stipulated in the 1974 agreement is subject to FID approval.
- The City cannot extract groundwater from beneath the RWRF in volumes that will cause the groundwater level to drop below levels observed in the previous year.

The City has not historically used its full entitlement of surface water under the 1974 Agreement due to lack of demand and adequate facilities, such as groundwater recharge basins or surface water treatment facilities.

The City and FID also entered into a separate cooperative agreement dated 1976 (1976 Agreement), that provides for the agencies to use FID's distribution system to satisfy their respective water supply rights, and to work together to protect and preserve the groundwater basin. The 1976 Agreement also stipulates that the City will retain its treated effluent within the boundaries of FID unless written consent to do otherwise is obtained.

The City currently owns, operates and maintains the facilities that deliver extracted groundwater to the FID system, up to the point of delivery. FID currently owns, operates and maintains all elements of the FID system that distribute the extracted water, beyond the point of delivery. There are currently no plans to change responsibility for ownership, operation and maintenance of the respective facilities.

Relative to agricultural alternatives that involve FID, the Master Plan recommends expansion of agricultural exchange via increased delivery of extracted groundwater, and / or the addition of delivery of tertiary-treated recycled water, to expand such agricultural exchange beyond the current limitation of 30,000 AFY. Expansion beyond the current limitation, and / or the addition of tertiary-treated recycled water to the agricultural exchange program, would require modification of the 1974 Agreement. The City and FID are not yet working to modify the 1974 Agreement. Neither the TTDF currently under construction, nor the planned recycled water transmission and distribution pipeline network, include elements that are specifically intended to expand the agricultural exchange program beyond the current limitation, or provide for the addition of tertiary-treated recycled water to the program.

2.1.2 Fresno Metropolitan Flood Control District

The Master Plan recommends that Groundwater Replenishment Reuse Projects (GRRPs) be implemented to the extent practical in the southwest, northwest and southeast quadrants of the City. The Master Plan identifies numerous potential GRRP sites that are generally situated near or adjacent to FMFCD basin sites, since storm water runoff or surface water in the FMFCD system could be used for groundwater recharge on its own, and could also serve as diluent water for the GRRPs if tertiary-treated recycled water is used in the GRRPs. The Master Plan also identifies three tentative locations for regional groundwater recharge areas, or "super-recharge basins".

If development of any of the GRRPs affects FMFCD basins or other facilities, the City would have to enter into related agreements with FMFCD, whether or not the GRRP incorporates the use of tertiary-treated recycled water. The City and FMFCD are not yet working to develop such agreements. Neither the TTDF currently under construction, nor the planned recycled water transmission and distribution pipeline network, include elements that are specifically intended to supply TTRW to potential GRRP sites.

2.2 Rules and Regulations

The City of Fresno Recycled Water Ordinance was adopted July 17, 2014 as Ordinance 2014-32, and it is appended to this report as Appendix A. The Recycled Water Ordinance specifies that the City will establish Recycled Water Rules and Regulations to govern the operation of the City's recycled water system and the use of recycled water, and to implement the policies and requirements of the Recycled Water Ordinance, the California Code of Regulations Titles 17 and 22; and other State and local rules

and regulations related to the use of recycled water. The Rules and Regulations have been prepared by the City, and they are appended as Appendix B.

The City will ensure that all parties involved in the distribution and use of its recycled water perform their activities in accordance with the Rules and Regulations, which have been developed by the City's Public Utilities Department (Public Utilities). The following documents support the Rules and Regulations:

- This Engineering Report
- TTDF Engineering Report
- Recycled Water Ordinance
- Recycled Water User Agreements

The Rules and Regulations cover design, construction, operation and maintenance for recycled water distribution systems and use areas, together with control measures to be implemented for use areas. They include a cross-connection control program, and provisions for inspection by City personnel. The Rules and Regulations are intended to meet or exceed all of the requirements of applicable State statutes and regulations, including but not limited to those compiled in the 25 June 2015 edition of the State Water Resources Control Board "*Recycled Water-Related Statutes and Regulations",* which was formerly referred to as "The Purple Book".

The Recycled Water Ordinance specifies that the Director of the City of Fresno Department of Public Utilities (Director), and / or City employees to whom such responsibility is delegated by the Director, shall administer, implement, and enforce the provisions of the ordinance. The Director also bears responsibility for enforcement of the Rules and Regulations. As of the date of this report, Thomas C. Esqueda is the Director of the City of Fresno Department of Public Utilities.

2.3 Producer, Distributor and Users of Recycled Water

2.3.1 Producer and Distributor

The City of Fresno, Department of Public Utilities, Wastewater Management Division, is the lead agency and project sponsor for this project, and is ultimately responsible for the design, construction, operation and maintenance of the recycled water production and distribution facilities. Although the City of Fresno owns and operates the RWRF in partnership with the City of Clovis, the City of Clovis has no ownership in or responsibility for the City of Fresno's planned recycled water production and distribution facilities. The City of Fresno will be the sole producer and distributor of recycled water.

2.3.2 Recycled Water Users

The Master Plan contains recommendations for three different categories of recycled water use opportunities, namely: Urban Reuse Opportunities, Agricultural Reuse and Exchange Opportunities, and Groundwater Reuse Recharge Opportunities.

As described earlier in this report, the City and FID are not yet working to modify the 1974 Agreement. Neither the TTDF currently under construction, nor the planned recycled water transmission and distribution pipeline network, include elements that are specifically intended to expand the agricultural exchange program beyond the current limitation, or provide for the addition of TTRW to the program. With respect to the use of TTRW, agricultural reuse and exchange involving FID is considered a long term opportunity, and it is not currently planned as a Phase 1 recycled water use.

GRRP opportunities are also considered long term recycled water use opportunities, and are not currently planned as a Phase 1 recycled water use.

The urban reuse opportunities recommended by the Master Plan are considered to be both near term and long term recycled water use opportunities, and it is expected that most or all of the Phase 1 recycled water uses will be in the urban reuse category. Urban reuse provides an opportunity to implement recycled water projects that directly offset potable water use and are highly visible to the community. The types of urban recycled water uses recommended in the Master Plan generally include landscape irrigation and industrial uses. Some examples of the types of users for which recycled water landscape irrigation is planned are listed below.

- Parks
- Golf courses and country clubs
- Homeowners association common areas
- Cemeteries
- Airports
- State highway rights-of-way
- Schools and college campuses
- Municipal facilities such as courthouses and city hall
- Water feature impoundments such as Lake Van Ness and Woodward Lake
- Fairgrounds

Similarly, some examples of industrial uses for which recycled water use is planned are given in the following bulleted list.

- Heating and cooling
- Industrial laundries
- Commercial vehicle washing
- Dust control
- Fire protection
- Sanitary, such as toilet flushing at industrial sites
- Process water (except for food processors)

- Cleanup/wash down water (except for food processors)
- Boiler Feed

The Recycled Water Ordinance requires recycled water use under certain circumstances, where recycled water service is available, as summarized in the following paragraphs.

a) The City may require all customers who connect to the potable water system to use recycled water for all approved uses, including but not limited to dual plumbing for commercial buildings and single family residential irrigation.

b) Existing commercial properties, existing industrial properties, existing apartments and condominiums, and all homeowners associations are required to use recycled water for landscape irrigation.

c) New commercial projects, new industrial projects, new institutional and governmental projects, and new apartments and condominiums are required to be dual plumbed to provide for internal use of recycled water, and are required to use recycled water for landscape irrigation.

d) New single family residential home projects are required to provide for landscape irrigation with recycled water.

All properties within the Recycled Water Project Area (RWPA), as it is defined in the Recycled Water Ordinance, that host land uses for which recycled water use is recommended by the Master Plan, or is required by the Recycled Water Ordinance, are potential recycled water use areas, and the owners or tenants of such properties are potential recycled water users.

The Rules and Regulations require that no recycled water shall be used on any property or use area not owned or controlled by the City unless a non-transferrable User Agreement has been executed between the City and the recycled water user. User Agreements will contain contractually binding terms requiring conformance with the Rules and Regulations and all applicable local, state and federal regulations, including Title 17 and 22 of the California Code of Regulations. Users will be responsible for constructing and maintaining their own on-site recycled water systems for their use area. Appendix C contains a user agreement template that will serve as the foundation for the individual User Agreements for each recycled water user.

The City of Fresno has begun making initial contacts with potential recycled water users to advise them of the forthcoming availability of recycled water, and to begin making necessary arrangements for them to become recycled water users. Initial contacts are being made with potential users sited within one-half mile of the planned recycled water transmission main system. Figure 2-1 is a highly reduced scale map graphically identifying the target area for initial contacts, and the locations of potential recycled water use areas. A full scale version of the map may be viewed at the URL address provided in the List Of Relevant Internet-Accessible Documents.

The City of Fresno also plans to install recycled water hydrants along the recycled water transmission main system. The recycled water hydrants could be used to provide TTRW for fire suppression activities, and for construction water uses such as dust control and moisture conditioning for soil compaction.

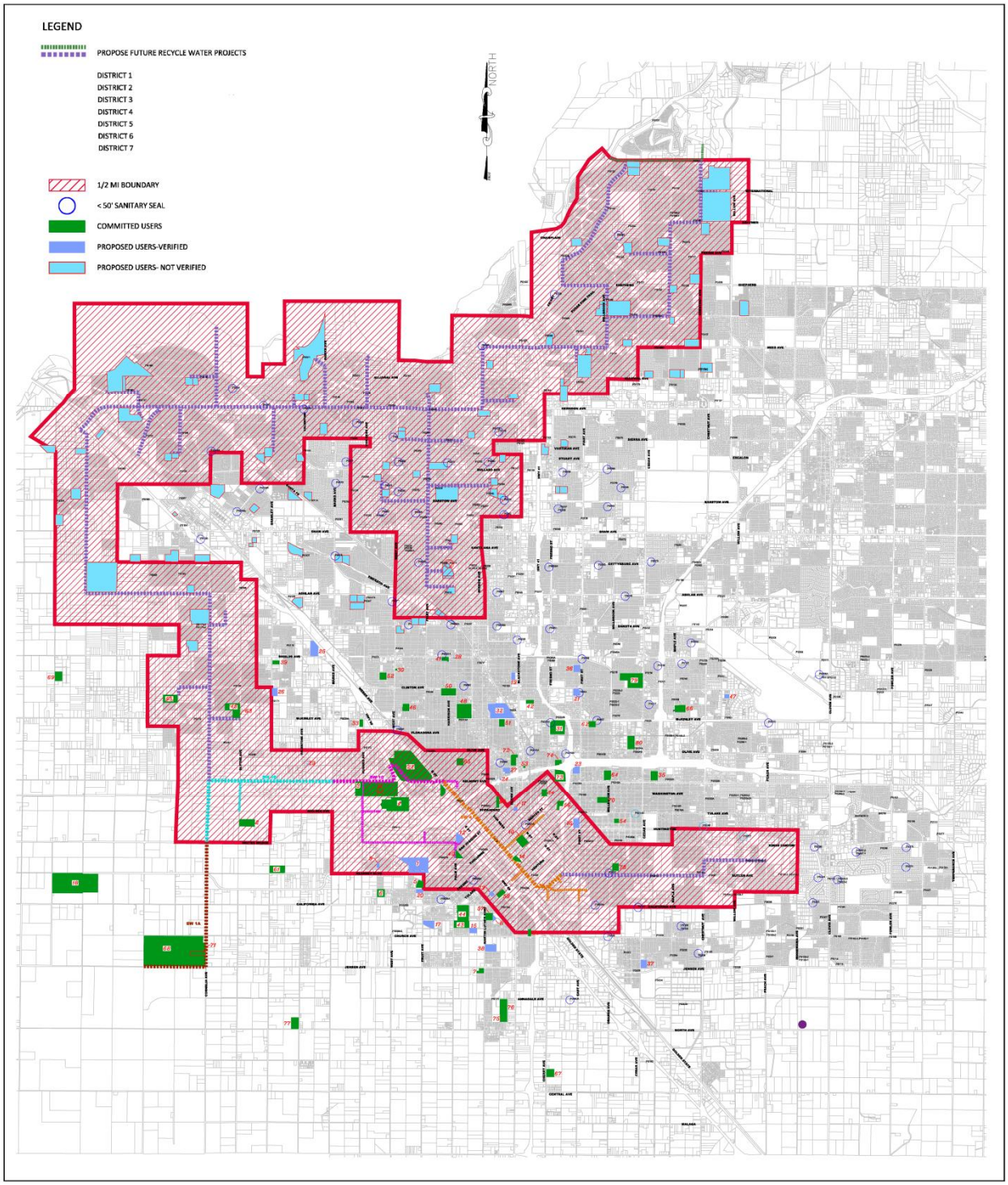


FIGURE 2-1
RECYCLED WATER USER MAP FOR INITIAL CONTACTS

2.4 Raw Wastewater

The raw wastewater entering the RWRF, for the last 12-month period ending 30 June 2015, has been characterized by the wastewater chemistry shown in Table 2-1, based on an analysis of data provided by the City. The data provided by the City consisted of laboratory analysis results for 24-hour composite samples.

TABLE 2-1
WASTEWATER CHARACTERISTICS
JULY 1 2014 THROUGH JUNE 30 2015

Property	Minimum	Maximum	Median	95th Percentile
Biochemical Oxygen Demand (BOD, mg/l)	219	598	336	450
Total Suspended Solids (TSS, mg/l)	182	546	294	368
Electrical Conductivity (EC, µmhos/cm)	778	1369	1051	1236
Ammonia Nitrogen (NH3-N, mg/l)	21	52	32	38
Total Dissolved Solids (TDS, mg/l)	430	964	605	779
Total Volatile Dissolved Solids (TVDS, mg/l)	108	448	192	285

The wastewater entering the RWRF is ordinary municipal wastewater generated within the majority of the wastewater collection system service areas of the Cities of Fresno and Clovis. The City of Fresno reports that wastewater generated by 46 industrial customers in calendar year 2014 accounted for the flow, BOD and TSS proportions, relative to the total flow received at the RWRF, shown in Table 2-2.

TABLE 2-2
INDUSTRIAL CUSTOMER CONTRIBUTIONS
JANUARY 1 2014 THROUGH DECEMBER 31 2014

Property	Total RWRF	Industrial Contribution	Industrial Percentage
Wastewater Flow (Million Gallons)	21,537	2,946	13.68%
Biochemical Oxygen Demand (BOD, Pounds)	62,489,056	21,655,376	34.65%
Total Suspended Solids (TSS, Pounds)	54,152,862	10,378,756	19.17%

The City has developed and rigorously implements an Industrial Pretreatment Program, as required by the Clean Water Act of 1977 (PL 95-217). The program sets forth uniform requirements for the discharge of certain industrial wastewater flows into the wastewater collection system and the RWRF, and enables the City as operator of the RWRF to comply with applicable local, state and federal laws relative to industrial wastewaters. The objectives of the program are to:

- Prevent the introduction of pollutants which will interfere with the operation of the RWRF, including interference with the use or disposal of municipal sludge.
- Prevent the introduction of pollutants which will pass through into the RWRF treatment facilities or otherwise be incompatible with the treatment facilities.
- Improve opportunities to recycle and reclaim wastewater and related sludges.
- Provide for equitable distribution of the cost of the Pretreatment Program among users.

The City of Fresno Industrial Pretreatment Program may be viewed at the URL address provided in the List Of Relevant Internet-Accessible Documents.

2.5 Treatment Processes

2.5.1 Existing RWRF Facilities

The existing RWRF is currently rated for an annual monthly average daily discharge flow of 80 MGD and a maximum monthly average daily discharge flow of 88 MGD. The annual monthly average daily discharge flow is currently reported to be approximately 60 MGD.

Wastewater is received at the RWRF headworks, which includes an influent pump station, bar screens, grit removal tanks, and grit processing equipment. After the preliminary treatment at the headworks, the wastewater is provided with primary treatment by six clarifiers. The primary effluent from these clarifiers is distributed to three secondary treatment trains, referred to as Trains A, B and C. Figure 2-2 provides a schematic illustration of the three RWRF treatment trains.

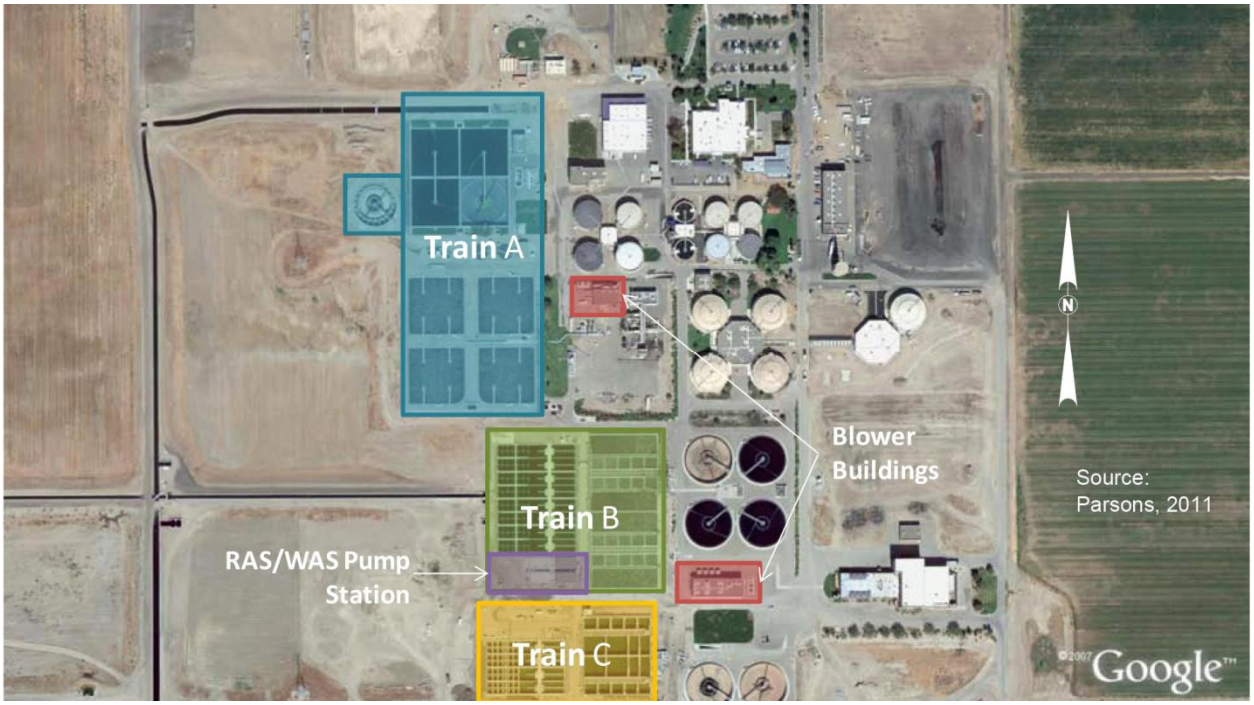


FIGURE 2-2
EXISTING RWRF TREATMENT TRAINS

Train A is the oldest of the three treatment trains, and it reportedly has several operational and maintenance issues as identified in the TTDF Engineering Report. Train B is the next oldest of the three treatment trains, and it consists of four rectangular aeration basins and eight rectangular secondary clarifiers. Train C is the newest of the three treatments trains. It consists of two rectangular aeration basins and four rectangular secondary clarifiers. The undisinfected secondary effluent from the RWRF

treatment trains flows into two canals on the site, by which it is conveyed to the RWRF percolation basins.

2.5.2 New TTDF Facilities

Primary effluent destined for treatment at the new TTDF will be diverted from Train C at a point immediately upstream of the Train C aeration basins by connection to an existing pipe stub in the primary effluent piping. The primary effluent will be treated by fine screening at a new fine screen facility situated near the point of diversion. Fine screen effluent (FSE) will be conveyed to the TTDF by a gravity flow FSE pipeline that crosses one of the secondary effluent canals (Canal B) in an inverted siphon configuration.

The TTDF will receive and treat the FSE and produce TTRW using membrane bioreactor (MBR) processes. The TTDF will be all new construction, with bioreactors (pre-aeration basins), membrane tanks and a blower building all having common walls to minimize concrete and piping costs. In the course of the treatment process, flow will progress through two parallel bioreactors that provide both anoxic and oxic zones, and then through the membrane cassette facilities in the membrane tanks. Membrane permeate will be disinfected by an in-pipe ultra-violet (UV) disinfection system to produce TTRW, meeting Title 22 recycled water quality criteria. Train A Aeration Basin No. 4 will be converted to provide covered recycled water storage.

The initial phase of the TTDF will have a constant flow capacity of 5 MGD, but will be laid out so as to provide for future expansion to have an ultimate design capacity of 30 MGD.

The existing 24 inch diameter aeration air line serving Train A Aeration Basin No. 4 will be used and extended to deliver process air to the bioreactors. Electrical power for the TTDF will be supplied from an existing 12 kV electrical building, located east of the Train A secondary clarifiers, through existing and new extended conduits.

Figure 2-3 provides a TTDF schematic site plan, and Figure 2-4 provides a TTDF schematic line diagram, both taken from the TTDF Design Report.

The most significant key elements of manufactured components of the TTDF are the fine screen equipment, the MBR membranes, and the UV disinfection system. The fine screen equipment will be ROTAMAT Rotary Drum Fine Screens RPPS-PRO, Model RPPS-PRO 1600/2, manufacture by Huber Technology. The MBR membrane facilities will be LEAPmbr, incorporating ZeeWeed hollow fiber membranes, manufactured by GE Water & Process Technologies. The UV disinfection systems will be TrojanUVFit Model 72AL75 UV disinfection system, manufactured by Trojan Technologies.

Chemicals that will be routinely used at the TTDF include sodium hypochlorite (12.5% solution) and citric acid (50% solution) for MBR maintenance and recovery cleans. The chemicals will be stored at an outdoor 30' by 20' containment area that consists of a concrete slab with perimeter containment walls 1' 2" high. Sodium hypochlorite will be stored in two 250 gallon totes, and citric acid will be stored in one 250 gallon tote. The totes will be supported on individual steel tote support frames. Chemical

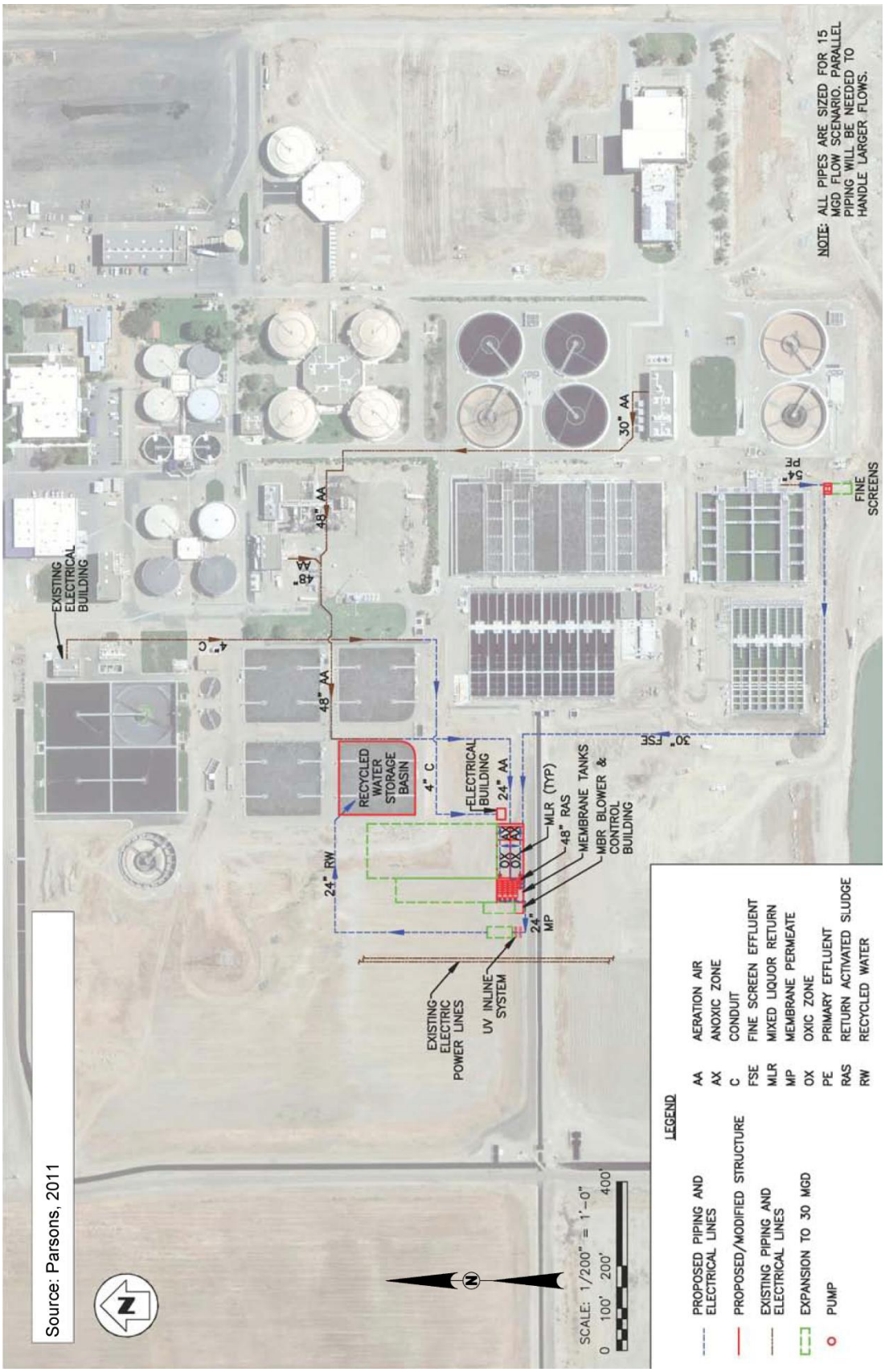


FIGURE 2-3
TTDF SCHEMATIC SITE PLAN

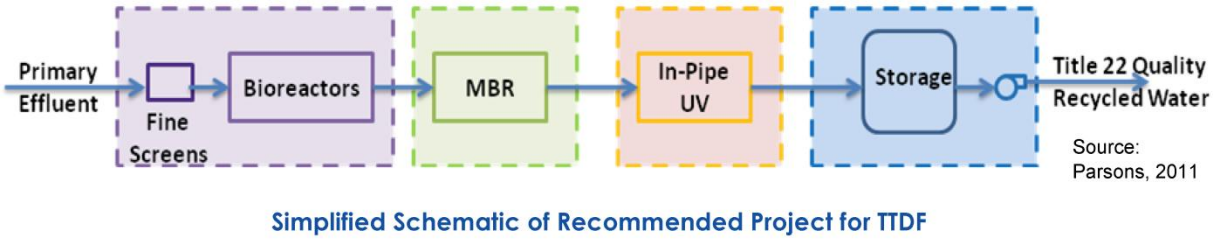


FIGURE 2-4
TTDF SCHEMATIC LINE DIAGRAM

metering pumps sited within the containment areas will inject the chemicals into the backpulse pumps discharge header for MBR maintenance and recovery cleans. It is estimated that annual chemical consumption will be 4,000 gallons per year for sodium hypochlorite, and 750 gallons per year for citric acid. The TTDF Design Report, Section 16 - Recommended Project Description in particular, provides a description of the TTDF, including a detailed list of major process equipment and planned chemical use. The TTDF Design Report is included as Appendix D, and may be viewed at the URL address provided in the List Of Relevant Internet-Accessible Documents. TTDF Construction Drawings may also be viewed at the URL address provided in the List Of Relevant Internet-Accessible Documents.

2.5.3 Operation and Maintenance Manuals

Under the provisions of the construction contract for the TTDF, the construction contractor is responsible for obtaining from the various vendors and suppliers and providing the operation and maintenance (O&M) manuals for all of the key elements of the TTDF. The TTDF design engineer, Parsons Corporation (Parsons) will prepare an overall Process O&M Manual for the TTDF, which will incorporate all of the O&M documentation and will be produced in an electronic format that will be accessible and usable online by computer and other electronic devices, such as iPads and similar tablets.

In a separate but related effort, Carollo Engineers (Carollo), under a contract with the City is assembling all of the existing O&M manuals for the RWRF, exclusive of the TTDF. The existing O&M manuals currently exist only in printed hard copy form. Carollo will combine the existing documentation in an electronic format that will provide similar online accessibility as for the Parsons Process O&M Manual for the TTDF. Although the Parsons Process O&M Manual for the TTDF and the Carollo combined O&M manual for the RWRF will be separate electronic documents, they will both be accessible for plant operators via the same secure online portal.

2.6 Plant Reliability Features

The TTDF Design Report, Section 15 - Selected MBR Alternatives Analysis, and Section 16 - Recommended Project Description in particular, provides a description of the key elements of the TTDF process equipment and their reliability features. The following paragraphs provide a summary of process equipment reliability features described in the TTDF Design Report.

2.6.1 Fine Screens

Fine screens will be in-channel perforated-plate drum screens. Two fine screens will be installed with one of the units as standby, thereby providing a fully redundant standby primary treatment unit process. Each screen would be capable of handling 5 MGD of flow to provide redundancy. The units will be installed in concrete channels equipped with isolation gates to allow for maintenance without interfering with fine screen and TTDF operation. Each fine screen will be equipped with an integrated washer/compactor for cleaning and concentrating the screenings prior to disposal off site.

The fine screens will be provided with alarms to indicate high differential water level (between upstream and downstream surfaces), high upstream water level, motor overload, low oil level, and emergency stop actuated conditions.

2.6.2 Bioreactors (Pre-Aeration Basins)

Two bioreactors will be constructed, each having a flow capacity of 5 MGD to provide system redundancy, thereby providing multiple biological treatment units capable of producing oxidized wastewater with one unit not in operation. Each bioreactor will be divided into several anoxic and oxic zones, with the first quarter of each bioreactor dedicated to the anoxic zone. Baffles would be placed in the bioreactors to separate the anoxic and oxic zones to minimize back-mixing as the flow passes through in a plug flow regime. Additional baffling would be used to divide each anoxic and oxic zone into 3 compartments to minimize back-mixing. The plug flow conditions increase the efficiency of biological treatment, optimizing carbonaceous matter removal, nitrification and denitrification. Submersible mixers will provide mixing in the anoxic zones. One submersible mixer will be provided in each anoxic zone compartment, for a total of six mixers, with one additional mixer provided as a shelf spare.

2.6.3 Aeration System

Air will be introduced into the oxic zones in the bioreactors through fine bubble diffusers. Aeration will be tapered so that approximately 70% of the oxygen is provided in the first half of the oxic zone to satisfy the high oxygen demand. The required air will be supplied to the oxic zones by the existing RWRF blowers. The blowers are of single-stage centrifugal type and have enough capacity to serve the biological needs of the MBR process as well as the remaining plant. There are five duty blowers with one standby blower. The existing 24 inch diameter air pipeline of RWRF Train A Aeration Basin No. 4 will be used and extended to supply air to the bioreactors, since that basin will be de-commissioned and converted to provide recycled water storage.

2.6.4 Mixed Liquor Return and Sludge Recirculation Pumps

Two recirculation lines will be provided in the MBR system, namely the mixed liquor return and sludge recirculation lines. The mixed liquor return system transfers mixed liquor from the tail end of the oxic zone back to the head of the anoxic zone at an adjustable rate up to four times the average flow. This

system transfers nitrates resulting from nitrification back to the anoxic zone for denitrification as the oxygen molecules associated with nitrates are used by the biomass. The sludge recirculation system transfers sludge from the membrane tanks to the head of the oxic zone, also at an adjustable rate up to four times the average flow. The recirculation system prevents the solids concentration in the membrane tanks from increasing excessively and plugging the membranes, as permeate is removed from the mixed liquor. Excess sludge will be wasted from the MBR system from the sludge recirculation line.

There will be two duty pumps with one shelf spare pump for the mixed liquor return pumps, one duty pump with one standby pump for the sludge recirculation pumps, and one duty pump with one standby pump for the waste activated sludge (WAS) pumps.

2.6.5 MBR Membrane System

The MBR membrane system will consist of four independent MBR tanks, with each tank containing six installed hollow fiber membrane cassettes with spare room for installation of an additional cassette. The system will be configured to allow isolation of a tank for maintenance and cleaning. Permeate pumps would draw the MBR membrane system effluent through the membranes, directing it to the TTDF disinfection system.

The total membrane surface area for the four tanks is 417,360 square feet, which provides for a treatment capacity of 5.0 MGD for the design flux rate of 12 gallons/square foot/day (GFD), and for the maximum flux rate of 16 GFD when one tank is out of service. The MBR membrane system facilities will include alarms to signal the production of TTDF effluent that does not meet the quality requirements for disinfected TTRW. The MBR membrane system thus provides alarm systems and multiple MBR tank units capable of treating the entire flow with one unit not in operation.

Key mechanical elements of the MBR membrane system include air scouring blowers, permeate pumps, backpulse pumps, and instrument air compressors. There will be two duty blowers and one standby blower for the air scouring blowers. There will be four duty pumps and one shelf spare pump for the permeate pumps. There will be one duty pump and one standby pump for the backpulse pump. And finally, there will one duty air compressor and one standby air compressor for the instrument air compressor.

2.6.6 Disinfection

Membrane permeate will be disinfected by an in-pipe ultra-violet (UV) disinfection system to produce TTRW, meeting Title 22 recycled water quality criteria. The UV disinfection systems will be TrojanUVFit Model 72AL75 UV disinfection system, manufactured by Trojan Technologies. There will be four reactor trains, with each train having two reactors. Three of the UV disinfection trains will be in service at any given time, with the fourth train being on standby. Each reactor will have a flow treatment capacity of 1.0 MGD, providing an in-service total treatment capacity of 6.0 MGD for the design flow of 5.0 MGD. The standby train with its two standby reactors will provide 2.0 MGD of standby capacity. The UV

disinfection system provides multiple UV disinfection units capable of treating the entire flow with one unit out of service, and also provides two standby units.

2.6.7 Alarm Provisions

The TTDF will include a new Supervisory Control and Data Acquisition (SCADA) system with an Operator Interface Station (OIS) in the Control Building. The TTDF will also include many alarm systems that will communicate with facility operators via the SCADA OIS. The OIS will include alarm management screens to display process and control system alarms.

The contents of the alarm management screen will be arranged in a tabular fashion, and entries in the alarm table will be color coded following the same color conventions as used in the existing RWRF SCADA system. The following information, as applicable, will be conveyed in the alarm table: date and time of the alarm, database point designation, type of alarm, value, PLC number and alarm description. The alarm management screen will provide a means for acknowledging alarms either individually or by page or globally.

If audible alarms are enabled at the intended site, a means will be provided for silencing audible alarms which is at all times accessible or visible to the operator. At physical locations where there is more than one OIS, the operator will not be required to silence the alarm on more than one OIS.

Alarms are categorized by four types listed in order of priority from highest to lowest.

a) Major alarm is the highest priority. A major alarm is caused by an abnormal process or equipment condition. A condition which is potentially dangerous to personnel or equipment or violates public health regulatory limits is classified as a major alarm. A major alarm is usually characterized as being a High-High alarm, hardwired alarm, or remote safety shutdown alarm.
b) Minor alarm is the next highest priority. A minor alarm is caused by an abnormal process or equipment condition. A condition which is not considered mission critical is classified as a minor alarm. A minor alarm may be a precursor to a major alarm.
c) Event alarm is the next to lowest priority. An event alarm is generated by operator action such as changing the control mode.
d) Informational alarm is the lowest priority. An informational alarm provides a means of conveying important process information to the operator. Informational alarms usually take the form of messages.

Table 2-3 provides a very brief summary of alarms that will be provided for key elements of the TTDF process equipment. It is based on information contained in Section 13370 – Programmable Controllers and Panel Instruments in the TTDF Construction Specifications.

TABLE 2-3
ALARM PROVISIONS FOR SELECTED KEY ELEMENTS
OF THE TTDF PROCESS EQUIPMENT

Process Equipment Item	Alarm Description
Fine Screens	Common Alarm
Fine Screens	High Differential Level
Fine Screens	High Upstream Level
Fine Screens	Emergency Stop Actuated
Fine Screens	Grease Pump No. 1 Reservoir Low Level
Aeration Basins	RAS Influent Valve Fail
Aeration Basins	Influent Channel Agitation Air Valve Fail
Aeration Basins	ML Channel Agitation Air Valve Fail
Aeration Basins	Anoxic Mixer Fail
Aeration Basins	Anoxic Mixer High Winding Temperature
Aeration Basins	Anoxic Mixer Seal Leak
Aeration Basins	Oxic Zone Aeration Valve Fail
Aeration Basins	Mixed Liquor Pump Fail
Membrane Basins	Agitation Air Valve Fail
Membrane Basins	Membrane Basin Low Level
Membrane Basins	Membrane Basin Low-Low Level
Membrane Basins	Infeed Slide Gate Fail
Membrane Pump Gallery	Permeate Pump Fail
Membrane Pump Gallery	Permeate Pump High Winding Temperature
Membrane Pump Gallery	Backpulse Pump Fail
Membrane Pump Gallery	Backpulse Pump High Winding Temperature
Membrane Pump Gallery	Backpulse Pumps High Discharge Pressure
Membrane Pump Gallery	Sump Pump Common Alarm
Membrane Pump Gallery	Sump Pump Seal Leak
Membrane Pump Gallery	Sump High-High Level
Membrane Pump Gallery	Floor High Level
Permeate Collector	Permeate Collector Low Level
Permeate Collector	Permeate Collector Low-Low Level
Permeate Collector	Permeate Collector High Turbidity
RAS Pump Station	RAS Pump Fail
RAS Pump Station	RAS Pump High Winding Temperature
RAS Pump Station	RAS Pump High Discharge Pressure
RAS Pump Station	RAS Pump Station Low-Low Level
WAS Pump Station	WAS Pump Fail
WAS Pump Station	WAS Pump High Winding Temperature
WAS Pump Station	WAS Pump Seal Leak
WAS Pump Station	WAS Pump Station Low-Low Level
UV Train	Discharge Valve Fail
UV Reactor	High Water Temperature
UV Reactor	Low UV Intensity
UV Reactor	Ground Fault

TABLE 2-3 ALARM PROVISIONS FOR SELECTED KEY ELEMENTS OF THE TTDF PROCESS EQUIPMENT	
Process Equipment Item	**Alarm Description**
UV Reactor	Low Priority Alarm
UV Reactor	High Priority Alarm
UV Reactor	Critical Instrument Failure
UV Reactor	UV Dose Failure
Drain Pump Station	Drain Pump Fail
Drain Pump Station	Drain Pump High Winding Temperature
Drain Pump Station	Drain Pump Seal Leak
Drain Pump Station	Drain Pump Station Low Level
Drain Pump Station	Drain Pump Station High Level
Valve Vault	Valve Vault Sump Pump Common Alarm
Valve Vault	Valve Vault Sump High-High Level

2.6.8 Facility Hours and Staffing

As for the existing RWRF facilities, the TTDF facilities will be staffed around the clock, 24 hours every day, by certified plant operators. All alarm indicators will be received by plant operators in the facility Control Building via the SCADA system and its OIS interfaces. The Control Building is continuously staffed by RWRF personnel.

2.6.9 Electrical Power Supply

The primary source of electrical power supply for the RWRF, provided by Pacific Gas & Electric Company (PGE) is one 70 KV high voltage power line supplying power via one City-owned 10 MVA power transformer with a secondary voltage of 12 KV. The secondary side of the transformer is connected to two main circuit breakers for the main 12 KV service switchgear, which is equipped with a normally open tie circuit breaker. This switchgear is rated at 12 KV, 2000A, 500 MVA short circuit capacity with Bus “A” and Bus “B” separated by the normally open tie circuit breaker.

A backup source of electrical power supply from PGE exists in the form of a 12 KV line that provides a capacity of 5 MVA for emergency use. This backup line originates at a different PGE substation than the primary source line, and it is considered highly unlikely that both sources would be out of service at the same time. This backup line is tied to the main 12KV service switchgear through a normally open circuit breaker with a "Kirk Key" trapped key interlock, operated manually.

The RWRF also has three backup generators, one of which is a propane fired system that generates 25 KW. The other two backup generators are diesel fired systems that produce 350 KW and 1600 KW, respectively. The total power generation capacity of these three backup generators is thus 1975 KW, or 1975 KVA. Combined with the backup PGE line, this results in a total backup power supply capacity of 6975 KVA.

The RWRF also has a natural gas fired turbine generator that can produce up to 9.25 MW, equivalent to 9250 KVA. This generator system is not currently configured to provide power to the overall RWRF electrical system, and so it is not available as a near-term backup source of electrical power for the RWRF and the TTDF. However, the City is working to implement the necessary improvements to allow this generator to serve as a backup source of electrical power.

The City reports that the RWRF summer peak electrical power demand is approximately 6500 KVA, and that the estimated peak power demand for the TTDF is approximately 1250 KVA, for a combined total of 7750 KVA. It is evident that the primary power supply provides sufficient capacity for the anticipated combined demand of the RWRF and the TTDF. However, until the natural gas fired turbine generator can be configured to serve as a general service backup generator, the backup power supply capacity of 6975 KVA does not provide sufficient electrical power for the combined demands of the RWRF and the TTDF. The City reports that until such time as the natural gas fired turbine generator can be configured to serve as a general service backup generator, plant operators will shut down non-essential electrical loads facility-wide if necessary for temporary operation under emergency backup power supply conditions.

2.7 Supplemental Water Supply

The City will operate the TTDF and manage its recycled water users such that the recycled water supply can meet recycled water demand at all times. However, if the TTDF becomes unable to produce sufficient recycled water on a short-term basis to meet recycled water demand, supplemental water may be required to meet the recycled water user needs.

Supplemental water could be provided by the following sources.

1) Stored Recycled Water. The covered recycled water storage basin, a converted RWRF Train A aeration basin, will provide 2.7 million gallons of recycled water storage, or approximately 54% of one day's recycled water production capacity of the TTDF. Stored recycled water may be used to provide continued recycled water service for limited periods in the event of a short-term emergency situation resulting in TTDF inability to produce TTRW.

2) Raw Water. Raw water consists of untreated surface water provided by FID. Raw water would not be introduced into and conveyed by the recycled water distribution system, but would be delivered by other conveyance systems, generally the FID pipeline and canal system and private irrigation water pipelines. Thus, utility of this source of supplemental water would be limited to those users who have access to such other systems, and would be subject to supply availability.

3) Potable Water Distribution System. The City's potable water distribution system could serve as a temporary source of supplemental water for recycled water users. This would require an approved temporary disconnection from the City's recycled water distribution system, followed by the establishment of an approved temporary connection to the City's potable water distribution system.

4) Private Wells. Some recycled water users will have onsite private wells that have been or are being used for irrigation water supply and/or potable water supply, and could be relied on as a temporary source of supplemental water. As for potable water, the use of this supplemental source would require an approved temporary disconnection from the City's recycled water distribution system, followed by the establishment of an approved temporary connection to the private well system.

5) Reclamation Wells. In the future, the City hopes to be able to use groundwater produced from aquifers beneath the RWRF percolation ponds, disinfected if necessary, as a supplemental water source for the recycled water system. The City estimates that it will be at least two years from the date of this report before the use of this groundwater as a supplemental water supply could be implemented Water quality testing to verify suitability of the groundwater would be done prior to approval of such use, and necessary infrastructure would have to be constructed.

The only supplemental water source of those listed above that has potentially lower general quality than the recycled water itself is the raw (untreated) surface water. In cases where raw water is used as a supplemental source, the City will confirm with the affected users that the raw water quality is adequate for their particular application, which is ordinarily expected to be the case.

Since most recycled water users will have formerly relied on raw water, potable water, or private wells for the same uses for which recycled water is subsequently used, it is expected that the supply and delivery infrastructure for those supplemental water supply sources would generally be adequate for those same uses on a temporary basis.

Cross-connection of any recycled water distribution system, whether the City's recycled water distribution system or any individual user's on-site recycled water system, with any potable water distribution system is prohibited, even as a supplemental water source in the event of a shutdown or failure at the TTDF. The Rules and Regulations contain specific requirements for disconnecting on-site recycled water systems from the recycled water distribution system before making a temporary connection to a potable water distribution system.

2.8 Monitoring and Reporting

The Waste Discharge Requirements (WDRs) for the RWRF include a Monitoring and Reporting Program (MRP) that specifies required monitoring and reporting for RWRF operations. Primary effluent destined for treatment at the new TTDF will be diverted from RWRF Train C at a point immediately upstream of the Train C aeration basins by connection to an existing pipe stub in the primary effluent piping. The diversion point is downstream of the RWRF headworks, and therefore downstream of the influent composite sampling location designated in the WDRs. Influent monitoring and reporting for the TTDF will therefore be done as an integral part of the influent monitoring and reporting done for the RWRF under the provisions of the MRP.

Monitoring and reporting for disinfected TTRW produced by the TTDF will also be done as specified in the MRP for effluent discharge monitoring. This will involve the introduction of a new effluent composite sampling location at the TTDF discharge, in addition to those currently designated in the WDRs. The new sampling location must be established with concurrence of CRWQCB staff, and a description of the new sampling location must be submitted to the Board and attached to the WDRs.

In addition to the effluent discharge monitoring and reporting required by the WDRs, disinfected TTRW will also be tested for total coliform bacteria and turbidity, as required by Title 22 CCR Section 60321.

The disinfected TTRW will be sampled at least once daily for total coliform bacteria. The samples will be taken from the disinfected TTRW at the new designated effluent composite sampling location, and will be analyzed by the RWRF laboratory.

Disinfected TTRW will also be continuously sampled for turbidity using a continuous turbidity meter and recorder at the new effluent composite sampling location. In the event of failure of the continuous turbidity meter and recorder, grab samples taken at the same location at a minimum frequency of 1.2-hours may be substituted for a period of up to 24-hours.

All monitoring results will be reported as specified in the WDRs, including the additional total coliform bacteria and turbidity monitoring for the TTDF.

2.9 Contingency Plan

For the purposes of this report, "off-spec effluent" is TTDF effluent that does not meet the quality requirements for disinfected TTRW, or partially treated or untreated wastewater that somehow passes through the TTDF. In the event of any circumstance that could result, or does result, in the discharge of off-spec effluent from the TTDF, effluent pumping from the TTDF permeate pumps to the covered recycled water storage basin would be halted, so as to preserve the quality of stored TTRW so that it may be used to provide continued recycled water service while the cause of the problem is investigated and remedied.

In the event that off-spec effluent is delivered into the covered recycled water storage basin, pumping from the recycled water pump station would be halted, so as to prevent the introduction of off-spec effluent into the recycled water distribution system. Provided that the off-spec effluent in storage is of an equivalent or higher quality than the undisinfected secondary effluent produced by the RWRF, the off-spec effluent would be pumped or allowed to overflow via the overflow pipeline to Canal B, which is part of the canal system that delivers undisinfected secondary effluent from the RWRF treatment facilities to the percolation basins. The TTDF facilities will include a dedicated pipeline for pumped conveyance of off-spec effluent under such conditions.

If off-spec effluent in the covered recycled water storage basin is not of an equivalent or higher quality than the undisinfected secondary effluent produced by the RWRF, the off-spec effluent would be pumped from the storage basin via temporary pipelines and returned to the primary effluent stream of

RWRF Train C. The recycled water storage basin would be flushed clean and disinfected prior to returning the basin to normal recycled water storage duty.

Since the supply of primary effluent for treatment by the TTDF is a diversion from the primary effluent stream of RWRF Train C, the supply can be stopped by simply stopping the diversion. This can be done by operation of a pneumatically operated valve located in a valve vault adjacent to the fine screens. When the diversion is stopped, the primary effluent that would otherwise be diverted to and treated by the TTDF is instead retained and treated in RWRF Train C.

3.0 TRANSMISSION AND DISTRIBUTION SYSTEMS

Chapter 1 of this report provides a brief description of the Master Plan, and its recommendations for recycled water production, transmission and distribution facilities that are now in the early stages of implementation. Figure 1-2 provides an overview of the planned distribution system, taken from the Master Plan. The initial phase of implementation of the planned distribution system includes the design and construction of certain elements of the recycled water transmission mains referred to as the Southwest Quadrant, together with a related recycled water booster pump station. Figure 3-1 shows the Southwest Quadrant recycled water transmission main and booster pump station projects.

The City is expected to soon award a construction contract for the Southwest Quadrant Project SW1A, and is currently soliciting bid proposals for the construction of Project SW1B. The construction plans for Projects SW1A and SW1B may be viewed at the URL addresses provided in the List Of Relevant Internet-Accessible Documents.

Projects SW1C, SW1D, SW4, and SWPS1 are currently under engineering design, at various levels of design completion. The City reportedly is planning to soon issue a Request for Qualifications for engineering design of the Northwest Quadrant and Northeast Quadrant recycled water transmission mains.

The hydraulic design for the recycled water transmission main system is based on a minimum operating pressure of 40 PSI, and a maximum pressure variation between low operating pressure and high operating pressure of 20 PSI.

Pipe materials for the recycled water transmission mains will be cement mortar lined and coated steel pipe (CMLCSP) or cement mortar lined and tape coated steel pipe with a mortar rock shield (CMLTCSP) for pipes 24 inches and larger in diameter. Pipes smaller than 24 inches in diameter will be poly-vinyl chloride pipe (PVC) or ductile iron pipe (DIP).

The City of Fresno has developed and adopted Standard Specifications and Standard Drawings for recycled water facilities. The Standard Specifications include construction specifications as well as design criteria. The Standard Specifications and Standard Drawings are appended to this report as Appendix E. The Standard Specifications and Standard Drawings apply to all construction of recycled water facilities within the City of Fresno.

With respect to pipe materials, the Standard Specifications and Standard Drawings currently include provisions for PVC and DIP pipe materials. The City of Fresno is also in the process of developing additional standard specification and standard drawing content to include the CMLCSP and CMLTCSP pipe materials, which is expected to be added to the Standard Specifications and Standard Drawings after it is adopted by the City.

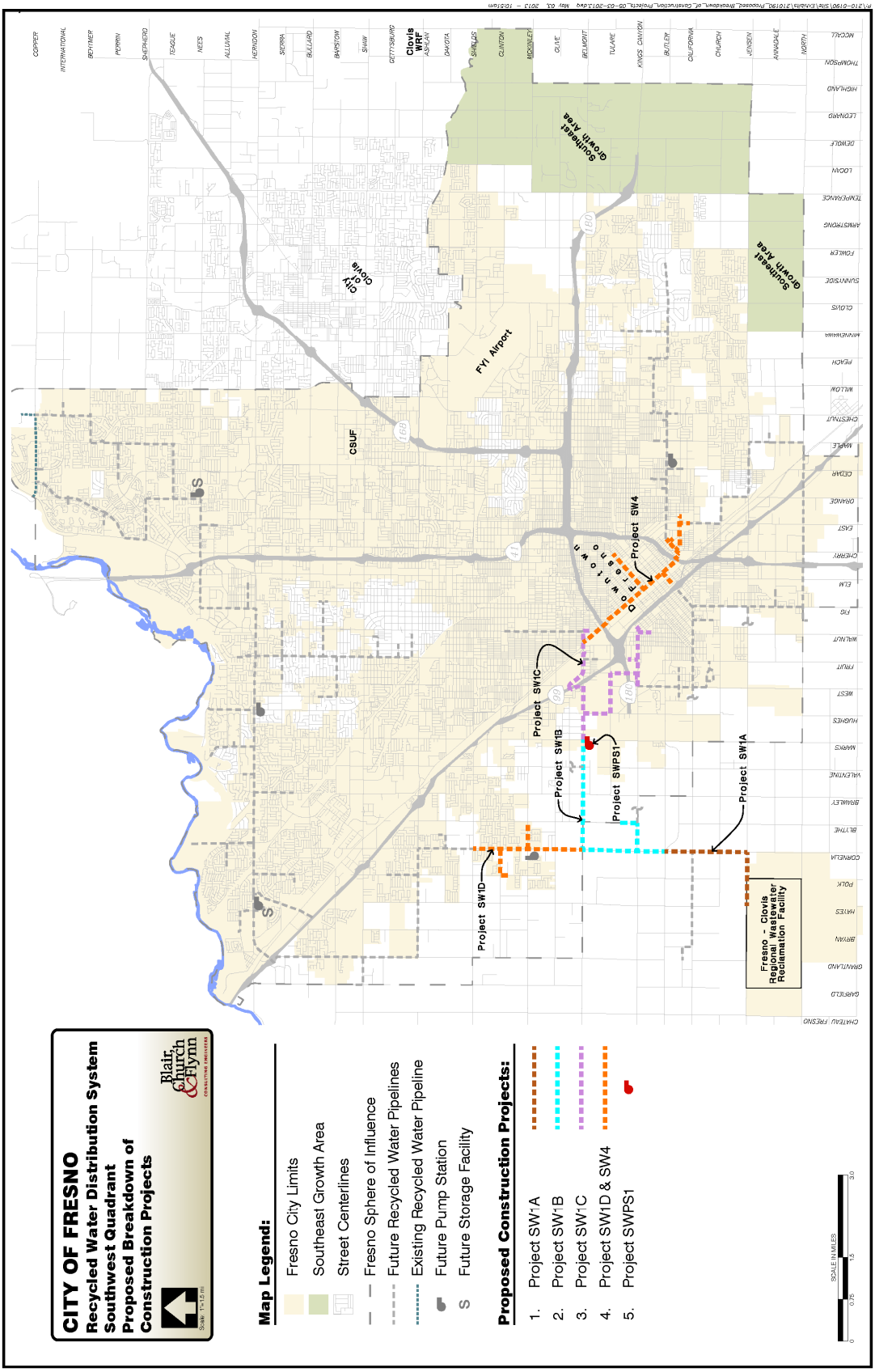


FIGURE 3-1
SOUTHWEST QUADRANT RECYCLED WATER TRANSMISSION MAIN PROJECTS

4.0 RECYCLED WATER USE AREAS

Subchapter 2.3 of this report provides a brief discussion of planned and/or required recycled water uses, restated in part here for the reader's ease of reference. All properties within the Recycled Water Project Area (RWPA), as it is defined in the Recycled Water Ordinance, that host land uses for which recycled water use is recommended by the Master Plan, or is required by the Recycled Water Ordinance, are potential recycled water use areas, and the owners or tenants of such properties are potential recycled water users.

The Rules and Regulations require that no recycled water shall be used on any property or use area not owned or controlled by the City unless a non-transferrable User Agreement has been executed between the City and the recycled water user. User Agreements will contain contractually binding terms requiring conformance with the Rules and Regulations and all applicable local, state and federal regulations, including Title 17 and 22 of the California Code of Regulations. Users will be responsible for constructing and maintaining their own on-site recycled water systems for their use area. Appendix C contains a user agreement template that will serve as the foundation for the individual User Agreements for each recycled water user.

The City of Fresno has begun making initial contacts with potential recycled water users to advise them of the forthcoming availability of recycled water, and to begin making necessary arrangements for them to become recycled water users. Initial contacts are being made with potential users sited within one-half mile of the planned recycled water transmission main system. Figure 2-1 is a highly reduced scale map graphically identifying the target area for initial contacts, and the locations of potential recycled water use areas. A full scale version of the map may be viewed at the URL address provided in the List Of Relevant Internet-Accessible Documents.

The City is in the process of retaining a recycled water use area consultant (RWUA Consultant) that will work with potential recycled water users and the City to set up recycled water use areas in conformance with the Recycled Water Ordinance, the Rules and Regulations, the Recycled Water User Agreement, and all applicable local, state and federal regulations. The City will pay the cost of the RWUA Consultant. The recycled water user will be responsible for implementing all onsite improvements, beyond the point of connection to the City's recycled water service, that may be necessary to retrofit or equip the use area for recycled water use. The recycled water user will also be responsible for elimination of any cross connections discovered in the course of the cross connection control survey.

Each recycled water user must designate a Recycled Water Site Supervisor to be responsible for the onsite recycled water system at each use area under their control. The Recycled Water Site Supervisor is required to be responsible for proper installation, operation, and maintenance of the recycled water system, compliance with the Rules and Regulations, prevention of potential hazards, and preservation of the onsite recycled water system plans in “as built” form. Additional specific responsibilities of the Recycled Water Site Supervisor are provided in the Rules and Regulations.

Upon completion of the RWTM facilities that will deliver TTRW to the Roeding Park area, the City plans to implement recycled water use at Roeding Park, including Chaffee Zoo and Rotary Storyland and

Playland, as the first of the City's own recycled water use areas. A feasibility study has been conducted, and the City is currently making arrangements to retain an engineering and landscape architecture consultant for the design of improvements necessary to retrofit or equip the use area for recycled water use.

APPENDIX A
RECYCLED WATER ORDINANCE

ORDINANCE NO. _____

AN ORDINANCE OF THE CITY OF FRESNO, CALIFORNIA, ADDING ARTICLE 9 OF CHAPTER 6 OF THE FRESNO MUNICIPAL CODE RELATING TO THE USE OF RECYCLED WATER FOR PLUMBING AND LANDSCAPE IRRIGATION

WHEREAS, the people of the State of California have a primary interest in the development of facilities to reuse water containing waste to supplement existing surface and underground water supplies and to assist in meeting the future water requirements of the State (California Water Code, Section 13510);

WHEREAS, conservation of all available water resources requires the maximum reuse of wastewater for beneficial uses of water (Water Code Section 461);

WHEREAS, continued use of potable water for irrigation of greenbelt areas and other non-potable uses may be an unreasonable use of such water where recycled water is available;

WHEREAS, the State Water Resources Control Board adopted Resolution No. 2009-0011, which intends to establish requirements to increase the use of recycled water in California;

WHEREAS, the State Water Resources Control Board adopted an Order, which creates General Waste Discharge Requirements for Landscape Irrigation Uses of Municipal Recycled Water (General Permit); and

WHEREAS, the City of Fresno Urban Water Management Plan (Resolution No. 2008-207, August 19, 2008) identifies the City's need to develop 25,000 acre-feet per

year of recycled water by 2025 to offset potable water use in order to help meet future water supply needs for the Fresno Metropolitan area;

THE COUNCIL OF THE CITY OF FRESNO DOES ORDAIN AS FOLLOWS:

SECTION 1. Article 9 is added to Chapter 6 of the Fresno Municipal Code to read:

ARTICLE 9

RECYCLED WATER ORDINANCE

Section	6-901.	Title.
	6-902.	Purpose and Intent.
	6-903.	Definitions.
	6-904.	Administration.
	6-905.	User Agreement.
	6-906.	Application Process for User Agreement.
	6-907.	Recycled Water Service Eligibility.
	6-908.	Requirements to Use Recycled Water.
	6-909.	Voluntary Use Inside and Outside of the Recycled Water Project Area.
	6-911.	Construction and Dust Control Activities.
	6-913.	Sanctions.
	6-915.	Conflicting Provisions.

SECTION 6-901. TITLE. This section shall be known as the "Recycled Water Ordinance" of the City of Fresno and may be so cited.

SECTION 6-902. PURPOSE AND INTENT. The purpose and intent is to provide recycled water to all service areas in the City identified in the Recycled Water Master Plan (Plan) (currently under development) and subsequent additions, revisions or updates of the Plan. It is the intent of the City that existing owners of property and future development, identified in the Master Plan as being potential users within areas designated for recycled water use, qualify for a recycled water use agreement from the City in accordance with this Recycled Water Ordinance.

It is also the intent of the City that such recycled water be used in a manner and for types of uses that are in compliance with any and all applicable Federal, State and local statues, ordinances, regulations and other requirements.

SECTION 6-903 DEFINITIONS.

(a) "Approved use" means the uses defined by State law as being approved for use of tertiary treated recycled water.

(b) "Cross-connection" means any unapproved and/or unprotected connection between a potable water system and a nonpotable system. No cross connections are allowed between recycled water and potable water systems.

(c) "Customer", "Consumer", or "User" means a person or entity having a connection to the recycled water system or potable water system owned and operated by the City.

(d) "Dual plumbed system" means a system that utilizes separate piping systems for recycled water and potable water within a facility and where the recycled water is used for either of the following:

a. To serve plumbing outlets (excluding fire suppression systems) within a building, or

b. Outdoor landscaping irrigation at individual residences.

(e) "On-site recycled water system" means facilities under the control of the owner, normally downstream of the recycled water meter.

(f) "Potable water" means water which conforms to the Federal, State and local standards for human consumption.

(g) "Recycled water" means non-potable tertiary treated water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource.

(h) "Recycled water distribution system" means recycled water pipelines, transmission mains, pump stations, storage reservoirs, and appurtenances acquired or constructed and owned by the City, and used for the conveyance of recycled water between the wastewater treatment plant and the recycled water service connections.

(i) "Recycled water project area" means those geographical areas identified in the Fresno Recycled Water Master Plan and designated by the City to which the City will provide recycled water service where it is expected to be available. Customers within the Recycled Water Project Area are eligible for recycled water service for approved uses when it becomes available.

(j) "Recycled water service connection" means the point of connection (POC) of the user/customer's recycled water line with the recycled water service line of the City, which shall normally be the downstream end of the recycled water meter tailpiece.

(k) "Rules and regulations" means the Rules and Regulations for Recycled Water Use and Distribution within the City of Fresno.

(l) "Use area" means an area of recycled water use with defined boundaries. A use area may contain one or more facilities.

SECTION 6-904. ADMINISTRATION. The Director of the Department of Public Utilities (Director) shall administer, implement, and enforce the provisions of this section. Any powers granted to or duties imposed upon the Director may be delegated by the Director to persons in the employ of the City.

The Director will develop and enforce rules and regulations necessary to the administration of this section. The Director may amend such rules and regulations from time to time as conditions require. These rules and regulations shall be consistent with the general policy established herein by the City.

SECTION 6-905. USER AGREEMENT. Recycled water shall not be delivered, used, or discharged upon any property or use area not owned or controlled by the City unless a user agreement has been established.

The City will issue to each recycled water customer a user agreement for each site or combination of sites, which grants permission to use recycled water and requires the customer to use recycled water in accordance with the rules, regulations and standards of the City's Recycled Water Rules and Regulations and all applicable State and local rules and regulations, including Titles 17 and 22 of the California Code of Regulations (CCR), as may be amended from time to time.

SECTION 6-906. APPLICATION PROCESS FOR USER AGREEMENT. Applicants shall file applications for recycled water use with the Department of Public Utilities. The application shall contain such information as required by the

Department of Public Utilities. The application shall be reviewed for conformance with the requirements in this section, the Recycled Water Master Plan and all other applicable statutes. Upon determination that a property shall be served with recycled water, or adoption of a condition for development approval requiring use of recycled water, and approval of the application, the owner of the property may become a user by entering into a user agreement that complies with the regulations and such other requirements deemed necessary by the Department of Public Utilities.

SECTION 6-907. RECYCLED WATER SERVICE ELIGIBILITY. All areas served by potable water service within the Recycled Water Project Area are eligible for recycled water service connections for approved uses when recycled water becomes available.

However, the Director, or his or her designee, may determine that currently, connection to the recycled water system is not economically or operationally feasible because of distance from an available recycled water source or other such condition as the Director, or his or her designee, deems appropriate. This determination can change as the system is expanded or revised in the future and will be considered at that time.

SECTION 6-908. REQUIREMENT TO USE RECYCLED WATER. The City reserves the right to require all customers who connect (or desire to connect) to the City potable water system on or after January 1, 2015 to use recycled water in-lieu of potable water for all approved uses, including, but not

limited to, dual plumbing requirements for commercial buildings and single family residential irrigation.

Upon application by a developer, owner or water customer for a tentative map, subdivision map, land use permit, or other development project, the Director shall review the Master Plan and make a preliminary determination whether the current or proposed use of the subject property require it to be served with recycled water or to include facilities designed to accommodate the use of recycled water in the future, due to its location within an existing or proposed Recycled Water Project Area. Based upon such determination, an agreement for such use may be required as a condition of approval of any such application, in addition to any other conditions of approval or service.

a. Requirement for Commercial Properties in Recycled Water Project Area.

Existing Commercial: Existing commercial properties in the Recycled Water Project Area are required to use recycled water for landscape irrigation. Owners of existing commercial properties shall connect to the recycled water system or must provide a feasibility study to apply for an exception to this Recycled Water Ordinance.

New Commercial: Projects involving new commercial subdivision of land for which a tentative map or parcel map is required and are located within the Recycled Water Project Area, shall be conditioned to be dual plumbed to provide for the internal use of recycled water and to provide for the use of recycled water for landscape irrigation. The point of connection to the recycled water distribution

system shall be coordinated between the customer and the City. The Director will determine requirements for recycled water plumbing. These requirements and the use of recycled water will become conditions of approval.

b. Requirement for Industrial Projects in the Recycled Water Project Area.

Existing Industrial: Existing industrial properties in the Recycled Water Project Area are required to use recycled water for landscaping. Owners of existing industrial properties shall connect to the recycled water system or must provide a feasibility study to apply for an exception to this Recycled Water Ordinance.

New Industrial: New industrial projects which require a City permit and which are located within the Recycled Water Project Area are required to provide dual plumbing for internal uses of recycled water and to provide for the use of recycled water for landscape irrigation. Such projects must also provide a feasibility study analyzing the possibility of using recycled water for industrial processes and cooling. The Director will determine requirements for recycled water plumbing. The feasibility study and, if applicable, any City requirements for the use of recycled water will become conditions of approval.

c. Requirement for Institutional and Governmental Use in the Recycled Water Project Area.

New Institutional and Governmental Projects: New institutional and governmental projects which are located within the Recycled Water Project Area are required to be dual plumbed to provide for the internal use of recycled water

and to provide for the use of recycled water for landscape irrigation. The Director will determine requirements for recycled water plumbing. These requirements and the use of recycled water will become conditions of approval.

d. Requirement for Residential Uses in the Recycled Water Project Area.

New Apartments and Condominiums: Apartment and Condominium projects involving new commercial subdivisions of land for which a tentative map or parcel map is required and are located within the Recycled Water Project Area, shall be conditioned to be dual plumbed to provide for the internal use of recycled water and to provide for the use of recycled water for landscape irrigation in common areas. The point of connection to the recycled water distribution system shall be coordinated between the customer and the City. The Director will determine requirements for recycled water plumbing. These requirements and the use of recycled water will become conditions of approval.

New Single Family Residential Homes: Single family residential home projects involving new residential subdivisions of land for which a tentative map or parcel map is required and are located within the Recycled Water Project Area, shall be conditioned to provide for landscape irrigation with recycled water. The point of connection to the recycled water distribution system shall be coordinated between the customer and the City. These requirements and the use of recycled water will become conditions of approval.

Existing Apartments and Condominiums: Existing apartment and condominiums are required to use recycled water for landscape irrigation in

common areas. Owners of existing apartment and condominium properties shall connect to the recycled water system or must provide a feasibility study to apply for an exception to this Recycled Water Ordinance.

Home Owner Associations: Home Owner Associations are required to use recycled water for landscape irrigation in common areas. Home Owner Associations shall connect to the recycled water system or must provide a feasibility study to apply for an exception to this Recycled Water Ordinance.

SECTION 6-909. VOLUNTARY USE INSIDE AND OUTSIDE OF THE RECYCLED WATER PROJECT AREA.

a. Existing Commercial Properties in the Recycled Water Project Area.

Existing Commercial Properties: Existing commercial properties that are in the Recycled Water Project Area shall consider using recycled water for internal dual plumbing, internal cooling towers and evaporative coolers.

b. Commercial Properties Outside of the Recycled Water Project Area.

New and Remodeled Commercial Properties: New and remodeled commercial properties that are located outside of the Recycled Water Project Area shall consider the feasibility of providing for internal dual plumbing and providing for the use of recycled water for landscape irrigation, as recycled water may be extended beyond the Recycled Water Project Area.

c. Existing Industrial Properties in the Recycled Water Project Area.

Existing Industrial Properties: Existing industrial properties in the Recycled Water Project Area shall consider the feasibility of using recycled water for internal dual plumbing.

d. Existing and New Institutional and Governmental Use.

Existing Institutional and Governmental Properties: Existing institutional and governmental properties in the Recycled Water Project Area shall consider the feasibility of using recycled water for internal dual plumbing and landscape irrigation.

New Institutional and Governmental Properties Outside of Recycled Water Project Area: New institutional and governmental properties that are located outside of the Recycled Water Project Area shall consider the feasibility of using recycled water for internal dual plumbing and landscape irrigation, as recycled water is expected to be extended beyond the Recycled Water Project Area.

e. Residential Uses Outside of Recycled Water Project Area

Remodeled Apartments and Condominiums: Remodeled apartment and condominium properties shall consider the feasibility of dual plumbing to provide for the internal use of recycled water and using recycled water for landscape irrigation in common areas.

Existing Apartments and Condominiums: Existing apartment and condominiums shall consider the feasibility of using recycled water for landscape irrigation in common areas.

Home Owner Associations: Home Owner Associations are encouraged to consider the feasibility of using recycled water for landscape irrigation in common areas.

These statements apply to residential uses outside of the Recycled Water Project Area as recycled water may be extended beyond the current Recycled Water Project Area.

f. Industrial Projects; Inside and Outside of Recycled Water Project Area.

All existing and new industrial projects shall consider the feasibility of providing for the use of recycled water for industrial processes and cooling and dual plumbing.

SECTION 6-910. EXISTING POTABLE WATER SERVICE: VOLUNTARY RETROFITS. Existing potable water customers in the Recycled Water Project Area may be provided with the opportunity by the City to retrofit their system to accept recycled water, such as existing commercial properties and existing institutional and governmental properties.

SECTION 6-911. CONSTRUCTION AND DUST CONTROL ACTIVITIES. Any person applying for a construction permit for a project that includes dust control activities is required to use recycled water for those activities within the Recycled Water Project Area.

SECTION 6-912. RECYCLED WATER RULES AND REGULATIONS. The City will at all times have Recycled Water Rules and Regulations which will be prepared, maintained and updated by the Director, or his or her designee.

The purpose of the Recycled Water Rules and Regulations is to detail the requirements of the City's recycled water system, namely: this section; the California Code of Regulations Titles 17 and 22; and other State and local rules and regulations related to the use of recycled water as they may be adopted or changed from time to time.

SECTION 6-913. SANCTIONS. Any owner and or operator who violates this Recycled Water Ordinance may, for each day of violation, or portion thereof, be subject to penalties in accordance with Chapter 1, Article 3 of the City Municipal Code.

SECTION 6-914. ENFORCEMENT. Any person, firm, corporation, association, or agency found to be violating any provisions of this section or the terms and conditions of the user agreement, permit or any applicable Federal, State, County, or City statute, regulation, resolution, ordinance or other requirement may be subject to termination of the recycled water service without notice.

SECTION 9-915. CONFLICTING PROVISIONS. In the event of any conflict, between the provisions of the most current version of the Uniform Plumbing Code, and the provisions of this Section, the provisions of this Section shall apply.

SECTION 9-916. SEVERABILITY. If any section, subsection, provision or part of this Recycled Water Ordinance, or its application to any person or circumstance, is held to be unconstitutional or otherwise invalid, the remainder of this Recycled Water Ordinance, and the application of such provision to other

person or circumstances, shall not be affected thereby and shall remain in full force and effect and, to that end, the provisions of this Recycled Water Ordinance are severable.

SECTION 2. This ordinance shall become effective and in full force and effect at 12:01 a.m. on the thirty-first day after its final passage.

* * * * * * * * * * * * * * *

STATE OF CALIFORNIA)
COUNTY OF FRESNO) ss.
CITY OF FRESNO)

I, YVONNE SPENCE, City Clerk of the City of Fresno, certify that the foregoing ordinance was adopted by the Council of the City of Fresno, at a regular meeting held on the _____ day of _____, 2014.

AYES :
NOES :
ABSENT :
ABSTAIN :

Mayor Approval: _____, 2014
Mayor Approval/No Return: _____, 2014
Mayor Veto: _____, 2014
Council Override Vote: _____, 2014

YVONNE SPENCE, CMC
City Clerk

BY:_____
Deputy

APPROVED AS TO FORM:
CITY ATTORNEY'S OFFICE

BY:_____
Brandon M. Collet, Deputy Date

BMC:prn [64611prn/ord] 05-19-14

APPENDIX B
RULES AND REGULATIONS

Rules and Regulations of Recycled Water Use



DEPARTMENT OF
PUBLIC UTILITIES
Providing Life's Essential Services

Wastewater Management Division
5607 W. Jensen Ave
Fresno, CA 93706

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1. Introduction

The City of Fresno owns and operates a Recycled Water Distribution System (Distribution System) providing Recycled Water for approved uses to Recycled Water Customers (Customer) within the Recycled Water Project Area. This document contains the City of Fresno's Rules and Regulations governing the design, construction and use of Recycled Water (Rules and Regulations). These Rules and Regulations aim to provide Customers with necessary information to comply with relevant codes, laws, statutes and regulations concerning the use of Recycled Water.

1.1. Authority and Sources

The Rules and Regulations are prepared and administered by the Department of Public Utilities Wastewater Management Division, and may be updated from time to time. The Rules and Regulations apply to all Customers and distributors of Recycled Water and shall govern the design, construction and use of both the Distribution System operated by the City and On-Site Recycled Water Systems operated by Customers. Since codes, laws, statutes and regulations can change without prior approval or knowledge, the City of Fresno does not assume any liability for errors in this document. It is the responsibility of the Customer to check with the City of Fresno before initiating any changes to their On-Site Recycled Water System. It is the intent of these Rules and Regulations to be consistent with the following criteria:

(a) California Code of Regulations, Title 22, Division 4, Chapter 3 (Water Recycling Criteria).

(b) California Code of Regulations, Title 17, Division 1, Chapter 5 Group 4, Article 1and 2 (General and Protection of Water System).

(c) The State Water Resources Control Board (SWRCB) and its Division of Drinking Water (DDW) Guidelines for Use of Recycled Water, and Guidelines for Use of Recycled Water for Construction Purposes.

(d) American Water Works Association (AWWA) California/Nevada section, Guidelines for the Distribution of Non-Potable Water and Guidelines for Retrofitting to Recycled Water or alternate measures that are acceptable to the DDW.

(e) Applicable regulations by the Regional Water Quality Control Board (RWQCB).

(f) City of Fresno Municipal Code, Chapter 6, Article 3, Sewage and Water Disposal and Article 9, Recycled Water Ordinance.

Interested parties may contact the Wastewater Management Division for copies of documents referenced in these Rules and Regulations.

1.2. Scope and Severability

If any section, subsection, clause or phrase of these Rules and Regulations is determined to be invalid, the remaining portions of these Rules and Regulations shall remain in effect. If there is any conflict between the provisions of these Rules and Regulations and the provisions of any of the referenced documents, the most stringent guidelines will control.

1.3 Planning for Recycled Water Use

The Rules and Regulations outlined in this document provide Recycled Water Customers with information for design, installation, operation and maintenance of an On-Site Recycled Water System. This section provides general information about the City of Fresno's Recycled Water program.

Eligibility to Use Recycled Water.

(a) The Department of Public Utilities shall review the Recycled Water Master Plan and make a preliminary determination whether the current or proposed use of the property requires service with Recycled Water, or facilities designed to accommodate the use of Recycled Water in the future. This determination is based in part on the property's location within the existing or proposed Recycled Water Project Area.[1]

(b) The City of Fresno's Recycled Water Ordinance requires all new construction, existing and future commercial/ industrial facilities to use Recycled Water for landscape irrigation, if available in the Recycled Water Project Area.

(c) Existing sites using Potable Water for irrigation may convert to Recycled Water with approval of the City.

(d) All Recycled Water systems shall be metered separately from the Potable Water supply and must have no Cross Connection to the Potable Water supply.

1.4. Protection of Public Health and the Environment

The use of Recycled Water shall not result in contamination or pollution of any surface water body nor create a hazard that is injurious to public health. The City of Fresno, Fresno County Department of Health, and the DDW may take measures to ensure that a Customer's On-Site Recycled Water System adequately protects public health and the environment. Conditions which may lead to unacceptable public health and environmental hazards include, but are not limited, to:

(a) Cross connections with the potable system or any other water system;

(b) Improper tagging, marking or signage;

(c) Unapproved uses of Recycled Water; and

(d) Recycled Water runoff to a surface water body.

1.5. Approved Uses of Recycled Water

Tertiary disinfected Recycled Water may be used for landscape and agricultural irrigation, impoundments, commercial laundries, cooling towers and other Approved Uses as identified in Title 22, Division 4, Chapter 3, Article 3 Recycled Water Criteria. Moreover, statutes delineating permissible uses of Recycled Water at locations such as

[1] Fresno Municipal Code, Chapter 6, Article 9, Section 6-908

cemeteries and car washes are identified in the Health and Safety Code, Division 8, Part 1, Chapter 4.5 and the Water Code Division 6, Part 2.12 § 10950 – § 10953, respectively.

1.6. Violation of Rules and Regulations

The City may terminate Recycled Water service to a Customer who uses, transports, or stores Recycled Water in violation of these Rules and Regulations. No Customer will create or threaten to create conditions of pollution, contamination, and nuisance or violate discharge requirements prescribed by the RWQCB. Enforcement actions may be initiated against any Customer resulting in potential termination of Recycled Water service. In addition, no person at any time shall tamper with City property except to shut off water to protect public health or prevent damage to property or the environment. Only authorized City personnel may operate City facilities.

The City shall investigate all reports of non-compliance with any provision of these Rules and Regulations and/or the User Agreement to determine the validity and seriousness of the violation. Determinations regarding the seriousness will be based upon the violation's magnitude and duration; effect on public health, the environment, City property or assets, or the operation of the Distribution System; effect on the City's compliance with the Rules and Regulations of the regulatory agencies with which it must in turn comply; and the history and good faith of the Customer.

1.7. Notice of Violation

.

Unless the violation is an emergency, as determined by the City, the Customer will receive a written notice of violation describing:

(a) The nature of the violation;
(b) Requirements for submittal of a corrective action plan;
(c) A reasonable time limit for the satisfactory mitigation of the violation; and
(d) A date for a follow-up inspection.

The Customer may file a notice of appeal within 15 calendar days after notice of violation is received, following the guidelines for filing a notice of appeal and the City shall implement duty of enforcement procedures as defined in Fresno Municipal Code, Chapter 1, Article 4.

For emergencies that result in cross connection of recycled water with potable water, refer to Part 10. Cross Connection, Section 10.3 Emergency Preparedness and Section 10.4 Emergency Cross Connection Procedures.

1.8. User Agreements

Recycled Water shall not be delivered, used, or discharged upon any property or Use Area not owned or controlled by the City unless a non-transferrable User Agreement has been executed between the City and Customer permitting the Customer to receive Recycled Water service.

The site-specific User Agreement will identify the Recycled Water's Use Area, an estimate of the quantity (including seasonal schedule) of Recycled Water to be used, and permitted uses of Recycled Water. User Agreements delineate contractually binding terms associated with these Rules and Regulations. Once executed, the User

Agreement permits use of Recycled Water in accordance with the terms of the User Agreement, these Rules and Regulations, and all applicable local, State and federal regulations, including Title 17 and 22 of the California Code of Regulations, as may be amended from time to time. If an On-Site Recycled Water System is found to be in violation of a City of Fresno Ordinance, the corresponding User Agreement and/or these Rules and Regulations, the City shall implement provisions of Section 1.7. of these Rules and Regulations.

1.8.1. User Agreement Renewal

Upon expiration of the existing User Agreement, customer shall enter into a new agreement for continuation of recycled water services. The new agreement may have additional regulatory requirements, costs, or rates not specified on the original agreement. In the case of change of property ownership and if the new owner desires to continue the recycled water service, a new Recycled Water User Agreement with the new owner will be processed reflecting changes in regulatory requirements, costs or rates not previously specified, if any.

1.9. Conditions Precluding Delivery of Recycled Water

The City has sole discretion and flexibility in scheduling, distributing and prioritizing Recycled Water deliveries, particularly under conditions of insufficient recycled water supply, maintenance of City's treatment or distribution systems, acts of a third party, or order of a Regulatory Agency.

2. Definitions

Whenever the following terms (or pronouns are used in their place) occur in these Rules and Regulations, they will be identified with capitalized initials and their meaning shall be interpreted as follows:

"**Air Gap**" is a physical separation from the free-flowing discharge end of a water supply pipeline and an open or non-pressure receiving vessel. It is generally regarded as the most protective method of backflow prevention. An approved air gap must be at least twice the diameter of the water supply pipeline, measured vertically from the flood rim of the Customer's receiving vessel to the supply pipe from the service connection. In no case shall the air-gap separation be less than one inch.

"**Applicant**" is a potential user requesting Recycled Water services from the City.

"**Approved Uses**" means uses defined by California Code of Regulations, Title 22, Division 4 Environmental Health, Chapter 3 Water Recycling Criteria, Article 3 Uses of Recycled Water.

"**As-Built**" means engineering drawings that depict completed facilities, as constructed or modified.

"**Backflow**" is a condition that results in the flow of water, mixtures or substances into a potable water system from a source other than an approved water supply.

"**City**" means City of Fresno, California.

"**Contamination**" means an impairment of the City's potable water quality resulting from the introduction of sewage, industrial fluids, waste liquids, compounds or other materials

to a degree which creates an actual hazard to public health through poisoning or spread of disease.

"**Cross Connection**" is the unprotected and/or unapproved actual or potential connection between a potable and non-potable water supply. By-pass arrangements, jumper connections, removable sections, swivel or changeover devices through which backflow could occur, shall be considered to be Cross Connections.

"**Cross Connection Control Specialist**" is an individual trained in cross-connection control, establishment of a procedure or system for testing backflow preventers, and maintenance of records of locations, tests, and repairs of backflow preventers.

"**Customer**", "Consumer" or "User" means a person or entity who is the contracted recipient of Recycled Water services owned and operated by the City of Fresno.

Division of Drinking Water ("**DDW**") is a division of the State Water Resources Control Board, formerly California Department of Public Health (CDPH).

"**Dual Plumbing**" means a system that utilizes separate piping systems for Recycled Water and potable water within a facility and where the Recycled Water is used for either of the following: (a) to serve plumbing outlets (excluding fire suppression systems) within buildings or (b) outdoor landscaping irrigation at individual residences.

"**Easement**" means a recorded document in which the land owner gives the City permanent rights to construct and maintain Recycled Water mains and/or facilities across private property.

"**Impoundment**" is a lined structure or a body of water with a lined structure containing Recycled Water, which is used for aesthetic, recreational or irrigation purposes.

"**On-Site Recycled Water System**" means facilities under the control of the property owner, extending from the Recycled Water service connection to the Use Area being serviced with Recycled Water. This includes any on-site distribution plumbing, irrigation systems, industrial processes, impoundments or other approved facilities.

"**Overspray**" means the spray of Recycled Water outside the irrigation area.

"**Pantone**" A color standard system referenced in the American Water Works Association California-Nevada Section Guidelines for Distribution of non-potable water.

"**Ponding**" means the unauthorized retention of Recycled Water in a Use Area for a period following the cessation of approved Recycled Water use activity.

"**Potable Water**" means water which meets the federal, state and local standards for human consumption and is approved for human consumption.

"**Record Drawings**" are the Customer's plans and specifications for the proposed Use Area required by the City's application for Recycled Water Service.

"**Recycled Water**" means non-potable tertiary disinfected water, which as a result of treatment of wastewater is suitable for a direct beneficial use or controlled use that would otherwise not occur, and is therefore considered a valuable resource.

"**Recycled Water Distribution System**" means Recycled Water pipelines, transmission mains, pump stations, storage reservoirs, and appurtenances acquired, constructed and owned by the City and used for the conveyance of Recycled Water between the wastewater treatment plant and the Recycled Water service connections.

"**Recycled Water Project Area**" means those geographical areas identified in the City's Recycled Water Master Plan where the City expects Recycled Water service to be available. Customers within the Recycled Water Project Area are eligible for Recycled Water service for approved uses when it becomes available.

"**Recycled Water Service Connection**" means the point of connection (POC) of the Customer's Recycled Water line with the Recycled Water service line of the City, which shall normally be the downstream end of the Recycled Water meter tailpiece.

"**Recycled Water Site Supervisor**" or "Site Supervisor" is the Customer's liaison with the City regarding Recycled Water matters. This person must have the authority to enforce these Rules and Regulations, be responsible for the operation and maintenance of the On-Site Recycled Water System, must prevent potential violations and submit a Use Area Monitoring Report.

"**Reduced Pressure Principle Backflow Prevention Device**" is a type of backflow prevention device, usually installed near a water meter, which prevents backflow by a combination of two check valves, an automatically operated differential relief valve between the two check valves and a tightly closing shut-off valve on each side of the check valve assembly.

"**Regulatory Agency**" refers to those public agencies legally constituted to protect public health and water quality, and whose rules govern the use of Recycled Water, such as DDW, RWQCB and the Fresno County Department of Public Health.

"**Rules and Regulations**" means the Rules and Regulations for Recycled Water use, distribution and transport within the City of Fresno.

"**Runoff**" means Recycled Water that drains outside the approved Use Area.

"**RWQCB**" means Regional Water Quality Control Board, a subdivision of the State Water Resources Control Board.

"**RWRF**", Fresno-Clovis Regional Wastewater Reclamation Facility.

"**SWRCB**", State Water Resources Control Board

"**Use Area**" means an area of Recycled Water use with defined boundaries. A Use Area may contain one or more facilities.

"**Water Recycling Criteria**" - the State of California's set of requirements for the implementation of Recycled Water programs as detailed in the California Code of Regulations, Title 22, Division 4, Chapter 3.

3. General City Responsibilities

The City shall be responsible for all aspects of the treatment, distribution system and quality of Recycled Water. City responsibilities shall include:

(a) Observe and permit installation, connection, and disconnection of Recycled Water service, including, piping, valves and other appurtenances required to connect the City's Recycled Water Distribution System to an On-Site Recycled Water System. The service includes a Recycled Water Meter(s) to measure Recycled Water consumption at the Use Area.

(b)). Ensure users follow the City of Fresno Public Works Standard Specifications, Section 33, Recycled Water Facilities Design Criteria and Section 34, Recycled Water Facilities. [2]

(c) Manage and supervise remergency and non-emergency conversions from a Recycled Water supply at a Use Area back to a Potable Water system and viceversa. This can happen if delivery of recycled water is precluded for reasons beyond the reasonable control of the City including, but not limited to insufficient recycled water supply, maintenance of City's treatment or distribution systems, acts of a third party, or an order from a Regulatory Agency..

(d) Conduct the initial and final inspections of the Use Area as part of the Customer's process for utilizing recycled water.

(e) Monitor the Customer's Recycled Water management practices.

(f) Collect fees from Customers Recycled Water use and related services, as designated in the Master Fee Schedule, when such fees are developed.

(g) Agents of the City, RWQCB, or DDW may enter and inspect the Use Area during reasonable hours, upon providing credentials and with 24 hours advance notice or such notice as required by law, for the purposes of verifying that Customer is complying with these Rules and Regulations and to protect public health and the environment.

(h) The City shall not be responsible for abatement of Cross Connections within a Customer's premises.

4. General Customer Responsibilities

Recycled Water Customers must comply with and enforce all aspects of these Rules and Regulations upon accepting Recycled Water service and finalizing the User Agreement. Customer responsibilities include but are not limited to the following:

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[2] City of Fresno Public Works Standard Specifications, Addendum No. 4, Resolution No.70-36, Sections 33. Updated version approved January 2013.

(a) Understanding that all Approved Uses of Recycled Water for the permitted Use Area are exclusively for non-potable uses as identified in Title 22, Division 4, Chapter 3, Article 3. Water Recycling Criteria

(b) Obtaining all permits necessary to install, operate and maintain the On-Site Recycled Water System.

(c) Granting the City an easement for construction of the Recycled Water Service Connection if the City decides to make provisions for delivery of Recycled Water to the proposed Use Area.

(d) Paying for, furnishing, installing, operating and maintaining all facilities necessary for conveyance of Recycled Water from the point of connection (beginning at a flow control valve adjacent to, and following the water meter assembly) to the On-Site Recycled Water System, in a manner consistent with these Rules and Regulations and without harming or damaging any person or property.

(e) Identifying and labeling all facilities associated with the On-Site Recycled Water System according to the type of water in each system.

(f) Paying to install, connect and/or disconnect from the Recycled Water Service Connection in a manner ensuring no Recycled Water enters the Potable Water system.

(g) Paying for, and furnishing, all necessary modifications to the On-Site Recycled Water System such as sprinkler changes, quick-coupler modifications or installations, modifications to prevent unauthorized discharges and additional requirements related to new or expanded systems (see Section 6).

(h) Providing the City a written notification, in a timely manner, specifying any material change or proposed change in the character of the use of Recycled Water.

(i) Ensuring all materials used in operating and maintaining the On-Site Recycled Water System are approved/recommended for Recycled Water use.

(j) Adhering to Use Area management practices as described in Section 7.

(k) Submitting an Annual Self Inspection Report (Exhibit B); arranging and paying for a third party Cross Connection inspection once every four years using the Cross Connection Control Test Procedures outlined in Exhibit C.

(l) Designating a Recycled Water Site Supervisor who is responsible for the On-Site Recycled Water System at each Use Area under their control (see Section 5).

5. Site Supervisor Responsibilities

The Recycled Water Site Supervisor is responsible for the On-Site Recycled Water System at each Use Area under their control. The Site Supervisor is responsible for proper installation, operation, and maintenance of the irrigation system; compliance with

these Rules and Regulations, prevention of potential hazards and preservation of the Recycled Water distribution system plans in “as built” form. Specific responsibilities include but are not limited to the following:

(a) Avoiding Cross Connections when installing, operating and maintaining pipelines, equipment and appurtenances associated with On-Site Recycled Water Systems.

(b) Attending all Cross Connection tests.

(c) Knowing and understanding the provisions of Title 17 and the Water Recycling Criteria relating to the safe use of Recycled Water; understanding basic concepts of backflow and Cross Connection prevention, system testing and related emergency procedures.

(d) Maintaining a copy of these Rules and Regulations, irrigation system layout map and a Recycled Water system operations manual at the Use Area. These documents shall be available to operating personnel at all times.

(e) Ensuring Recycled Water signs are fully legible and displayed at all irrigation sites, particularly areas with greater visibility and public use.

(f) Training Use Area personnel on the Approved Uses of Recycled Water.

(g) Providing the City with updated contact information of the supervisor and/or a designee to ensure operational and maintenance issues receive prompt attention.

(h) Conducting a required annual self-inspection of the Use Area and submitting a monitoring report to the City (see Appendix A).

(i) Coordinating a Cross Connection test by a third party every four years and ensuring the City receives documentation following the test.

(j) Establishing and maintaining a record of all inspections, modifications, maintenance, employee trainings, permit documents, and communications with the City and other Regulatory Agencies.

(k) Reporting all violations and emergencies to the appropriate Regulatory Agency.

5.1. Changing the Recycled Water Site Supervisor

The Customer must immediately notify the City of any personnel changes relating to the Recycled Water Site Supervisor position. In the event of any change, the new Site Supervisor must attend a Recycled Water Site Supervisor Certification Workshop within 90 days of the position change. Failure to attend this workshop may result in termination of Recycled Water service.

5.2. Recycled Water Site Supervisor Training

The Site Supervisor must attend a Supervisor Certification Workshop as recommended by the DDW and provided by the City, within the first 120 days of receiving Recycled

Water service. Failure to attend the Site Supervisor Certification Workshop may result in the termination of Recycled Water service.

6. Facility Requirements

This section specifies the Rules and Regulations governing the design, installation and inspection of new and existing Recycled Water irrigation systems. Additionally, this section also covers the required Rules and Regulations governing design requirements at the service connection and on-site requirements for piping depth, separation requirements, vertical separation at crossings, pipe class specifications and depth of cover consistent with Title 22, Division 4, Chapter 16, Article 4 § 64572.

6.1. Design Requirements at the Service Connection

Each Recycled Water Service Connection will be equipped with a valve on both sides of, and adjacent to, the meter assembly. The valve on the inlet side of the meter assembly will be owned and maintained by the City and shall be used by the City to control the water supply through the meter assembly. The valve on the outlet side of the meter assembly will be owned and maintained by the Customer and shall be used by the Customer to control the flow of Recycled Water to the Use Area. City ownership and maintenance responsibilities of the service connection include the meter assembly and terminate at, and does not include, the valve on the Customer's side of the meter assembly.

(a) Air gap

If conveyance of Recycled Water is carried out with existing plumbing, Potable Water service will be disconnected from the On-Site Recycled Water System and an above-ground air gap will be installed. The air gap will be spaced so that a Reduced Pressure Principle Backflow Prevention Device may be installed by the City in the future.

(b) Future Connections

In the event of potential Recycled Water service interruption or failure, Customers may connect the On-Site Recycled Water System to the previous Potable Water supply provided that (a) Recycled Water supply is disconnected from the On-Site Recycled Water System and (b) a Potable Water service point is configured to allow for future connections.

6.2. Required Temporary Connection to Potable Water Service

Each On-Site Recycled Water System must pass a Cross Connection test prior to receiving Recycled Water. To facilitate this, the On-Site facility must be supplied with water via a temporary supply pipe to an on-site Potable Water system up to and during the Cross Connection test. After passing the test, the temporary supply connection must be removed and the system connected to the Recycled Water meter. On-Site Recycled Water Systems with no Potable Water within the Use Area, such as some streetscapes and medians, do not need to conduct a Cross Connection test and therefore do not need a temporary Potable Water source.

6.3. Conversion of Facilities

(a) Conversion from Potable to Recycled Water Use

No existing Potable Water facility shall be converted to, or incorporated into, a Recycled Water facility without proper testing and approval by the City. With the exception of pipe identification and pipe separation, On-site Recycled Water Systems for which the existing buried piping system is converted from Potable Water to Recycled Water must meet the same requirements as new facilities. However, any new buried piping added to existing piping at a converted Use Area must meet the identification and separation requirements for new systems. In addition, any existing piping uncovered for any reason during construction must be marked according to new pipe identification requirements to the extent feasible. Prior to the conversion of an existing Potable Water system to Recycled Water use, the Customer shall, at a minimum, submit Record Drawings and a report outlining the measures necessary to bring the system into full compliance to the City for review and approval.

(b) Conversion from Recycled to Potable Water Use

If the City determines it is necessary to convert Recycled Water facilities to Potable Water use, it shall be the responsibility of the Customer, at the Customer's cost and expense, to implement the following, as determined by the City:

(i) Notify DDW of the intention to return to Potable Water use.

(ii) Arrange to have the City disconnect and plug the Use Area Recycled Water Service Connection in a manner approved by the City.

(iii) Shock the On-site Recycled Water System to be converted with 50 ppm of chlorine for 24 hours.

(iv) Measure the chlorine residual after 24 hours. If a residual greater than 25 ppm is maintained, then continue to the next step. If the residual is below 25 ppm, then re-chlorinate by returning to the previous step until the chlorine residual can be maintained above 25 ppm.

(v) Flush the On-site Recycled Water System with Potable Water and perform a standard bacteriological test. The final test results must be acceptable to the City before supplying the former On-site Recycled Water System with Potable Water.

(vi) Install and test approved backflow prevention assemblies on all Potable Water meter connections as required by Cross Connection requirements.

(vii) Remove all Recycled Water quick-couplers.

(viii) Notify all Use Area personnel of the change.

(ix) Remove all Recycled Water warning labels/signs from the On-site Recycled Water System and the Use Area.

(x) Notify DDW both prior to and upon completion of conversion back to Potable Water.

6.4. Recycled Water Piping Requirements

Construction of Recycled Water mains, facilities and appurtenances within the Recycled Water Project Area shall comply with design requirements as identified in the City's Standard Specifications.[3] The specifications also include identification requirements for piping, valve boxes, quick couplers, sprinkler heads, signage boards and specifications for pipe sizing, depth, materials, identification tags and service assemblies. The "California Waterworks Standards" set forth minimum separation requirements for Recycled Water and water main lines. Refer to Title 22 California Code of Regulations § 64572 for specific horizontal and vertical separation distances between potable and recycled water lines.

7. On-Site Recycled Water Systems

The following requirements shall be met for new On-Site Recycled Water System facilities. Before Recycled Water is delivered to a Use Area, the site shall be assessed and retrofitted, as necessary, by the Customer in order to meet the requirements of this subsection. Customers shall furnish, install, operate, and maintain all On-site Recycled Water Systems and appurtenances necessary to convey water from the valve immediately following the meter assembly to the approved Use Area in a manner that does not harm or damage any person or property. Refer to Sections 5 and 6 for general City and Customer responsibilities regarding On-Site Recycled Water Systems. Plans, specifications and drawings of On-Site Recycled Water Systems shall be submitted to and approved by the City prior to construction.

7.1. Signage

All Use Areas that are accessible to the public shall be posted with conspicuous signs, not smaller than 4 inches by 8 inches in area and showing an international symbol for Non-Potable Water. The lettering on the signs must be a minimum of ½ inch in height and must be back or white on a purple background (See figure 1 for an acceptable symbol). The signs must read "Recycled Water—Do Not Drink" in English, Spanish ("Agua Reciclada—No Beber") or any additional language that may be needed to reach the population or workers in the area using recycled water The User will be responsible for posting signs in all Use Areas visible to the public (such as site entrances), and at all valves, control boxes, and similar features. Use Areas that are prone to vandalism may place Recycled Water signage at higher elevations to avoid tagging, theft, and property damage.

Recycled Water signage may also be posted at any points where after-market clip-on purple rings are used for head identification of pop-up sprinklers, rotary sprinklers and shrub riser sprinklers.

7.2. Irrigation Requirements

Operation of all On-Site Recycled Water Systems shall comply with the Use Area irrigation requirements defined in Title 22 Code of Regulations, Division 4, Chapter 3, Article 4, § 60310.

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[3] City of Fresno Public Works Standard Specifications, Addendum No. 4, Resolution No.70-36, Sections 33 and 34. Updated version approved January 2013.

8. Department of Transportation

In cooperation with the City, the California Department of Transportation (Caltrans) shall permit the City to place transmission lines for Recycled Water in freeway rights-of-way to promote the beneficial use of Recycled Water so long as transmission does not unreasonably interfere with use of the freeway or unreasonably increase any hazard to vehicles on the freeway. Caltrans shall require the use of Recycled Water for irrigation of freeway landscaping as identified in Streets and Highways Code, Division 1, Chapter 1, Article 1, § 92.3.

9. Recycled Water Fill Stations

Residential and commercial Customers may collect bulk supply of recycled water at City-designated areas to offset potable water uses by agreeing to the terms and conditions of the user agreement for fill station Customers (Exhibit E). Residential Customers may collect up to 300 gallons per load and commercial users may collect 300 gallons or more per load.

10. Cross Connection

IMPORTANT: No physical connection shall be made or allowed between any Recycled Water system and any potable water system.

10.1. General City Responsibilities

(a) The City shall implement a Cross Connection control program as required by all provisions of Title 17, Division 1, Chapter 5, Group 4, Article 1, § 7584.

(b) The Cross Connection control program may be implemented directly by the City or by means of a contract with the local health agency, or with another agency approved by the health agency.

(c) The Cross Connection control program shall include the provision of at least one Cross Connection Control Specialist trained in cross-connection control to carry out the cross-connection program, the establishment of a procedure or system for testing backflow preventers, and the maintenance of records of locations, tests, and repairs of backflow preventers.

(d) The City is not responsible for abatement of Cross Connections which may exist within a Customer's Use Area.

(e) The City shall evaluate the degree of potential health hazard to the public water supply that may be created as a result of special conditions existing in a Use Area as identified in Title 17, Division 1, Chapter 5, Group 4, Article 1, § 7585.

10.2. General Customer Responsibilities

(a) The Customer must pass a Cross Connection test before connecting the On-Site Recycled Water System to the Distribution System at any Use Area that uses both recycled and potable water.

(b) The following elements are required for a Cross Connection test. See Exhibit C for specific Cross Connection Testing Procedure.

(i) The Customer must notify the City at least 48 hours prior to the test so that a City representative is present.

(ii) The test must be done once every four years under the supervision of the City and performed by an AWWA-certified Cross Connection Control Specialist.

(iii) The Recycled Water Site Supervisor must be present at the test.

(iv) A written report documenting test results must be submitted by the Cross Connection Control Specialist to the Recycled Water Site Supervisor and the City following test completion.

10.3. Emergency Preparedness

In case of earthquake, flood, fire, major freeze, nearby construction, or other incident that could damage the Recycled Water or Potable Water systems, the Site Supervisor must inspect all Potable Water systems and the On-site Recycled Water System for damage as soon as it is safe to do so. If either system appears damaged, both systems should be shut off at their points of connection. The Site Supervisor must immediately contact the City for further instruction.

To prevent contamination, damage, or a public health hazard, the Customer may make emergency modifications or repairs without the prior approval of the City. As soon as possible after the modification, but within 24 hours, the Customer must notify the City of the emergency modifications and file a written report within three days.

10.4. Emergency Cross Connection Procedures

In the event that a Cross Connection occurs or is identified, the following emergency Cross Connection response plan shall be implemented:

(a) The Customer must notify the City by telephone immediately. This notification must be followed by a written notice within 24 hours that includes an explanation of the nature of the Cross Connection, date and time discovered, and the contact information of the person reporting the Cross Connection if different from the Recycled Water Site Supervisor.

(b) The City will notify DDW and other Regulatory Agencies, as appropriate, of the reported Cross Connection.

(c) Customer must immediately shut down the Recycled Water supply to the On-site Recycled Water System.

(d) Customer must keep Potable Water systems pressurized and post “Contaminated Water – Do Not Drink or Apply to Food” signs at all Potable Water fixtures and outlets.

(e) Customer must provide bottled water for employees until the Potable Water system is deemed safe to drink.

(f) After DDW has provided final approval, the City will reestablish the Recycled Water service and inform the Customer to remove "Contaminated Water – Do Not Drink or Apply to Food" signage at Potable Water fixtures and outlets.

11. Backflow Prevention

Customers shall be responsible for ensuring that all Potable Water services into Use Areas are fitted with a Reduced Pressure Principal Backflow Prevention Device if one does not already exist. The backflow prevention device must be located as close as practical to the downstream side of every Potable Water meter. Backflow prevention devices must be properly maintained and tested by the User at least annually. Backflow protection is usually not necessary on Recycled Water irrigation systems as Recycled Water is non-potable. However, the City may require certain sites to install backflow prevention devices at the service connection if it is determined that a potential on-site backflow hazard exists; this protects the quality of Recycled Water in the Distribution System. Examples include:

(a) Irrigation systems that are installed with direct injection chemical fertilizer capability; and
(b) Irrigation sites where Recycled Water impoundment may cause a backflow hazard.

Refer to Title 17, Division 1, Chapter 5, Group 4, Article 2, § 7601 - § 7605 for requirements on construction and type of backflow preventers, feasible locations, and type of protection required.

12. Obtaining Recycled Water Service

12.1. Request for Service

Potential customers requesting recycled water service shall contact the Department of Public Utilities who will determine if the customer's proposed area is in an area where Recycled Water is or will be available. If in the area where Recycled Water is or will be available, Customer will be provided an "Application for the use of Recycled Water" form (Exhibit A) which should be filled out and returned to the City for process. Prior to receiving Recycled Water service, any proposed use of Recycled Water not listed on Title 22, Uses of Recycled Water, will be required to be approved by DDW.

12.2. Proposed Site Assessment and Inspection

Upon receipt of Application and before the On-Site Recycled Water System is connected to the Distribution System, the proposed Use Area will be inspected and an assessment will be made by the City for locations of potential Ponding, Runoff, Overspray, and other concerns. The City will indicate how the On-site Recycled Water System needs be designed in order to address potential violations of these Rules and Regulations.

12.3. Design Approval

Prior to constructing or modifying On-Site Recycled Water Systems, draft Record Drawings prepared by the Customer must be approved by the City. The Customer must meet all applicable design requirements for the Use Area to comply with these Rules and Regulations. The Customer shall submit to the City plans for the On-Site Recycled Water System utilizing City Standard format. No work shall begin by the Customer until plans and necessary permits have been approved and issued by the City.

12.5. Acceptance Inspection

(a) Construction Inspection. The City will inspect Use Areas undergoing construction to incorporate On-Site Recycled Water Systems and appurtenances in conformance with the approved Record Drawings and applicable regulations. It is the responsibility of the Customer to notify the City of all planning and construction phases so that inspections can be scheduled.

(b) Cross Connection Test. Any Use Area where both Recycled and Potable Water are present shall pass a Cross Connection test prior to connecting the On-Site Recycled Water System to the Distribution System. Refer to section 11 and Appendix B for all Cross Connection requirements.

(c) Final Inspection and Approval to Receive Recycled Water. The City will perform a final inspection to ensure all requirements have been met prior to establishing Recycled Water service. This inspection may be coordinated with the Cross Connection test. The inspector will check to see that the proper equipment was used and that all required tags, labels, and signs are in place. The City must grant final approval before Recycled Water may be supplied to the Use Area. Final approval will be granted when construction has been completed in accordance with approved Record Drawings, all Cross Connection tests have been performed, a final on-site inspection has been conducted, and all requirements have been met satisfactorily. After the User Agreement is finalized by the City and all applicable fees have been paid, the City will finalize the installation of the service connection with the service meter assembly. Upon request, DDW will be provided with a copy of all test and inspection reports as well as notification that Recycled Water service has started. For the lifetime of the On-site Recycled Water System, the City will periodically inspect the Use Area to ensure compliance with all applicable Rules and Regulations.

12.6. Coverage Test

Customers are responsible for minimizing Overspray, Runoff, and Ponding from their On-site Recycled Water System. The City will conduct an inspection of the On-site Recycled Water System; the Customer must contact the City to schedule a coverage test walk-through of the system. The Recycled Water Site Supervisor must be in attendance. All modifications to the system are the responsibility of the Customer, and the Customer must pay all costs associated with such modifications.

12.7. Metering

All Recycled Water use shall be metered, and all Recycled Water used on any Use Area where a meter is installed must pass through said meter. Users shall be held responsible, and charged, for all Recycled Water passing through the meter(s), unless otherwise specified by the City.

12.8. Record Drawings

Customers must provide Record Drawings of the On-Site Recycled Water System to the City within 90 days of receiving Recycled Water. Record Drawings must indicate any and all changes in the work involving departures from the original contract drawings, including those involving both constant pressure and intermittent-pressure lines and appurtenances. Changes must be approved by the City before the Customer implements the changes in the construction contract. Exhibit D provides a list of required information when submitting Record Drawings12.9. Fees and Charges

The Customer shall pay all fees and charges for the use of recycled water and other related charges based upon the actual use of recycled water by the Customer, in the amount designated in the City's Master Fee Schedule when such a fee is developed.

12.10. Disputed Recycled Water Bills

Any dispute over the accuracy of a Recycled Water bills shall be governed byFresno Municipal Code (FMC) Article 1 – Billing and Collection Procedures for Municipal Utility Services, Section 6-104 (h)

12.11. Non-Registering Recycled Water Meter

When a meter is found to be out of order, the charge for Recycled Water will be governed FMC Article 1 – Billing and Collection Procedures for Municipal Utility Services, Section 6-104 (j)

13. Service Termination

13.1. Turn-off at User's Request

A Customer may request that service be discontinued, either temporarily or permanently, by giving at least 30 days' advance notice to the City. The User assumes full responsibility for all meter and usage charges incurred from the effective date of service until User notifies the City to discontinue service.

13.2. Turn-off by the City

The City may discontinue a Customer's service for any of the following reasons:

(a) Non-Payment of Bills. Service may be discontinued for nonpayment of any water charges by a User, subject to the terms of the User Agreement.

(b) Non-Compliance. Service may be discontinued for non-compliance with the terms and conditions of the User Agreement or these Rules and Regulations, as specified in the User Agreement.

(c) Water Quality. Service may be discontinued if, at any point in the City's Distribution System, the Recycled Water does not meet the quality requirements of the City or a Regulatory Agency. Service would, in such case, be restored at such time as Recycled Water again meets the quality requirements or at such time as the City supplements the Recycled Water system with water from other sources.

(d) Non-Compliance with Regulations. Service may be suspended or terminated in the manner provided herein at any time the Customer's operations do not conform to these Rules and Regulations as determined by the City in its sole discretion. Where safety of water supply or public health is endangered, or Regulatory Agency regulations have been violated, service may be suspended immediately without notice. Otherwise, all defects noted shall be corrected within the period of time specified by the City.

(e) Waste of Water. In order to protect against serious and negligent waste or misuse of Recycled Water, the City may provide notice of such waste and suspend service if such wasteful practices are not remedied after notice to such effect has been given to the Customer.

(f) Unauthorized Use of Recycled Water. When the City has discovered an unauthorized use, the service may be suspended without notice.

13.3. Re-Establishment of Service

The City shall have the right to refuse to re-establish service following termination of service for violation of these Rules and Regulations or the terms of a User Agreement. If a Customer desires to re-establish service following the termination of Recycled Water service, the City may renew the original User Agreement, with modified terms and conditions to achieve compliance with these Rules and Regulations or terms of the User Agreement. . Any restoration of recycled water service to the Use Area that is desired by the Customer shall be the responsibility of the Customer and shall be at no cost to the City.

Exhibit A

APPLICATION FOR USE OF RECYCLED WATER

1. Customer Name:
2. Address:
3. Use Area Property Manager:
4. Property Manager Email:
5. Property Manager Telephone number:
6. Name of Recycled Water Site Supervisor:
7. Recycled Water Site Supervisor Telephone number:
8. Complete the following information for the Use Area:

    Use Area APN:
    Use Area Address:
    Total Irrigated Area (Acres):
    Estimated Recycled Water Demand:
    Method of irrigation:
    Type of plant material present:
    Type of Recycled Water use: ☐Landscape Irrigation
    ☐Agricultural Irrigation
    ☐Impoundments
    ☐Other:
    Public access to the Use Area is: ☐Unrestricted ☐Restricted
    Number of outdoor drinking fountains in the Use Area:
    Number of outdoor eating areas in the Use Area:
    Number of domestic wells in the Use Area:
    Number of impoundments in the Use Area (if any, briefly describe):

For City of Fresno Use Only:

9. Check list of items required for obtaining Recycled Water service:

    ☐ The Customer and the City have determined that the Use Area is eligible to be served with Recycled Water.

- ☐ The Customer has submitted Exhibit A – Application for the Use of Recycled Water. Application received on:
- ☐ The City has reviewed the application.
- ☐ The City has assessed the Customer's on-site irrigation system and provided a description of required improvements. Assessment performed on:
- ☐ The City has approved the plans and retrofit/construction schedule prior to retrofit/construction.
- ☐ The Customer has constructed/retrofitted the On-Site Recycled Water System.
- ☐ The City has reimbursed the Customer for required improvements as recommended by the on-site assessment.
- ☐ The Customer has submitted "as-built" drawings to the City for record, including all remaining information requested by Exhibit B.
- ☐ The City has performed the final on-site inspection and approval, as specified in Exhibit C.
- ☐ The Customer has signed a Recycled Water User Agreement.
- ☐ The City initiates Recycled Water service. Date:
- ☐ The City confirms service to DDW.
- ☐ The City documents Recycled Water Site Supervisor training.

10. Description of on-site assessment and required improvements:

Exhibit B

USE AREA MONITORING REPORT

City of FRESNO

Department of Public Utilities

Wastewater Management Division
5607 W. Jensen Ave
Fresno, CA 93706-9458
559-621-5100—FAX 559-498-1700
www.fresno.gov

PART 1 - ANNUAL INSPECTION

1. **Site Name**:

2. **Site Address**:

3. Indicate regular hours of irrigation system operation:
   From: Choose an item. **To**: Choose an item.

If you answer yes to any question from 4 to 11 list the corrective action in each case.

4. Is there evidence of runoff Recycled Water from the site? Show affected area(s) on a sketch. Fax sketch to (559) 498-1700, Attn: Reclamation Coordinator.

   ☐**Yes** ☐**No**
   Corrective Action:

5. Is odor of wastewater origin emanating from the irrigation site? If present, indicate apparent sources, characterization, and direction of travel.

   ☐**Yes** ☐**No**
   Corrective Action:

6. Is there evidence of ponding of Recycled Water, and evidence of mosquitoes breeding within the irrigation area due to ponding?

   ☐**Yes** ☐**No**
   Corrective Action:

7. Are warning signs, tags, stickers and above-ground pipe markings properly posted to to inform the public that Recycled Water is being used for irrigation, which is not suitable for drinking?

☐**Yes** ☐**No**
Corrective Action:

8. Is there evidence of plugged, broken, or otherwise faulty drip irrigation system emitters, valves, or sprinklers?

   ☐**Yes** ☐**No**
   If yes, indicate which apply:

   ☐Pop-up repair Date: Click here to enter a date.
   ☐Rotor repair Date: Click here to enter a date.
   ☐Nozzle replacement Date: Click here to enter a date.
   ☐Lateral repair Date: Click here to enter a date.
   ☐Main-line repair Date: Click here to enter a date.
   ☐Quick coupler repair Date: Click here to enter a date.
   ☐Other Date: Click here to enter a date.

9. Are the irrigation controls working properly?

   ☐**Yes** ☐**No**
   Corrective Action:

10. Is there evidence of direct spraying of Recycled Water on drinking water fountains, passing vehicles, buildings, and food facilities?

    ☐**Yes** ☐**No**
    Corrective Action:

11. Has there been any construction or have there been any modifications done on the property within the last six months? If yes, please explain.

    ☐**Yes** ☐**No**
    Explanation:

PART II - RECYCLED WATER SITE SUPERVISOR SIGN OFF

I, _____, certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, and accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and/or disconnection of Recycled Water service."

☐ By checking this box, I have read and agree to the statement above.

Name of Recycled Water Site Supervisor:

Date: Click here to enter a date.

PART III – CHANGE OF ON-SITE SUPERVISOR, OWNERSHIP OR MANAGEMENT

If the on-site supervisor, property ownership or management has changed since the last inspection, fill out the following change of information:

New Owner/Management:

Address:
Street Name

City: **State**: **Zip**:

Email: **Phone**:

New On-Site Supervisor:

Address:
Street Name

City: **State**: **Zip**:

Email: **Phone**:

PART IV – SAVE, PRINT AND SUBMIT

Save, Print and Submit form:

Attn: Reclamation Coordinator
Fresno-Clovis Regional Reclamation Facility
5607 W. Jensen Ave
Fresno, CA 93706

Or fax to: (559) 498-1700, Attn: Reclamation Coordinator

Exhibit C
CROSS CONNECTION TEST PROCEDURE

The following is the required methodology for conducting Cross Connection control tests in Use Areas having both Recycled Water and Potable Water service. An AWWA-certified Cross Connection Control Specialist must perform the test using equipment dedicated for use with Recycled Water. Backflow testing equipment used for Recycled Water must not be reused on Potable Water systems.

Cross Connection Control Test Part 1

The Potable Water system shall be activated and pressurized. The On-Site Recycled Water System shall be shut down at its point of connection to the Distribution System and depressurized – this is usually done by manually bleeding a control valve or quick-coupling valve located in the lowest elevation of the On-Site Recycled Water System.

(a) The Cross Connection Control Specialist will specify the amount of time that the Potable Water system shall remain pressurized while the On-Site Recycled Water System is depressurized. The size and complexity of the Potable Water and On-Site Recycled Water System will determine the minimum amount of time the On-Site Recycled Water System is to remain depressurized.

(b) All On-Site Recycled Water System control valves, quick-coupling valves, irrigation systems and impoundment inlets shall be tested and surveyed for flow. If the On-Site Recycled Water System is shut down at its point of connection to the Distribution System, then continuous flow from any part of the On-Site Recycled Water System indicates a Cross Connection.

(c) All water fixtures using Potable Water (hose bibs, faucets, drinking fountains, urinals, decorative fountains) shall be tested and surveyed for flow. No flow from Potable Water outlets indicates that it may be connected to the On-Site Recycled Water System and therefore constitutes a Cross Connection to be remedied.

(d) Use Areas where no Cross Connections have been identified may proceed to part 2 of this test. If any Cross Connections are discovered, they must be disconnected and the Use Area must be re-inspected by an AWWA-certified Cross Connection Specialist per these procedures, beginning with Part 1 of the Cross Connection Control Test.

Cross Connection Control Test Part 2

(a) The Potable Water system shall be shut down at its point of connection (usually the City-controlled valve immediately preceding the meter assembly) and depressurized. For multistory buildings, the Cross Connection Control Specialist will determine the amount of pressure to be reduced and monitored with a gauge installed at a low point of elevation in the Potable Water System.

(b) The On-Site Recycled Water System shall then be activated and pressurized.

(c) The Cross Connection Control Specialist shall specify the minimum amount of time to pressurize the On-Site Recycled Water System while the Potable Water system is depressurized (or in the case of multistory buildings remains in a state of reduced pressure). The minimum amount of time the Potable Water system is

to remain depressurized shall be determined by the Cross Connection Control Specialist.

(d) All water fixtures using Potable Water (hose bibs, faucets, drinking fountains, urinals, decorative fountains) shall be tested and surveyed for flow. If the Potable Water System has been shut down at its point of connection, then continuous flow from any part of the Potable Water system indicates a Cross Connection. Potable Water fixtures in multistory buildings may be inspected in combination with a pressure gauge, or the pressure gauge may be used instead of testing all fixtures. If the Potable Water system has truly been shut down at its point of connection, an increase in pressure viewed at the gauge over a period of time specified by the Cross Connection Control Specialist indicates a Cross Connection with the Recycled Water System.

(e) All On-Site Recycled Water System control valves, quick-coupling valves, and any other approved Use Area facilities (such as supply lines to impoundments) shall be tested and surveyed for flow. No flow from any On-Site Recycled Water System control valve, quick-coupling valve or Recycled Water fixture indicates a likely connection with the Potable Water system, and therefore constitutes a Cross Connection to be remedied.

(f) If no Cross Connections are identified, then the Potable Water system shall be re-pressurized. If any Cross Connections are discovered, the On-Site Recycled Water System must be re-inspected by a Cross Connection Control Specialist according to these procedures, beginning with part 1 of the Cross Connection Control Test.

(g) The Cross Connection Control Specialist performing the foregoing tests must report the results and return it to the Department of Public Utilities, Wastewater Management Division.

Exhibit D

REQUIRED INFORMATION FOR RECORD DRAWINGS

Customers shall submit draft Record Drawings during the process for obtaining Recycled Water service and then provide final as-built Record Drawings upon completion of all modifications to the On-Site Recycled Water System(s) and Potable Water System(s). Applicants shall submit drawings of each Use Area on 8½" x 11", 11" x 17" or 24" x 36" sheets of paper which shall include a signature line for the Department of Public Utilities approval.

Sheet 1

☐ Location and vicinity map including surrounding land use and adjacent streets demarking the Recycled Water Use Area.

Sheet 2

☐ Specific Potable Water irrigation use areas (if applicable).
☐ Location of Potable Water main lines, ancillary lines, gate valves, controllers, drinking fountains, and supply facility.
☐ Location and size of Potable Water service connections.
☐ Location and size of existing and future Recycled Water service connections.
☐ Location of all On-Site Recycled Water System distribution lines, gate valves, master valves, pressure regulating valves, and other associated facilities. Exception: Although it may not be possible to show the location of all water pipelines for existing irrigation systems converting to Recycled Water, all locations where future Recycled Water piping must be separated from the Potable water piping must be clearly indicated on the plans.
☐ Location of any other piping network piping, gate valves, strainers, controllers, and supply facilities, specifically all backflow prevention devices for Potable Water systems.
☐ Where applicable, indicate that the separation between Potable and Recycled Water lines meets minimum requirements. Also show sleeving and other cross-connection prevention measures where applicable.
☐ Areas of public access on the Use Area.
☐ Location of domestic wells on or within 100 ft. of the Use Area.
☐ Location of any lakes, ponds, reservoirs, or other impoundments located within the Use Area or within 100 feet of the Use Area, and indicate the type of water source.
☐ Location of Recycled Water signage on the Use Area.
☐ Location of foundations, buildings, structures, and public facilities with either Recycled or Potable Water service. Public facilities include, but are not limited to

drinking fountains, outdoor eating areas, restrooms, snack bars, swimming pools,
wading pools, decorative fountains and showers. Include the pipelines feeding all
of these facilities.

☐ Any other features known or considered to be important to the on-site use of Recycled Water.

☐ Depiction of any other applicable On-Site Recycled Water System components
as required by the Rules and Regulations.

☐ Include the Standard Notes specified by the City.

<u>Sheet 3</u> (if applicable)

☐ Construction details of any domestic well within 100 feet of the Use Area.

Exhibit E
FILL STATION APPLICATION FORM

City of FRESNO
Department of Public Utilities

Wastewater Management Division
5607 W. Jensen Ave
Fresno, CA 93706-9458
559-621-5100—FAX 559-498-1700
www.fresno.gov

DEPARTMENT OF PUBLIC UTILITIES
Providing Life's Essential Services

Recycled Water Use Application and Agreement for Fill Station Customers

Customer Information:

Customer Name:

Customer Street Address:

City:

Zip Code:

Customer Phone:

Your Water Provider:

Phone:

Email:

Type of Customer: Residential (up to 300 gallons per load)
Commercial (300 gallons and more per load)

Vehicle Information

Please provide the following information for all vehicles collecting recycled water:

1. Vehicle A License Plate Number:

Does Vehicle A have valid insurance and registration?

What is the automobile insurance expiration date for Vehicle A?

2. Vehicle B License Plate Number:

Does Vehicle B have valid insurance and registration?

What is the automobile insurance expiration date for Vehicle B?

3. Vehicle C License Plate Number:

Does Vehicle C have valid insurance and registration?

What is the automobile insurance expiration date for Vehicle C?

Recycled Water Use Information

From the list below, select all applicable uses of Recycled water:

☐ Dust control

☐ Irrigation of trees, landscaping and gardens

☐ Vehicle Washing

☐ Soil compaction

☐ Washing of hard surfaces such as paths, walls, windows

☐ Other:

Specify the street address, City and zip code where recycled water will be used:

Location A:

Location B:

Location C:

Frequently Asked Questions about Recycled Water

1. What is the Recycled Water Fill Station Program?

The “Recycled Water Fill Station” program is a pilot initiative to provide recycled water from the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) for commercial and residential Customers to offset the use of drinking water for non-drinking uses.

2. What is recycled water and is it safe?

Recycled water is wastewater which as a result of treatment and disinfection is suitable for a beneficial use and is therefore considered a valuable resource. The ultra violet disinfection process uses high energy ultraviolet light to inactivate pathogens and other microorganisms. It must meet strict standards of the Division of Drinking Water (DDW)

3. What can I use recycled water for?

Recycled water can be used for watering trees, lawns and gardens. It can also be used for dust control, soil compaction, washing vehicles and hard surfaces such as paths, walls and windows.

4. What is recycled water <u>NOT</u> suitable for?

It is not suitable for drinking, cooking or use in the kitchen, bathing or showering, filling swimming pools or spas, children's water toys and connecting it to the household domestic (drinking water) plumbing or irrigation system.

5. Do water use restrictions (conservation) apply to recycled water?

No. Water use restrictions do not apply to recycled water. However, it is a valuable resource and should not be wasted.

6. How much will recycled water cost me?

The Customer shall pay all fees and charges for the use of recycled water and other related charges based upon the actual use of recycled water by the Customer in an amount to be designated in the City's Master Fee Schedule.

7. How much recycled water can I pick up at a time?

Commercial Customers may collect 300 gallons or more per load and residential Customers may collect up to 300 gallons per load. **The City of Fresno is not liable for any damages to you or your vehicle(s) due to your participation in the recycled water fill station program.**

8. Where and when can I use the Recycled Water Fill Station?

Designated areas for recycled water fill stations will be approved by the City's Director of Public Utilities.

Rules and Regulations of Recycled Water Use

1. **DO NOT DRINK** recycled water.

2. Recycled water **shall not** be put into any piping or storage facility that has any connection to an on-site drinking water supply.

3. Commercial distributor's vehicles used for bulk collection, transportation and distribution of recycled water must have containers with capabilities of 300 gallons or greater.

4. Designated vehicles must have water tight valves and fittings, must not leak, and tanks must be cleaned of contaminants prior to use.

5. Hauling vehicles may be self-propelled or towed vehicles having an attached water tank, with or without pumps, hoses and accessory equipment for filling or distribution of recycled water. Use of convertible trucks, dump trucks, or flat-bed trucks with detachable tanks is allowed if the tanks are securely attached.

6. Vehicles without a tank or detached tank are not approved for collecting recycled water.

7. A truck or tank that has contained material from a septic tank or cesspool shall not be used to convey recycled water.

8. Customers are required to label both sides of their water tanks with the words "**Recycled Water/Do not drink**" in letters of at least 4 inches in height. Labeling must be permanently attached to or painted on the vehicle and must be fully legible and visible at all times.

9. Recycled water shall be used and/or applied promptly. No storage of recycled water on-site at a residential property.

10. Recycled water shall not be discharged to the street gutter or storm drain system. If you have leftover recycled water and want to dispose of it, either discharge it to a landscaped area or to the sanitary sewer system via an on-site cleanout.

11. After handling recycled water, remember to apply hand sanitizer or wash hands with soap and drinking water, especially before eating or smoking.

12. The City may conduct site visits to ensure your proper use of recycled water and to ensure the health and safety of your family and the public.

Procedure to Obtain Recycled Water

1. Read and understand the conditions of this Use Application/Agreement. Download and save the form to your Desktop. Type in your responses, Save, Print, and mail a signed form to the following address:

Attn: Reclamation Coordinator
Fresno Clovis Regional Wastewater Reclamation Facility
5607 W. Jensen Ave
Fresno, CA 93706

A hard copy of the form can be mailed to you by calling (559) 621-5134.

2. Approved applicants will receive a brief one-on-one training on use requirements of recycled water. Customers will be provided a badge to access the gate into the fill station site and activate the water supply. A City representative will direct participating Customers to the fill station located inside the RWRF.

3. The badge holder is the primary party held accountable for accessing the fill station site. If the badge is misplaced or damaged, the primary badge holder shall pay $25.00 to the Wastewater Management Division for a new badge.

4. All water tanks and containers are required to be labeled with the words "**Non-potable water/Do not drink**".

5. Access to the commercial and residential recycled water fill station is based on a first-come basis.

6. Haulers must ensure that tanks are sealed and secured for transport prior to leaving the facility.

Certification Statement/Signature Section

☐ By checking this box, myself, and if applicable, my organization's officers, owners, personnel, employees, agents, contractors, invitees or volunteers agree to hold harmless the City of Fresno from any and all claims, lawsuits, demands, liability, monetary loss, property damage and/or injury arising out of our organization's connection with the collection, transportation and distribution of recycled water.

☐ By checking this box, I assert that the information provided in this application is true and accurate to the best of my knowledge, and represent that I have read, understand, and agree to comply with the City's Rules and Regulations for recycled water. Failure to comply with the conditions of this agreement may lead to termination of this agreement and the ability to obtain recycled water from the commercial/residential fill station.

Name:

Customer's Signature

Date

Figure 1

NON-POTABLE DO NOT DRINK ACCEPTABLE FIGURE



APPENDIX C
RECYCLED WATER USER AGREEMENT

AGREEMENT
CITY OF FRESNO, CALIFORNIA
RECYCLED WATER SERVICES

THIS AGREEMENT is made and entered into effective the [Day of the month, e.g., 1st] day of Choose an item. [Year], by and between the CITY OF FRESNO, a California municipal corporation (hereinafter referred to as "CITY", and [Customer's Name], [Legal identity], located at [address] (hereinafter referred to as "CUSTOMER").

RECITALS

WHEREAS, CITY produces and distributes recycled water of satisfactory quality for use in irrigating landscaped areas and impoundment areas with unrestricted public access; and

WHEREAS, CUSTOMER owns and operates certain landscaped areas and/or impoundment areas that CUSTOMER desires to irrigate/supply with recycled water distributed by CITY; and

WHEREAS, CITY and CUSTOMER will conserve potable water by using recycled water for agricultural or landscape irrigation and/or impoundment water supply; and

WHEREAS, CUSTOMER acknowledges that this Agreement is subject to the requirements of Fresno Municipal Code Section Chapter 6, Article 9, Recycled Water Ordinance; and

WHEREAS, this Agreement will be administered for CITY by its Director of Public Utilities (hereinafter referred to as "Administrator") or his/her designee.

AGREEMENT

NOW, THEREFORE, in consideration of the foregoing and of the covenants, conditions, and premises, hereinafter contained to be kept by the respective parties, it is mutually agreed as follows:

1. Term of Agreement. This Agreement shall be effective from the date first set forth above ("Effective date") and shall continue in full force and effect through [Day of the month, e.g., 1st] day of Choose an item., [Year], subject to any earlier termination in accordance with this Agreement.

2. Recycled Water Use Area. CUSTOMER shall use recycled water supplied by CITY on approximately [Number of acres] acres within the permitted use area. The location of the use area is described in the attached Exhibit A as submitted with the "Application for the Use of Recycled Water". CITY understands that the CUSTOMER has the right to add or subtract from the total use area as operations plans dictate, provided that all potential use areas are disclosed in this Agreement.

3. City Ordinance. CUSTOMER has read and agrees to the terms stated in CITY Ordinance 2014-32 (hereinafter, "Recycled Water Ordinance"), attached as Exhibit D and incorporated herein.

4. Rules and Regulations. CUSTOMER has read and agrees to the terms of the CITY's Recycled Water Use Rules and Regulations governing the use, distribution and transport of recycled water (hereinafter, "CITY's Rules and Regulations"), which are attached as Exhibit E and incorporated herein.

5. No Representation Regarding Water Service, Pressure, or Volume for any Portion of the Recycled Water Pipeline. CITY does not make any representation, warranty or guarantee of any kind or nature and hereby specifically disclaims any kind of representation, warranty or guarantee that any portion of the recycled water system described or the recycled water system as a whole will yield any specific volume of water or provide any specific water pressure to CUSTOMER under static or demand scenarios or for any use by CUSTOMER and its tenants, lessees, purchasers, successors or assigns. CUSTOMER assumes full responsibility for the adequacy of volume of water and water pressure beyond the Point of Connection ("POC") as defined in the CITY's Rules and Regulations.

6. Maintenance and Repair. CUSTOMER shall be responsible for operation, maintenance, repair, and replacement of all portions of the recycled water system beyond the POC. Under no circumstances shall CITY be required or accountable to maintain, repair or replace CUSTOMER's recycled water system unless and until CITY may, at its sole discretion and option, accept dedication of the water system, or any portion thereof in increments or otherwise, at some future date. CUSTOMER's obligation to maintain, repair and replace its recycled water system shall include, without limitation, any operation and maintenance, repair, replacement or modification of the recycled water system as may be required by CITY. Should CUSTOMER fail to operate, maintain, repair and replace its portion of recycled water pipeline as needed for proper operation of the public portions of the recycled water pipeline, the CITY shall have the right, but not the obligation, to stop providing water.

7. Priorities for Delivery of Recycled Water.

(a) The CITY reserves the right to control and schedule recycled water distribution as necessary to maintain an acceptable working pressure; protect public health; construct, maintain and operate other CITY facilities; and manage availability of recycled water supply.

(b) Delivery of recycled water may at times be precluded for reasons beyond the reasonable control of the CITY including, but not limited to insufficient recycled water supply, maintenance of CITY's treatment or distribution systems, acts of a third party, or order of a regulatory agency.

(c) If recycled water supply is interrupted for any reason, including but not limited to those outlined in (b), first priority for recycled water service shall be given to potable water rate payers of the CITY to meet all anticipated municipal needs of the CITY.

(d) If recycled water delivery is interrupted for more than 48 hours, the CITY may connect the CUSTOMER'S back-up water supply. If the CUSTOMER does not have a backup supply and was originally connected to the CITY potable water system, CITY may reconnect CUSTOMER'S on-site recycled water system to the CITY potable water system subject to the terms of the Rules and Regulations. The CUSTOMER agrees to return to recycled water use as soon as the CITY is able to resume recycled water delivery. CUSTOMER shall pay for the full cost of water used from the alternate supply.

8. Receipt and Application of Recycled Water.

(a) CUSTOMER agrees to use recycled water for uses stated in Exhibit A of this Agreement, as submitted on the "Application for the Use of Recycled Water," except for portions of the use area where application of recycled water may be prohibited by any law, statute, rule, regulations or guidelines governing the use of recycled water.

(b) CUSTOMER understands that the CITY will inspect and assess the use area before the On-Site Recycled Water System is connected to the Distribution System. The CITY will indicate how the On-site Recycled Water System needs be designed in order to minimize/eliminate potential violations of the Rules and Regulations. Furthermore, CUSTOMER understands that this Agreement shall become valid upon passing a Final On-Site Inspection by the CITY (Exhibit -C).

(c) CUSTOMER agrees that any agreement it may have with a third party for the management of the use area shall not in any way relieve CUSTOMER of the requirements, terms and conditions of this Agreement. CUSTOMER shall be responsible to the CITY for the safe use of recycled water by CUSTOMER and any third party.

(d) The CITY shall not be liable for any damage related to CUSTOMER's recycled water infrastructure, use, and distribution, including damage resulting from inadequate capacity, defective plumbing, broken or faulty services, or any conditions beyond the control of the CITY. Furthermore, CUSTOMER accepts such conditions of pressure, as provided by the distribution system at the location of its service connection, and holds the CITY harmless from any and all liability, damage, losses, costs, fees or expenses, arising from low pressure or high pressure conditions, or from interruptions of service.

(e) CUSTOMER understands and accounts for the nutrient contribution of recycled water when irrigating crops, green spaces, freeway medians, parks, school yards and cemeteries. CUSTOMER agrees that the CITY will not be liable for damage to vegetation resulting from the application of recycled water.

9. Recycled Water Use Requirements. CUSTOMER agrees to abide by all use requirements identified in the CITY's Rules and Regulations, the Recycled Water Ordinance, California Code of Regulations Title 17 and 22 relating to the use of recycled water, and all laws, statutes or guidelines governing recycled water use. Approved uses of recycled water for the CUSTOMER's use area shall be limited to those described in Exhibit A of this Agreement and as specified on the "Application for the Use of Recycled Water".

10. Recycled Water Site Supervisor. CUSTOMER shall designate an individual as its Recycled Water Site Supervisor ("Site Supervisor"), who shall be the CUSTOMER's coordinator and direct liaison with the CITY regarding recycled water matters. CUSTOMER agrees that the Site Supervisor shall be responsible for all duties identified in CITY's Rules and Regulations. The Site Supervisor is required to attend a certification course provided by the City on the accepted uses and regulatory restrictions for the use of Recycled Water. The Site Supervisor is also responsible for training operators or recycled water in the Use Area.

11. On-Site Recycled Water System Modifications. CUSTOMER understands and agrees that any modifications to its On-Site Recycled Water System, as defined in the Recycled Water Ordinance, must comply with the CITY's Rules and Regulations relating to recycled water and failure to do may result in termination of recycled water service.

12. Notification of Public. CUSTOMER shall provide adequate notification, as required by the Division of Drinking Water (DDW) to employees and the general public that recycled water is being applied within the designated use area.

13.

Record Drawings. Upon completion of all modifications to CUSTOMER'S on-site recycled water system and potable water system, CUSTOMER shall provide the CITY with record drawings containing specific information as identified in Exhibit B of this agreement.

14. Fees and Charges. CUSTOMER shall pay all fees and charges for the use of recycled water and other related charges based upon the actual use of recycled water by the CUSTOMER, in an amount designated in the CITY's Master Fee Schedule when such a fee is developed. The CITY shall provide recycled water at no cost until June 30, 2019. As an incentive, CUSTOMERS may receive a one-time reimbursement of up to $5,000 at the sole discretion of the Director of Public Utilities or his or her designee for on-site improvements needed to utilize recycled water.

15. Indemnification. To the furthest extent allowed by law, CUSTOMER shall indemnify, hold harmless and defend CITY and each of its officers, officials, employees, agents and volunteers from any and all loss, liability, fines, penalties, forfeitures, costs and damages (whether in contract, tort or strict liability, including but not limited to personal injury, death at any time, and property damage) incurred by CITY, CUSTOMER or any other person, and from any and all claims, demands, liabilities, damages and actions in law or equity (including attorney's fees and litigation expenses), arising or alleged to have arisen directly or indirectly out of the performance of this Agreement and the performance of any or all work to be done in and upon the street rights-of-way or within CUSTOMER's property boundary, and premises adjacent thereto, pursuant to this Agreement, or arising or alleged to have arisen directly or indirectly in any way related to the construction, installation and operation of the recycled water supply pipeline or its appurtenances by anyone occupying any portion of CUSTOMER's property including, without limitation, any such claims, causes of action, damages, liabilities, fees, costs, expenses, and attorney fees arising from water quality compliance, a lack of volume of water, inadequate fire flow, lack of water pressure in, from or delivered to the recycled water supply pipeline, or lack of flow capacity in the recycled water supply pipeline. CUSTOMER's obligations under the preceding sentence shall apply regardless of whether CITY or any of its officers, officials, boards, employees, agents or volunteers are passively negligent, but shall not apply to any loss, liability, fines, penalties, forfeitures, costs or damages caused by the active or sole negligence, or the willful misconduct, of CITY or any of its officers, officials, employees, agents or volunteers.

16. General Terms.

(a) Governing Law and Venue. This Agreement shall be governed by, and construed and enforced in accordance with the laws of the State of California, and venue for purposes of filing any action regarding the enforcement or interpretation of this Agreement shall be Fresno County, California.

(b) Severability. The provisions of this Agreement are severable. The invalidity or unenforceability of any one provision in this Agreement shall not affect the other provisions.

(c) Binding. Once this Agreement is signed by all parties, it shall be binding upon all parties and each parties' respective heirs, successors, lessees, sub lessees, assigns, transferees, agents, servants, employees and representatives.

(d) No Third Party Beneficiaries. The rights, interests, duties and obligations defined within this Agreement are intended for the specific parties hereto as identified in the preamble of this Agreement. Notwithstanding anything stated to the contrary in this Agreement, it is not intended that any rights or interests in this Agreement benefit or flow to the interest of any third parties.

(e) Extent of Agreement. Each party acknowledges that they have

read and fully understand the contents of this Agreement. This Agreement represents the entire and integrated agreement between the parties with respect to the subject matter hereof and supersedes all prior negotiations, representations or agreements, either written or oral.

17. Monitoring and Reporting. CUSTOMER agrees to comply with the monitoring and reporting requirements as identified in the CITY's Rules and Regulations.

18. Headings. The section headings in the Agreement are for convenience and reference only and shall not be construed or held in any way to explain, modify or add to the interpretation or meaning of the provisions of this Agreement.

19. Exhibits. Each exhibit and attachment referenced in this Agreement is, by the reference, incorporated into and made part of this Agreement.

20. Notices. Any notice required or intended to be given to either party under the terms of this Agreement shall be in writing and shall be deemed to be duly given if delivered personally, transmitted by facsimile followed by phone confirmation of receipt, or sent by United States registered or certified mail, with postage prepaid, return receipt requested, addressed to the party to which notice is to be given at the party's address set forth on the signature page of this Agreement.

21. Attorney's Fees. If a party is required to commence any proceeding or legal action to enforce or interpret any term, covenant or condition of this MOU, the prevailing party in such proceeding or action shall be entitled to recover from the other party its/their reasonable attorney's fees and legal expenses.

22. Termination. Upon any breach of this Agreement by CUSTOMER, CITY may (a) exercise any right, remedy (in contract, law or equity), or privilege which may be available to it under applicable laws of the State of California or any other applicable law; (b) proceed by appropriate court action to enforce the terms of the Agreement and/or recover all direct, indirect, consequential, economic, and incidental damages for the breach of the Agreement.

The CITY may terminate this Agreement immediately following any of the reasons listed in Section 13.2 of the CITY's Rules and Regulations for recycled water use.

IN WITNESS WHEREOF, the parties have executed this Agreement at Fresno, California, the day and year first above written.

[Name of Company] [legal entity] By: _____ Name: _____ (Type or print written signature.)	CITY OF FRESNO, a California municipal corporation By: _____ Thomas C. Esqueda, Director Department of Public Utilities Dated: _____

Addresses:	
CUSTOMER:	CITY:
[Company Name]	City of Fresno
Attention:	Attention: Conrad Braganza
[Title]	Wastewater Reclamation Coordinator
[Street Address]	5607 W. Jensen Ave.
[City, State, Zip Code]	Fresno, CA 93706
Phone:	Phone: (559) 621-5134
Fax:	Fax: (559) 498-1700

Attachments:

1. Exhibit A – Application for the Use of Recycled Water
2. Exhibit B – Required Information for Record Drawings
3. Exhibit C – Final On-Site Inspection and Approval
4. Exhibit D – Recycled Water Ordinance
5. Exhibit E – CITY's Recycled Water Use Rules and Regulations

Exhibit A
APPLICATION FOR THE USE OF RECYCLED WATER

1. Customer Name:

2. Address:

3. Use Area Property Manager:

4. Property Manager Email:

5. Property Manager Telephone number:

6. Name of Recycled Water Site Supervisor:

7. Recycled Water Site Supervisor Telephone number:

8. Complete the following information for the Use Area:

   Use Area APN:
   Use Area Address:
   Total Irrigated Area (Acres):
   Estimated Recycled Water Demand:
   Method of irrigation:
   Type of plant material present:
   Type of Recycled Water use: ☐Landscape Irrigation
   ☐Agricultural Irrigation
   ☐Impoundments
   ☐Other:
   Public access to the Use Area is: ☐Unrestricted ☐Restricted
   Number of outdoor drinking fountains in the Use Area:
   Number of outdoor eating areas in the Use Area:
   Number of domestic wells in the Use Area:
   Number of impoundments in the Use Area (if any, briefly describe):

For City of Fresno Use Only:

9. Check list of items required for obtaining Recycled Water service:

   ☐ The Customer and the City have determined that the Use Area is eligible to be served with Recycled Water.
   ☐ The Customer has submitted Exhibit A – Application for the Use of Recycled Water. Application received on:
   ☐ The City has reviewed the application.

- ☐ The City has assessed the Customer's on-site irrigation system and provided a description of required improvements.
  Assessment performed on:
- ☐ The City has approved the plans and retrofit/construction schedule prior to retrofit/construction.
- ☐ The Customer has constructed/retrofitted the On-Site Recycled Water System.
- ☐ The City has reimbursed the Customer for required improvements as recommended by the on-site assessment.
- ☐ The Customer has submitted "as-built" drawings to the City for record, including all remaining information requested by Exhibit B.
- ☐ The City has performed the final on-site inspection and approval, as specified in Exhibit C.
- ☐ The Customer has signed a Recycled Water User Agreement.
- ☐ The City initiates Recycled Water service. Date:
- ☐ The City confirms service to DDW.
- ☐ The City documents Recycled Water Site Supervisor training.

10. Description of on-site assessment and required improvements:

Exhibit B

REQUIRED INFORMATION FOR RECORD DRAWING

Customers shall submit draft Record Drawings during the process for obtaining Recycled Water service and then provide final as-built Record Drawings upon completion of all modifications to the On-Site Recycled Water System(s) and Potable Water System(s). Applicants shall submit drawings of each Use Area on 8½" x 11", 11" x 17" or 24" x 36" sheets of paper which shall include a signature line for the Department of Public Utilities approval.

Sheet 1

☐ Location and vicinity map including surrounding land use and adjacent streets demarking the Recycled Water Use Area.

Sheet 2

☐ Specific Potable Water irrigation use areas (if applicable).
☐ Location of Potable Water main lines, ancillary lines, gate valves, controllers, drinking fountains, and supply facility.
☐ Location and size of Potable Water service connections.
☐ Location and size of existing and future Recycled Water service connections.
☐ Location of all On-Site Recycled Water System distribution lines, gate valves, master valves, pressure regulating valves, and other associated facilities. Exception: Although it may not be possible to show the location of all water pipelines for existing irrigation systems converting to Recycled Water, all locations where future Recycled Water piping must be separated from the Potable water piping must be clearly indicated on the plans.
☐ Location of any other piping network piping, gate valves, strainers, controllers, and supply facilities, specifically all backflow prevention devices for Potable Water systems.
☐ Where applicable, indicate that the separation between Potable and Recycled Water lines meets minimum requirements. Also show sleeving and other cross-connection prevention measures where applicable.
☐ Areas of public access on the Use Area.
☐ Location of domestic wells on or within 100 ft. of the Use Area.
☐ Location of any lakes, ponds, reservoirs, or other impoundments located within the Use Area or within 100 feet of the Use Area, and indicate the type of water source.
☐ Location of Recycled Water signage on the Use Area.
☐ Location of foundations, buildings, structures, and public facilities with either Recycled or Potable Water service. Public facilities include, but are not limited to drinking fountains, outdoor eating areas, restrooms, snack bars, swimming pools, wading pools, decorative fountains and showers. Include the pipelines feeding all

of these facilities.

☐ Any other features known or considered to be important to the on-site use of Recycled Water.

☐ Depiction of any other applicable On-Site Recycled Water System components as required by the Rules and Regulations.

☐ Include the Standard Notes specified by the City.

<u>Sheet 3</u> (if applicable)

☐ Construction details of any domestic well within 100 feet of the Use Area.

Exhibit C

FINAL ON-SITE INSPECTION AND APPROVAL

1. Customer Name:

2. Complete the following information for the Use Area:

   Use Area APN:

   Use Area Address:

   Requested date of service:

   Recycled Water service initiated on (TBD):

   Number of service connections:

   Specify the back-up water supply source:

   Has the Cross Connection Test been waived?[1] ☐Yes ☐No

   Date of Cross Connection Test:

   Briefly describe any upgrades to the Use Area:

   How many domestic wells are present within 50 ft. of the Use Area or within 100 ft. of any impoundment?

   Describe the level and method of backflow protection at the Use Area:

   Is Recycled Water signage displayed in visible and public areas? ☐Yes ☐No

   Special requirements and conditions:

3. **Final Inspection by the City**:

   I have inspected the On-Site Recycled Water System(s) governed by this User Agreement and attest that the construction and operation of this system are in accordance with the City's Rules and Regulations governing recycled water use.

   Inspector Name:

   Inspector Signature: _____

   Date:

[1] Customers may request a waiver of the Cross Connection test if no potable water piping is present in the Use Area.

Exhibit D

RECYCLED WATER ORDINANCE

Exhibit E

RECYCLED WATER RULES AND REGULATIONS

APPENDIX D
TTDF DESIGN REPORT

City of Fresno

Fresno-Clovis Regional Wastewater Reclamation Facility

Tertiary Treatment and Disinfection Facility Technical Memorandum

(Part One—Schematic Design Phase)

August 2011



PARSONS

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EXECUTIVE SUMMARY

BACKGROUND

New Water Source – Recycled Water

The City of Fresno (City) has embarked on development of a new water source – recycled water, to offset potable water use and improve ground water quality. The City prepared a Recycled Water Master Plan (July 2010) to assess potential uses and demand for recycled water.

The City's ultimate goal is to recycle 25,000 acre feet/year or more of recycled water by 2025. The recycled water goal includes direct non-potable use of State of California Title 22 quality recycled water for landscape irrigation as well as for groundwater recharge. The City anticipated that the project would be developed in three logical phases and decided to construct a 5 to 10 mgd first phase Tertiary Treatment and Disinfection Facility (TTDF) at their Fresno-Clovis Regional Water Reclamation Facility (RWRF).

During the master planning efforts, although the City had decided on the approximate capacity of the TTDF, the tertiary treatment technology, system layout and location of the facilities were not finalized. These tasks have been performed as part of the pre-design and are summarized in this technical memorandum (TM). Therefore, this pre-design TM, in addition to developing the design basis, focuses on evaluation and selection of a filtration technology out of eight (8) proven California Department of Public Health (CDPH) approved technologies, a disinfection technology between UV irradiation and ozonation, and a recycled water storage system from several options.

Nitrogen Removal and Effluent Electrical Conductivity (EC)

The RWRF's discharge currently has a limit for electrical conductivity (EC) of 500 micro mhos/cm + EC of the source water. Meeting this limit is a challenge and may require various measures including source water treatment or replacement, expensive systems to remove salts in wastewater, industrial source control and/or public education on waste minimization. The various alternatives presented, including Membrane Bio Reactor (MBR), may not be effective removing all salts from the final effluent. However, MBR technology could help reduce EC levels through its reliable nitrification/denitrification (NDN) capability. Parsons estimates that effluent EC can be reduced by about 150 micro mhos/cm through NDN in the MBR permeate, as ammonia is converted to nitrogen gas and escapes into the atmosphere.

During the past few years, the RWRF has experienced a reduction of the effluent EC through an incidental NDN process that reduced ammonia to nitrogen gas. The reduction in the effluent was estimated between 8% to 9.5% of the total EC influent, enough to maintain compliance with the Waste Discharge Requirements (WDR) discharge limit.

North Fresno Wastewater Reclamation Facility, operated by the City, was issued a WDR/NPDES permit on December 10, 2009 by the Central Valley Regional Water Quality Control Board (RWQCB) with a Total Nitrogen (TN) limit of 10 mg/L for the recycled water used for golf course irrigation. It is expected that the proposed TTDF at the RWRF will also have a similar TN limit for irrigation water. This means that it will be short sighted to design the TTDF with no consideration for nitrogen removal.

Aging Train A Infrastructure

Train A facilities, reportedly, are old, of obsolete design and are difficult to operate and maintain. Further, nitrogen removal cannot be achieved reliably with the current configuration of the aeration basins in Train A. Discussions with the City's operations staff indicated that the ceramic disc diffusers installed in the aerations basins need replacement/cleaning and it may not be possible to restore them to their original state due to their age. Further, the aeration pipe grids that connect the diffusers are old and unique to the type of diffusers currently installed. The secondary clarifiers in Train A are in need of central column and scraper mechanism replacement. Based on the above extensive repair/replacement needs related to Train A infrastructure coupled with the long age of the equipment, it appears that replacement of Train A facilities in the near future would be a prudent measure, if the intention is to continue to use Train A for the long term.

MBR - A Clear Choice for Holistic Solution

Considering the regulatory requirements discussed earlier and long age of Train A facilities, a decision was made to consider the MBR process as a potential alternative to conventional tertiary filtration technologies. The MBR system followed by ultraviolet disinfection offers a multi faceted solution and provides the following four key benefits.

- Excellent Filtration – Produces the highest quality recycled water with effluent turbidity consistently less than 0.2 NTU. The MBR permeate is superior in quality compared to effluent from any conventional tertiary filtration process and exceeds Title 22 standards for recycled water.
- Simultaneous Nitrification and Denitrification (NDN) – Provides effluent that meets the expected permit limits, specifically Total Nitrogen (TN) of less than 10 mg/L, without significant infrastructure addition.
- Reduction in EC – Due to its NDN capability, a measurable reduction in EC can be achieved by using MBR process.
- Future Capacity Replacement – Provides a means for reliable, phased capacity replacement of aging infrastructure at Train A, with one of the most advanced and state-of-the-art membrane filtration technologies that will consistently and reliably meet current and future discharge regulations. This would avoid substantial costs associated with replacing and/or upgrading of Train A facilities in the near future, if tertiary filters were used in lieu of an MBR system.

Based on the above considerations, MBR will be more cost effective compared to conventional filtration systems, when considering its ability to produce high quality effluent with nitrogen removal and avoided cost of future upgrades/replacement of Train A facilities for nitrogen removal.

The scope of this TM evolved around the City's recycled water goals and associated electrical power supply options. Although a major part of this TM focuses on evaluation and selection of a conventional filtration technology, Sections following Workshop No.1 (Sections 8 through 13) compare conventional tertiary filtration systems with MBR system.

During Workshop No. 2 (Section 14), the decision was made in favor of MBR process due to the key benefits discussed above. Therefore, the last Section (Section 15) of this TM, which serves as a standalone section with MBR as the system of choice, has been printed on color paper to differentiate it from the rest of the report.

The proposed TTDF needs to become an integral part of the RWRF for its operation, reliability and compliance with the near term and future regulatory requirements. Further, the SCADA system of the proposed TTDF should fully integrate with the existing RWRF SCADA system for smooth and reliable operation.

COMMUNICATION AND DECISION WORKSHOPS

Since the inception of this project, Parsons maintained regular interaction and discussions with the City's staff throughout the development of this TM. The feedback received from the City's staff helped Parsons immensely to understand the plant's operational and maintenance constraints as well as City's preferences and to incorporate them into the TM. Two full-day technical Workshops were conducted at the RWRF to review and discuss the progress of this TM development. The first Workshop was held on 11/4/2010 while the second one was conducted on 2/3/2011.

Sections 3 through 7 present the work completed prior to Workshop No.1. This includes a comparison of eight conventional filtration system alternatives, three disinfection system alternatives/variations, and three storage alternatives. Features of operation, pros and cons, reliability, expandability to 30 mgd, capital, O&M and life cycle costs were compared and discussed. Section 8 summarizes the discussions and decisions made during Workshop No.1.

The following are the key collective decisions made during Workshop No.1.

1. Nova filtration system will be the preferred conventional filtration technology, if filtration is considered over MBR process.
2. In-pipe UV disinfection will be used for all alternatives
3. Depending on the physical configuration of the alternative, either pre-stressed concrete tanks or converted Train A aeration basins will be used as storage tanks for recycled water.

4. Due to aging infrastructure at Train A, only Train A will be considered for retrofitting into MBR system.

Moving forward, three Plans were identified for further development.

- Plan A – Conversion of Train A facilities into a 12 mgd MBR with 1.23 peaking factor. This plan includes conversion of one secondary clarifier into aeration basin for MBR; building new tank(s) to house membranes; constructing new housing for in-pipe UV reactors and conversion of one aeration basin into recycled water storage
- Plan B – 5 mgd constant flow conventional filtration (Nova disc filter) system for Train B. This plan includes feed from Canal B at a constant flow rate, Nova disk filters for filtration, construction of new housing for in-pipe UV reactors, and building new pre-stressed concrete tank (5 MG) for recycled water storage
- Plan C – 12 mgd constant flow conventional filtration (Nova disk filter) system for Train B.

These Plans are discussed in detail in Sections 9, 10 and 11. Section 11 presents a comparison of Plan A with Plan C. Section 12 describes the power source options for TTDF with both conventional filtration and MBR system for a 12 mgd facility expandable to an ultimate capacity of 30 mgd. The Section includes a duct bank and cable routing plan for the two alternative systems. These routing plans were developed after a thorough review of the Plant's record drawings and in close coordination with City's electrical engineers. Utilization of existing conduits was maximized to the extent possible in both the alternatives.

During Workshop No. 2, in addition to the option of converting Train A facilities into MBR, the City expressed their interest to explore the option of having MBR designed and built as a separate stand-alone system with all new structures.

As a result of the discussion during Workshop No.2, the following two MBR alternatives are selected over the conventional tertiary filtration alternatives for further development and City's review and final decision.

1. Converting Train A into MBR – (5 mgd constant flow; no peaking factor) – This is similar to Plan A as discussed in Section 9 of this report, except that the capacity will be 5 mgd constant flow instead of 12 mgd with peaking factor.
2. Constructing a separate standalone MBR system with all new tanks – (5 mgd constant flow; no peaking factor)

Sections 14 and 15 summarize the latest developments, subsequent to Workshop No.2. Section 14 sets the stage for a new project direction provided by the City during Workshop No.2. and steers the discussion into Section 15, which compares the two MBR alternatives noted above. Figures 15-1 and 15-2 present the preliminary layouts for the two alternatives.

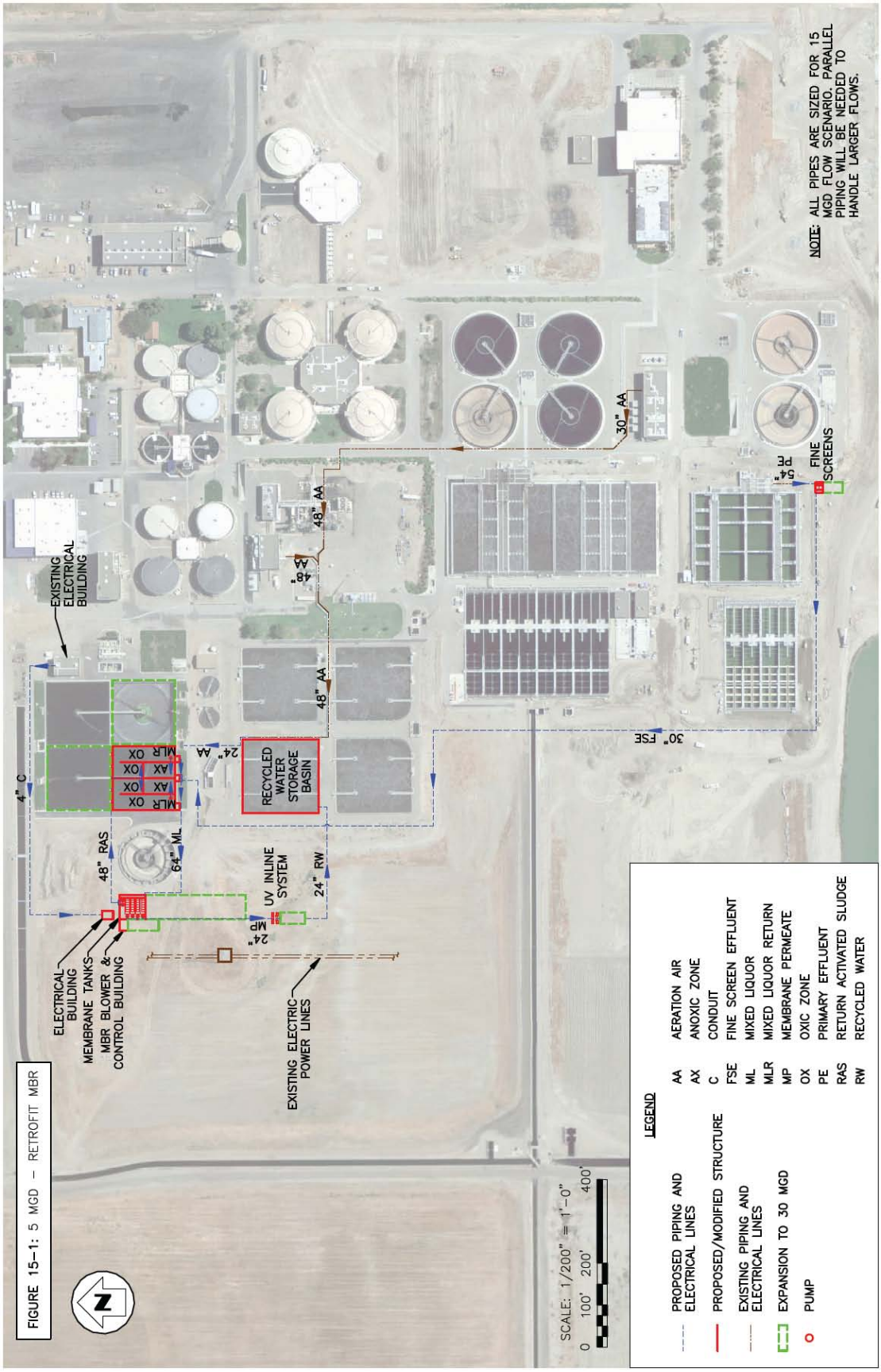


FIGURE 15-1: 5 MGD – RETROFIT MBR

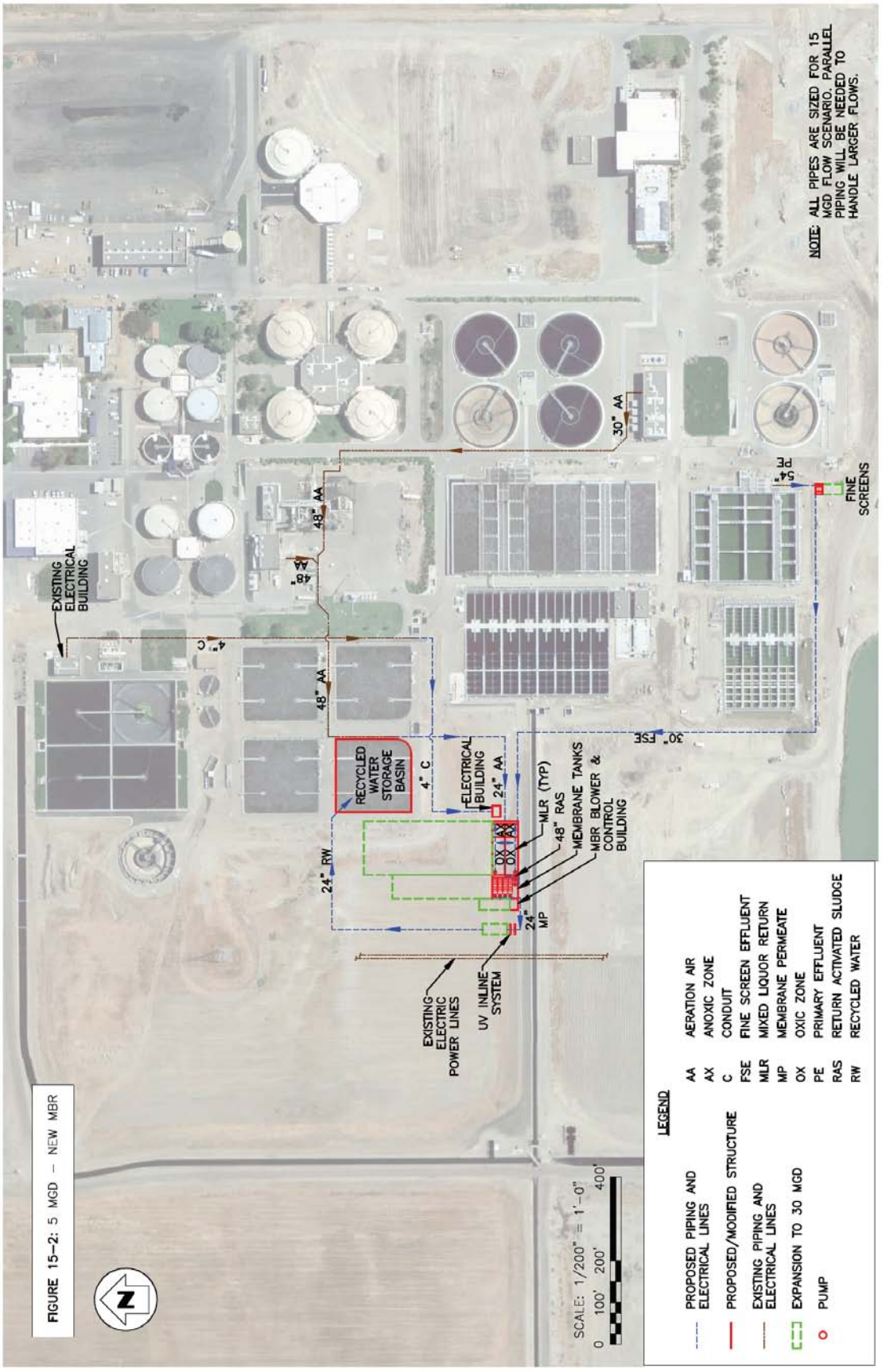


FIGURE 15-2: 5 MGD – NEW MBR

IN-PIPE UV FOR DISINFECTION

During Workshop No.1, the City chose in-pipe UV disinfection as opposed to an open channel UV system. One of the major drivers was the positive feedback received from the staff at neighboring Clovis Water Reuse Facility in operating and maintaining their in-pipe UV system. Therefore, for the purpose of this TM, 1-mgd capacity in-pipe UV reactors were considered. The 1 MGD rating for each reactor is based upon high quality membrane permeate feed such as from the MBR system. Four reactor trains (3 operating + one standby) will be required to disinfect 5 mgd of flow and each train will accommodate two reactors. There are several larger in-pipe reactors currently available from other manufacturers that may be more economical for the present project and will be evaluated during detailed design.

CONVERSION OF AERATION BASIN (TRAIN A) FOR RECYCLED WATER STORAGE

It was determined that the aeration basins at Train A, with sloping walls could be retrofitted into recycled water storage tanks. According to the City's staff, at least one of the units in Train A is typically out of service and hence conversion of one aeration basin into recycled water storage tank will not negatively impact the current plant operations. Further, due to the proximity of the proposed MBR facilities to Train A, conversion of one of the aeration basins into a storage tank would be a prudent choice.

PRELIMINARY COSTS

Preliminary costs were developed for two alternatives described earlier - retrofitting the existing facilities in Train A for aeration basins of MBR system or using completely new structures for this purpose. The costs estimated are according to Class 4 level per AACE (Association for the Advancement of Cost Engineering) guidelines. At this point in the design process, these costs are preliminary and should be used only for comparative purposes. The costs were estimated using several resources. Quotes from the manufacturers, information available from similar projects performed by Parsons, including construction in the Central Valley, were used to determine these costs.

Avoided Cost of Future Upgrades/Replacement of Train A

As disused earlier, a credit could be given to compensate for the cost of replacing and upgrading Train A in the near future, which would occur under conventional filtration alternatives but not under MBR alternatives. To estimate this credit, $3-$4 per gal of wastewater treated was used as the cost basis, which would translate into $15-$20 million of avoided future capital investment for a 5 mgd system. For the purposes of cost comparison, $18 million is considered as avoided capital replacement cost. Note that the estimated avoided cost is based on constructing new basins to remove nitrogen but without new aeration blowers.

Table ES-1: MBR Alternatives Capital Cost (5 mgd) [a]

Parameter	Capital Cost ($ Million)	
	Retrofit MBR	New MBR
MBR Equipment and Structures Cost	8.4	8.7
MBR Total Capital Cost [b]	24.5	24.4
UV Disinfection Total Capital Cost [b]	5.3	5.3
Storage (Aeration Basin No. 3 or 4) Total Capital Cost [b]	3.1	3.1
Total Capital Cost	**32.9**	**32.8**
Train A Capacity Replacement (Avoided Cost) [c]	(18)	(18)
Net Effective Capital Cost	**14.9**	**14.8**

[a] For detailed cost analysis see Appendix A.
[b] Including installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013)
[c] Near future replacement cost of Train A facilities equivalent to 5 mgd capacity

DISCUSSION AND CONCLUSION

It is evident from the data presented in Table ES-1 above that the two MBR alternatives compared are very close to each other from a cost standpoint. The capital cost difference between the two alternatives is insignificant and is within the margin of error of our estimates. The concrete savings realized by retrofitting existing structures is balanced by less extensive piping required by using new structures.

However, using all new structures offers a more flexible and compact design. By properly planning the new facilities, they can be built in a monolithic construction with common walls, which would make it easier to build and more efficient to operate. The future expansion of tertiary facilities would follow the same compact pattern. Also, the design would not need to be tailored based on the constraints of existing facilities, but based on the best design practices. For example, deeper new aeration basins compared to the retrofitted basins would allow for a more efficient aeration system.

Further, a separate standalone MBR system will be easier to construct and will also provide some redundant treatment facilities associated with that particular train in the interim and for several years until the City decides to totally decommission that train due to its obsolescence.

Based on the above discussion, Parsons recommends using all new structures for constructing the MBR system, as it would be a more prudent and reliable approach to achieve filtration, nitrogen removal and future capacity replacement for Train A.

SECTION 1 - INTRODUCTION AND OBJECTIVE

1.1 BACKGROUND

The City of Fresno (City) mainly relies on groundwater as the primary drinking water resource where the groundwater level is approximately 300 feet below ground surface. To conserve valuable drinking water resources, the City plans to use tertiary treated recycled water for landscape irrigation as well as for commercial and industrial uses. Also the City plans to maximize the recharge of groundwater with high quality recycled water. The City's goal is to recycle 25,000 acre feet/year or more of recycled water by 2025. Therefore, the City is embarking upon new projects to design and construct a tertiary treatment and disinfection facility (TTDF) at the City of Fresno-Clovis Regional Water Reclamation Facility (RWRF) and new recycled water distribution system including pipelines, pump stations and storage reservoirs. The new recycled water distribution system will deliver disinfected tertiary recycled water to potential recycled water use sites according to the City's Recycled Water Master Plan that is currently being prepared.

The size of the new TTDF will have an initial capacity of 5 to 10 million gallons a day (mgd) in response to the immediate recycled water demand identified in the Recycled Water Master Plan; however it will ultimately expand to 30 mgd over the years to accommodate more users. The City's initial plan was to expand the TTDF in phases: the first phase (Phase I) would have a capacity of 5 mgd, the second phase (Phase II) would have a capacity of 10 mgd for a total of 15 mgd, and the third phase (Phase III) would have a capacity of 15 mgd for a total of 30 mgd. The City is now considering a Phase I capacity of 5 to 10 mgd, depending on the system selection and associated economics. If the Phase I is constructed for a capacity greater than 5 mgd, the capacity of subsequent phases will be adjusted accordingly. A phased expansion approach is prudent for several reasons:

- Recycled water demand will be low initially, but will increase over the years.
- It will minimize initial capital outlay.
- This approach takes advantage of emerging technologies in the area of recycled water production as new technologies emerge and are developed and optimized over the years, e.g., ultraviolet (UV) disinfection, ozonation, membrane filtration and so forth.
- Public acceptance of recycled water and hence the demand for that water will increase over the years.

The proposed TTDF needs to become an integral part of the RWRF for its operation, reliability and compliance with the near term and future regulatory requirements. Train A, the oldest treatment train at RWRF, is dated and has operational issues and therefore is a candidate for replacement in the near future with a more reliable and state-of-the-art treatment system. Furhter, the SCADA system of the proposed TTDF should fully integrate with the existing RWRF SCADA system for smooth and reliable operation.

1.2 SCOPE AND OBJECTIVES

Key objectives of this project include:

- Design and construct the first phase of the TTDF to match the demand of 5 to 10 mgd.
- Consider proven, cost effective and state-of-the-art technologies for upgradability and expandability in the future to a capacity of 30 mgd.
- Develop phased site master plan for ultimate 30 mgd capacity.
- Design treatment facilities that meet Title 22 irrigation and groundwater recharge requirements and could be retrofitted in the future to meet more stringent effluent quality requirements, if needed, in a cost effective manner, such as nitrogen removal.
- Consider facilities that present desired flexibility and redundancy as required for California Department of Public Health (CDPH) Title 22 criteria.
- Design facilities which are easier to operate.
- Consider full integration of TTDF control system (SCADA, etc.,) with the existing facilities at RWRF's control system.

More specifically, the following eight types of commonly used filters will be evaluated for tertiary filtration:

- Dual media gravity filters
- Deep bed mono-media gravity filters
- Continuous backwash filters
- Traveling bridge filters
- Fuzzy Filters™
- Cloth media disk filters
- Nova Ultrascreen® filters
- Microfilters

In addition to the alternatives above, membrane bioreactors (MBR), which replace secondary clarifiers and provide filtration at the same time, will also be evaluated.

The filtered effluent in all cases will be disinfected to meet the State of California Title 22 requirements for unrestricted reuse. Both UV disinfection and ozone will be evaluated for this purpose. Disinfection by gaseous or liquid chlorine (NaOCl) was not considered at the suggestion of the City, due to extensive operation and maintenance requirements associated with chlorine storage, handling and pumping and due to its potential to form toxic disinfection by products (DBP). A storage tank, 5 million gallons (MG) capacity, will be provided for storage of the final effluent/recycled water before it can be pumped though the recycled water distribution system.

SECTION 2 - EXISITNG RELEVANT TREATMENT FACILITIES

2.1 EXISTING FACILITIES AT THE CITY OF FRESNO CLOVIS REGIONAL WATER RECLAMATION FACILITY (RWRF)

The existing RWRF located at 5607 W. Jenson Avenue in Fresno, is designed for a capacity of 80 mgd average annual flow while the current plant flow is about 64 mgd. The wastewater entering the plant is received at the headworks, which includes an influent pump station, bar screens, grit removal tanks, and grit processing equipment. After the preliminary treatment at the headworks, the wastewater is provided with primary treatment by six clarifiers. The primary effluent from these clarifiers is distributed to three trains of secondary treatment facilities (Trains A, B and C). See Figure 2-1 below.

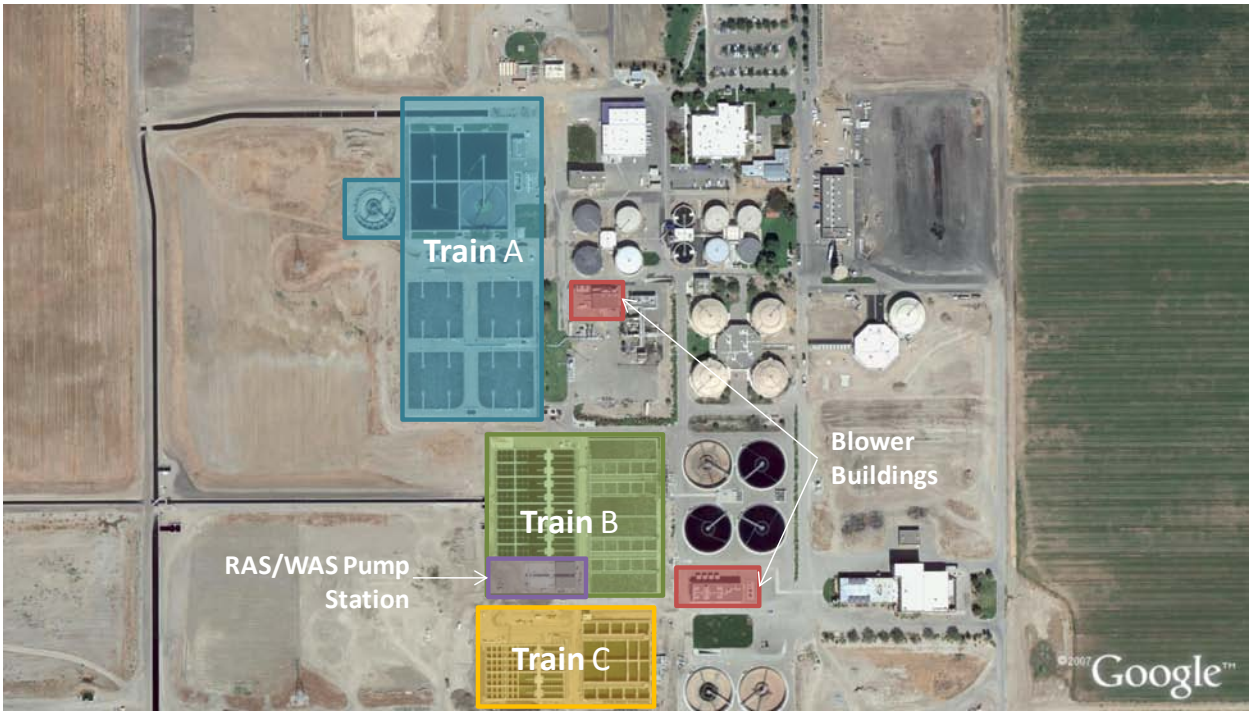


Figure 2-1: Relevant Facilities

Train A is the oldest one. It consists of four square aeration basins and four square secondary clarifiers. Train A has several operational and maintenance issues as summarized in Section 14 of this TM. Train B is the next oldest one. It consists of four rectangular aeration basins and eight rectangular secondary clarifiers. This train is located between trains A and C. Train C is the newest train. It consists of two rectangular aeration basins and four rectangular secondary clarifiers. The effluent from the plant flows into two canals on the site and finally from there to percolation ponds. The RWRF is in compliance with all the current regulatory requirements, except for Electrical Conductivity (EC) and occasionally other constituents such as chlorides, manganese and arsenic. Relevant design information for the three trains is provided in Table 2-1 with a brief schematic shown in Figure 2-2.

Table 2-1: Existing Relevant Facilities - Major Design Information[1]

Parameter	Units	Train A	Train B	Train C	Total
Rated Average Flow[2]	mgd	-	-	-	80
Rated Max Month Flow[2]	mgd	-	-	-	88
Aeration Basins, Blowers, and Air Supply System					
Number	-	4	4	2	10
Volume, Each	MG	2.7	2.6	2.7	26.6
Side Water Depth (SWD)	ft	16	17	17	-
Mixed Liquor Suspended Solids (MLSS)	mg/L	2,500 - 3,000	2,500 - 3,000	2,500 - 3,000	-
Solids Retention Time (SRT)	days	4 - 5	4 - 5	4 - 5	-
Blower Type	-	Single-stage centrifugal (Turblex)			-
Blower No.	-	6 (Located in Two Buildings)			-
Bower Capacity, Each	scfm	27,000			162,000
Diffuser Type	-	Ceramic Dome	Ceramic Plate	Membrane	-
Secondary Clarifiers					
Number	-	4[3]	8	4	16[3]
Volume, Each	MG	2.36	0.93	0.93	20.6
SWD	ft	14	13	13	-

[1]Values obtained from 2006 conformed drawings. SRT was obtained from Water Environment & Technology (WE&T) paper, June 2009
[2]Per Waste Discharge Report (WDR) Order No. 5-01-254 - See Appendix C)

[3]Train A circular secondary clarifier (clarifier no.5) is not included.

Even though the current discharge permit only requires Biochemical Oxygen Demand (BOD) and Total Suspended Solids (TSS) removal (40 mg/L BOD and 40 mg/L TSS in the effluent), the operations staff has been able to achieve some nitrification and denitrification by dissolved oxygen (DO) control at strategic locations and maintaining a higher (4-5 days) SRT in the aeration basins.[1]

[1]"How Low is Too Low?" Schuyler, Ronald G et.al., WE&T Journal, June 2009

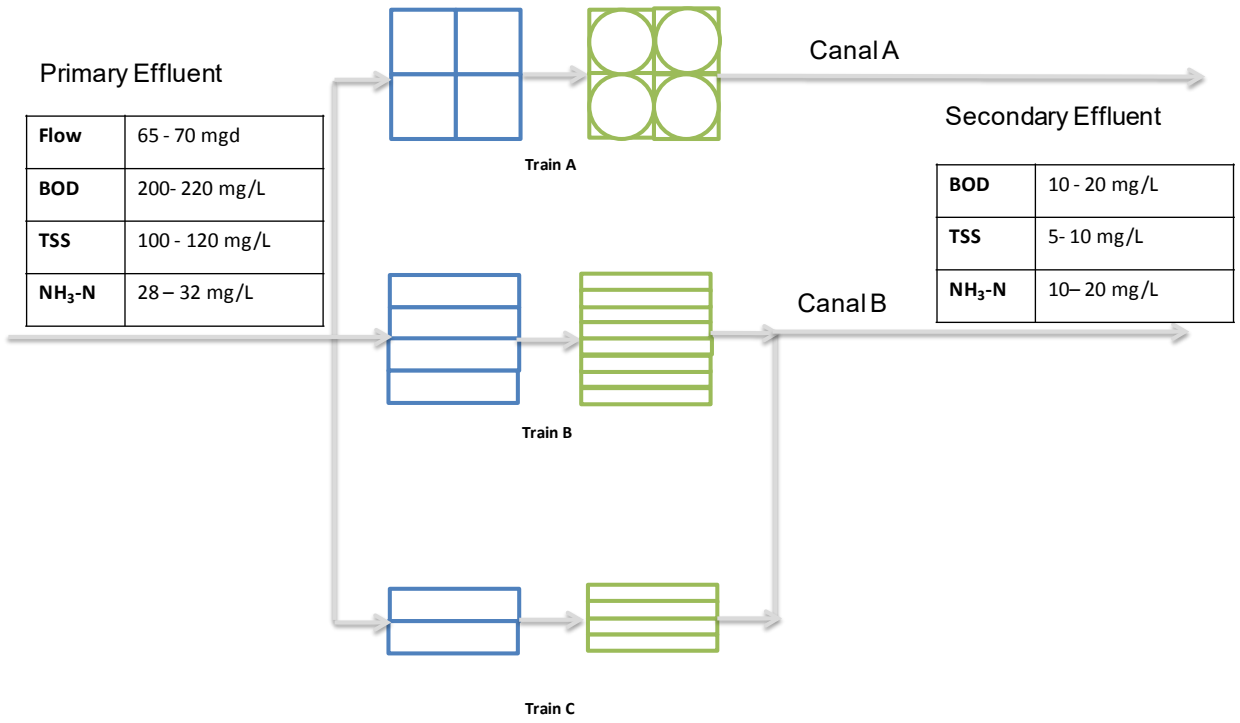


Figure 2-2: Existing Relevant Facilities - Current Operation

Train A, as pointed out above, is the oldest and is of obsolete design. The aeration basins are square shaped with sloping side walls. The mixed liquor is difficult to mix and aerate, the design is inefficient and does not allow plug flow regime (nearly essential to achieve high efficiency in a biological reactor), and operation and maintenance is less than optimum with sloping "gunited" walls. Further, based on Parsons' discussions with City's operations staff, Train A has immediate need for significant repairs/replacements (See Section 14 for details).

Trains B and C, however, are of newer construction and are well designed and operated. They have concrete walls and employ plug flow in reactors. The associated secondary clarifiers are also of proper design in terms of detention time, surface settling rates and other important criteria.

Therefore, the City believes and Parsons concurs, that in the current TTDF project, if any existing facilities should be upgraded and/or modified for reuse, they should be of Train A.

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PRE-WORKSHOP NO.1 ANALYSIS (SECTION 3 - SECTION 7)

SECTION 3 - PLANNED TERTIARY TREATMENT AND DISINFECTION FACILITY (TTDF)

3.1 GENERAL

As described in the previous Sections of this Technical Memorandum (TM), the City plans to construct a 5 to 10 mgd TTDF at the RWRF under first phase. This facility will consist of a 5 to 10 mgd filter feed pump station, a new conventional filtration system, a disinfection system, and a 5 million gallon (MG) storage tank along with post-chlorination and recycled water distribution pump station. The recycled water treated at the TTDF will be used for unrestricted landscape irrigation. The City, in the future, may also use the recycled water for ground water recharge, which requires removal of nitrogen to comply with the CDPH guidelines for recycled water recharge. The TTDF will be located in an open area north of Canal "B." During the Schematic Design Phase, a preliminary layout of 5 to 10 mgd TTDF expandable to ultimate capacity of 30 mgd will be prepared. Figure 3-1 below shows the planned TTDF in the overall RWRF treatment scheme. A simplified schematic of the TTDF and its unit processes is shown in Figure 3-2.

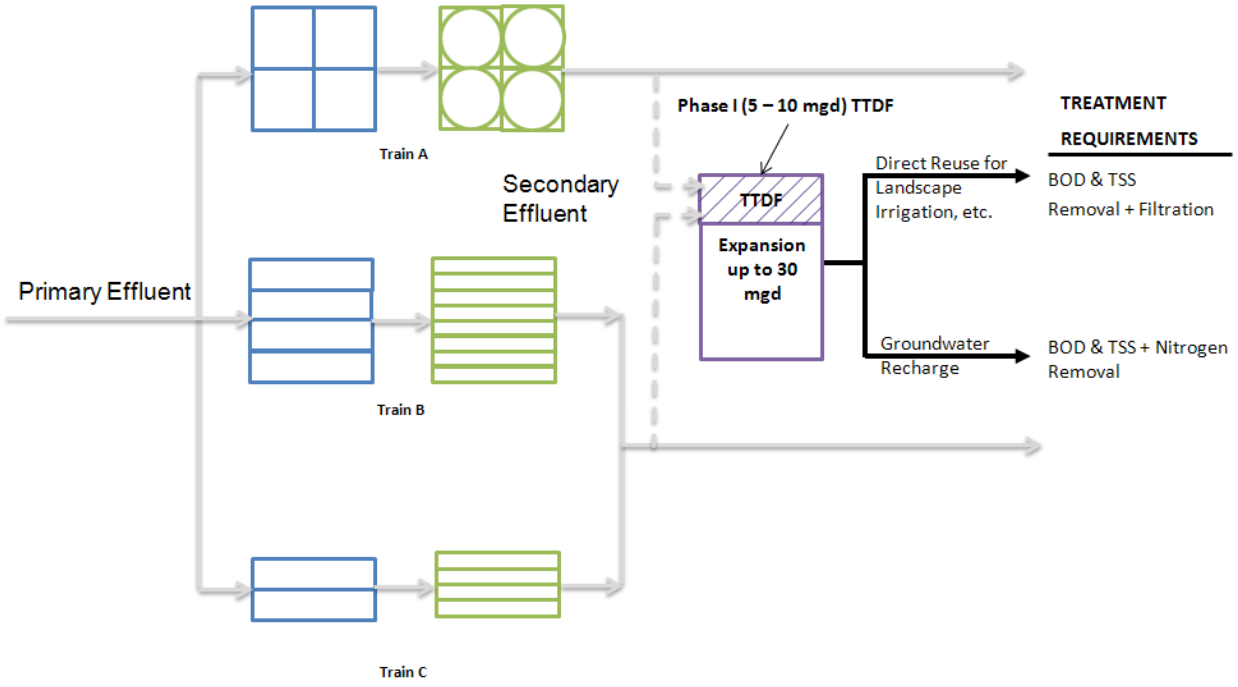


Figure 3-1: Planned TTDF

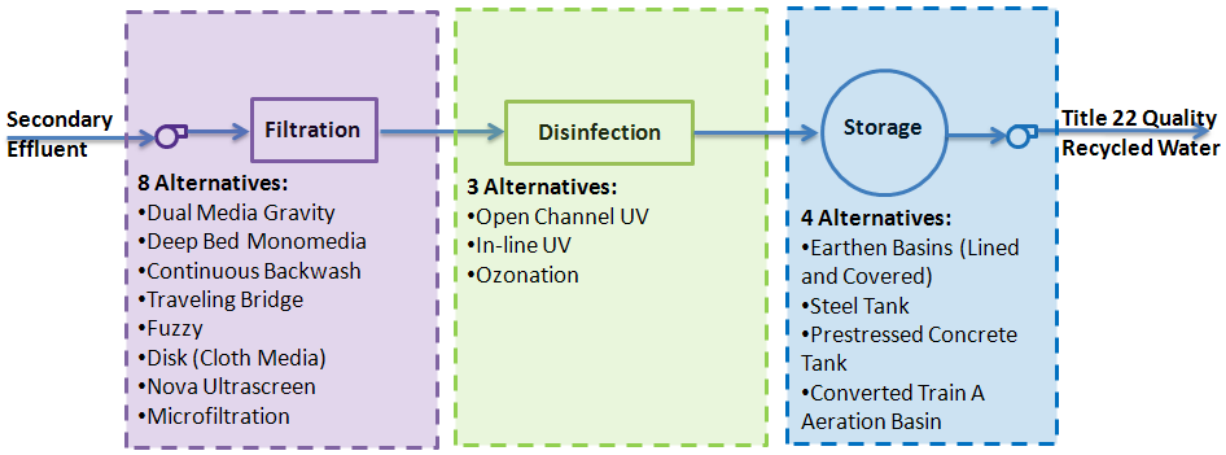


Figure 3-2: Simplified Schematic of the TTDF

A detailed analysis of the alternative technologies considered for evaluation for filtration, disinfection and storage systems is presented in Sections 4, 5 and 6, respectively, of this TM.

3.2 FILTER FEED PUMP STATION

A new filter feed pump station will be located adjacent to the existing effluent junction box to feed the secondary effluent to the proposed filters. The pump station will be sized to accommodate a total of four (4) vertical turbine pumps: two (one duty and one standby) will be installed for 5 mgd capacity and two more will be installed for next 10 mgd expansion of the TTDF. Space will be left for expansion of the pump station to 30 mgd.

3.3 FILTRATION

The following eight CDPH approved conventional filtration technologies will be evaluated to select the preferred filtration technology:

- Dual Media Gravity Filters
- Deep Bed Monomedia Filters
- Continuous Backwash Filters
- Traveling Bridge Filters
- Fuzzy Filters
- Disk (Cloth Media) Filters
- NOVA Ultrascreen Filters
- Microfiltration

In addition to the alternatives above, MBR, which replaces secondary clarifiers and provides filtration at the same time, will also be evaluated as an alternative to conventional filtration.

3.4 DISINFECTION

To select the most viable technology for the TTDF, proven disinfection technologies including

UV radiation (open channel and in-pipe) and ozonation will be evaluated. Only low-pressure high-intensity UV lamps will be considered for both open channel and in-pipe UV disinfection. Ozonation alternative will only consider the use of liquid oxygen for ozone generation. Section 5 of this TM provides a detailed analysis of disinfection system alternatives.

3.5 STORAGE

The proposed TTDF will include a 5 MG recycled water storage tank. The storage tank will have a recycled water distribution pump station. The following four alternatives for the storage tank construction will be evaluated to select the most viable alternative:

- Earthen Basins (lined and covered)
- Steel Tank
- Concrete Tank
- Conversion of an existing aeration basin from train A (capacity will be limited to 2.7 MG) – only for MBR option

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SECTION 4 - FILTRATION SYSTEM ALTERNATIVES ANALYSIS

4.1 BACKGROUND

As noted in Section 1, the City's goal is to produce 25,000 acre-ft/year of recycled water by 2025. This Section of the TM presents the eight filtration alternatives that were evaluated for the TTDF.

As described earlier, the existing facilities at the RWRF are designed to treat an average wastewater flow of 80 mgd. The existing RWRF produces secondary effluent that is well within the permitted BOD and TSS limits, as indicated in Table 4-1 below.

Table 4-1: Secondary Effluent Permitted Quality and Currently Achieved Quality

Parameter	Units	WDR Permit Limit[1] (Monthly Average)	Currently Achieving
BOD_5	mg/L	40	10 - 20
TSS	mg/L	40	5 - 10

[1]WDR Order No. 5-01-254 (See Appendix C)

To comply with CDPH standards for unrestricted reuse (Title 22) of wastewater effluent, the secondary effluent must be coagulated (although this requirement can be waived - see below), filtered, and disinfected. By removing a majority of the suspended solids and turbidity, filtration enhances the effectiveness of the downstream disinfection process.

Per Title 22 standards, when media filtration is used, the filtered effluent turbidity must not exceed a daily average of 2 Nephelometric Turbidity Units (NTU), 5 NTU more than 5% of the time within a 24 hour period, and 10 NTU at any time. These turbidity maxima were developed based on the Pomona Virus Study conducted by the County Sanitation Districts of Los Angeles County (CSDLAC, 1977), which correlated the turbidity values with successful disinfection as measured by total coliforms (less than 2.2 per 100 ml for Title 22 tertiary effluent) and viruses. When membrane filtration is used, the filtered effluent turbidity must not exceed 0.2 NTU more than 5% of the time within a 24 hour period, and 0.5 NTU at any time. Table 4-2 below summarizes Title 22 tertiary effluent criteria.

Table 4-2: Tertiary Effluent (Title 22) Criteria

Parameter	Units	Value
Turbidity for Media Filtration	NTU	≤2 Daily Average, ≤5 95% of the time within a 24 hour period, ≤10 at all times
Turbidity for Membrane Filtration	NTU	≤0.2 NTU 95% of the time within a 24 hour period, ≤0.5 NTU at all times
Filter Loading Rate	gpm/ft^2	2 – 30

Title 22 standards state that coagulation may be waived if the filter effluent does not exceed 2 NTU, the filter influent is continuously measured, the filter influent turbidity does not exceed 5 NTU, and automatically activated chemical addition or diversion facilities are provided in the event filter influent turbidity exceeds 5 NTU. The current secondary effluent quality data suggests that the RWRF meets the filter influent criteria for waiving the coagulation requirement. To enhance reliability and provide a prudent design, automatically actuated coagulation will be provided in the event filter influent turbidity exceeds 5 NTU.

There are several CDPH approved filtration technologies which generally fall into the following eight categories:

- Dual media gravity filters
- Deep bed monomedia filters
- Continuous backwash filters
- Traveling bridge filters
- Fuzzy filters
- Cloth media filters
- Nova Ultrascreen filters
- Microfilters

Each of these categories of filters has a specific maximum allowable filtration rate approved by the CDPH. The approved rates are based on pilot tests conducted (typically by an independent testing agency) on these filters using secondary effluent from an actual wastewater treatment plant and measurement and verification of performance in these tests.

Operational reliability is an important criterion for recycled water systems and there are several options for meeting Title 22 reliability requirements, including (reproduced from California Code of Regulations, Title 22, Chapter 3, Article 10, Section 60351) :

- Alarm and multiple filter units capable of treating the entire flow with one unit not in operation.
- Alarm, short-term retention or disposal provisions and standby replacement equipment.
- Alarm and long-term storage or disposal provisions.
- Automatically actuated long-term storage or disposal provisions.
- Alarm and standby filtration unit process.

For the purposes of filtration system alternative analysis in this TM, multiple filter units capable of treating the entire flow with one unit not in operation were considered. However, it should be noted that the RWRF does currently have long term disposal provisions under its existing WDR Order No. 5-01-254.

This TM presents the features of operation, advantages and disadvantages, design criteria, preliminary layout drawings, and preliminary construction, O&M, and 20 year life-cycle cost estimates for each of the eight filtration technologies. The evaluations consider a filtration capacity of 5 mgd constant flow (enough to satisfy near-term recycled water demand identified in the City's Recycled Water Master Plan).

4.2 FILTRATION SYSTEM ALTERNATIVES

4.2.1 Dual Media Gravity Filters

Features of Operation

Dual media filters are custom designed filters employing anthracite (typically 18-inches depth) and sand (typically 12-inches depth) media. The anthracite medium layer is above the sand medium layer. The sand medium is supported by a layer of gravel (in order to prevent plugging of underdrain nozzles/orifices and to distribute the backwash water evenly across the filter) which, in turn, is supported by the filter underdrain system. Many underdrain systems, however, are now capable of supporting the media directly, without the need of a gravel layer. Solids are removed by a variety of mechanisms including straining, sedimentation, impaction, interception, and adhesion (removal mechanisms that are common to all granular media depth filters). Figure 4-1 below presents a simplified schematic of a granular media depth filter.

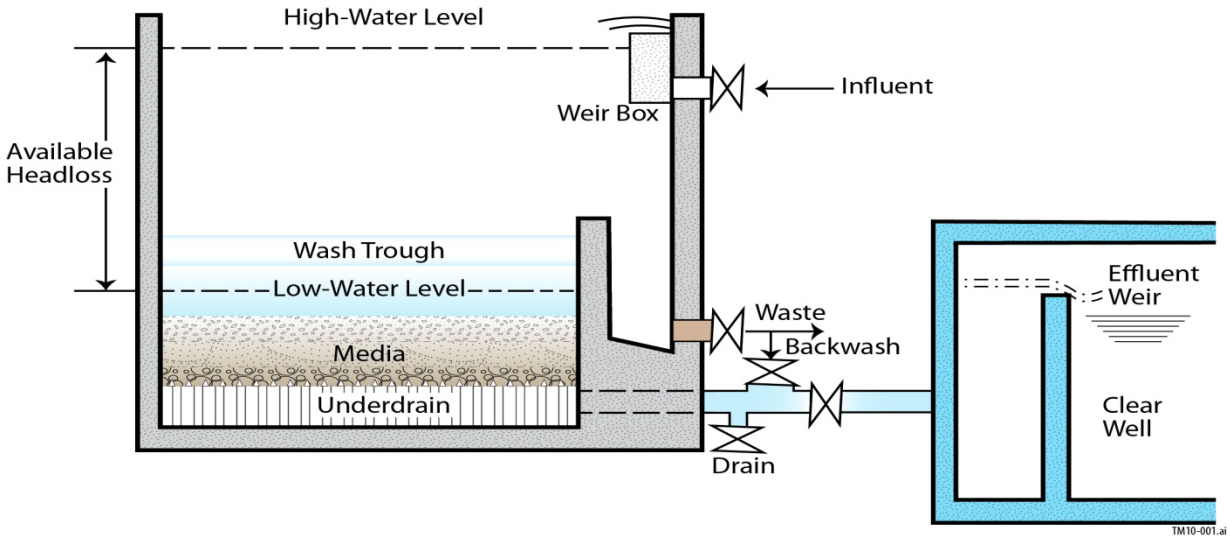


Figure 4-1: Simplified Schematic of a Granular Media Depth Filter

Over time, the solids accumulate within the voids of the filter bed, increasing the headloss across the filter. After the headloss exceeds a certain allowable level or after the filtered turbidity exceeds the allowable level, the filter must be backwashed in order to remove the accumulated solids. In the majority of operating filtration systems, headloss is used as the criteria for backwashing. The backwashing sequence in these filters is automatic and programmable so that backwashing occurs first with air only (approximately 3 minutes, but to be preselected), then air and water (approximately 5 minutes, but to be preselected), and then water only (approximately 10 minutes, but to be preselected). Two backwash pumps (one duty and one standby) and two air scour blowers (one duty and one standby), sized for backwashing one filter cell at a time, are provided. The backwash velocity is enough to fluidize the bed while avoiding media loss. In other words, the backwash velocity is controlled such that height of the fluidized bed does not exceed the level of the wash trough. The backwash waste is collected in the wash trough and is sent to a backwash waste storage tank. From the backwash waste

storage tank, the backwash waste is pumped at a controlled rate back to the headworks via return pumps. The length of a filter run (i.e. the time between filter cell backwashes) is conservatively 24 hours; however, the length of a filter run will depend upon the filter influent quality. Influent with higher turbidity would require more frequent backwashes and vice versa. The typical headloss through the filter is 2 (clean bed) - 10 (dirty bed) feet. The backwash waste production rate varies depending upon the filter influent quality, typically ranging between 5 - 15% of the filter influent flow rate.

Advantages and disadvantages of dual media gravity filters are summarized in Table 4-3 and the design criteria are summarized in Table 4-4. A preliminary layout for the dual media gravity filters at the TTDF is presented in Figure 4-2. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter cell is planned for the 5 mgd and 15 mgd systems and two redundant filter cells are planned for the 30 mgd system. Preliminary construction, O&M, and 20 year life-cycle cost estimates for dual media filters are presented in Table 4-5.

Advantages and Disadvantages

Table 4-3: Dual Media Filter Advantages and Disadvantages

Advantages	Disadvantages
Dual media filters are proven, with many long-operating installations.	Backwashes produce a large, instantaneous flow of backwash waste - which requires storage. The backwash waste storage tank is large (sized for two backwashes), adding to capital costs.
Dual media filters are, by virtue of their ample storage capacity, less susceptible to upsets and breakthrough than other filtration technologies that do not employ depth filtration.	Backwashing requires that a filter cell be taken off-line.
Dual media filters are non-proprietary (both in terms of design and materials e.g. media) and can be competitively bid.	Concrete and piping requirements are high.
	Expansion of the filter requires the construction of additional filter cells.
	Operating issues, such as loss of media and destratification of media, will occur over time.
	Chlorine dosing is recommended for algae control.

Design Criteria

Table 4-4: Dual Media Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	5
Number of Filter Cells	4
Dimensions of Each Cell, Length (ft) x Width (ft) x Depth (ft)	16 x 16 x 15.5
Total Filtration Area, ft^2	1,024
Filtration Rate with One Filter Backwashing, gpm/ft^2	4.5
Backwash	
Type	Air-water (Air, Air & Water, Water)
Rate, Air and Water Cycle	
Air, scfm/ft^2	3 to 5
Water, gpm/ft^2	8 to 9
Rate, Water Cycle Only, gpm/ft^2	16 to 18
Underdrain Type	False Bottom with Nozzles or Underdrain Blocks
Backwash Waste Storage Tank Capacity	2 Backwashes
Headloss Through Filter, ft (Operating)	10

Preliminary Layout

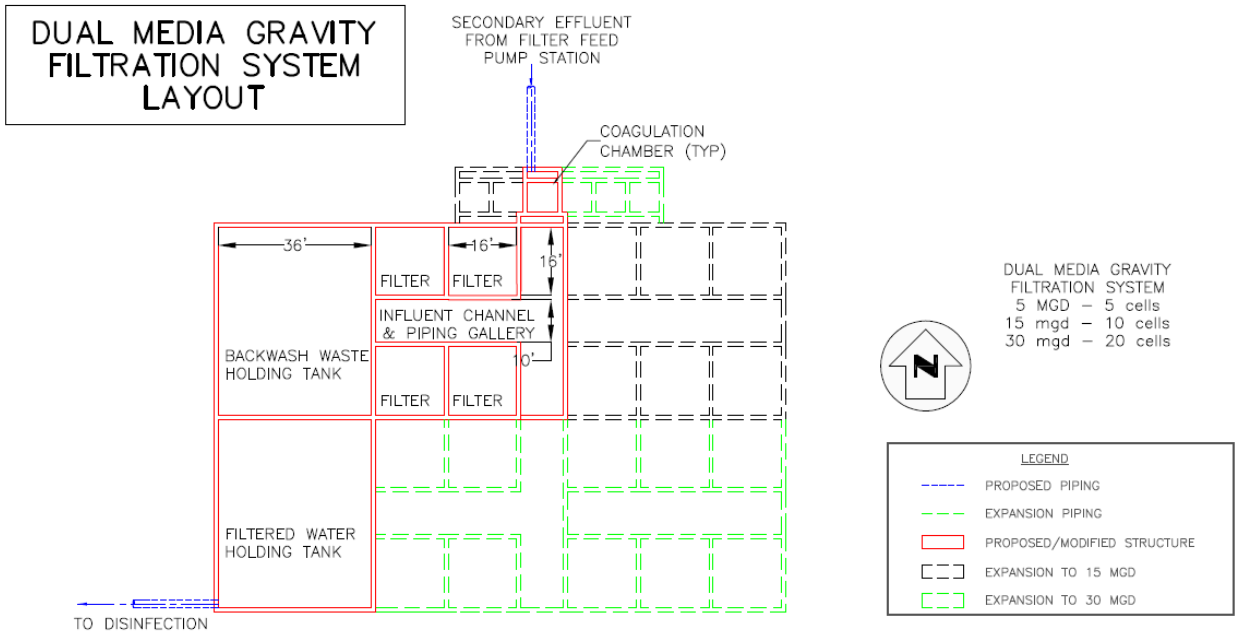


Figure 4-2: Preliminary Layout of 5 mgd Dual Media Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-5: Dual Media Filter Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,600,000
Total Capital Cost[a]	4,300,000
Total Annual O&M Cost[b]	90,000
20-Year Life Cycle Cost [c]	5,900,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

4.2.2 Deep Bed Monomedia Filters

Features of Operation

The features of operation for deep bed monomedia filters are essentially identical to dual media gravity filters, with the only major difference being the media - deep bed monomedia filters employ a single medium (typically anthracite with a depth of 48-inches). The length of a filter run, the operating headloss across the filter bed, and the backwash waste production rate for deep bed monomedia filters are essentially the same as for dual media gravity filters (refer to Section 4.2.1).

Advantages and disadvantages of deep bed monomedia filters are summarized in Table 4-6 and the design criteria are summarized in Table 4-7. A preliminary layout for the deep bed monomedia filters at the TTDF is presented in Figure 4-3. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter cell is planned for the 5 mgd and 15 mgd systems and two redundant filter cells are planned for the 30 mgd system. Preliminary construction, O&M, and 20 year life-cycle cost estimates for deep bed monomedia filters are presented in Table 4-8 below.

Advantages and Disadvantages

Table 4-6: Deep Bed Monomedia Filter Advantages and Disadvantages

Advantages	Disadvantages
Deep bed monomedia filters are proven, with many long-operating installations.	Backwashes produce a large, instantaneous flow of backwash waste - which requires storage. The backwash waste storage tank is large (sized for two backwashes), adding to capital costs.
Deep bed monomedia filters are, by virtue of their ample storage capacity, less susceptible to upsets and breakthrough than other filtration technologies, including dual media gravity filters.	Backwashing requires that a filter cell be taken off-line.
Deep bed monomedia filters are non-proprietary (both in terms of design and materials e.g. media) and can be competitively bid.	Concrete and piping requirements are high.
Deep bed monomedia filters use a single medium, avoiding the problems with destratification of media experienced with multimedia filters.	Expansion of the filter requires the construction of additional filter cells.
	Operating issues, such as loss of media, occur over time.
	Chlorine dosing is recommended for algae control.

Design Criteria

Table 4-7: Deep Bed Monomedia Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	5
Number of Filter Cells	4
Dimensions of Each Cell, Length (ft) x Width (ft) x Depth (ft)	16 x 16 x 17
Total Filtration Area, ft^2	1,024
Filtration Rate with One Filter Backwashing, gpm/ft^2	4.5
Backwash	
Type	Air-water (Air, Air & Water, Water)
Rate, Air and Water Cycle	
Air, scfm/ft^2	3 to 5
Water, gpm/ft^2	8 to 9
Rate, Water Cycle Only, gpm/ft^2	16 to 18
Underdrain Type	False Bottom with Nozzles or Underdrain Blocks
Backwash Waste Storage Tank Capacity	2 Backwashes
Headloss Through Filter, ft (Operating)	10

Preliminary Layout

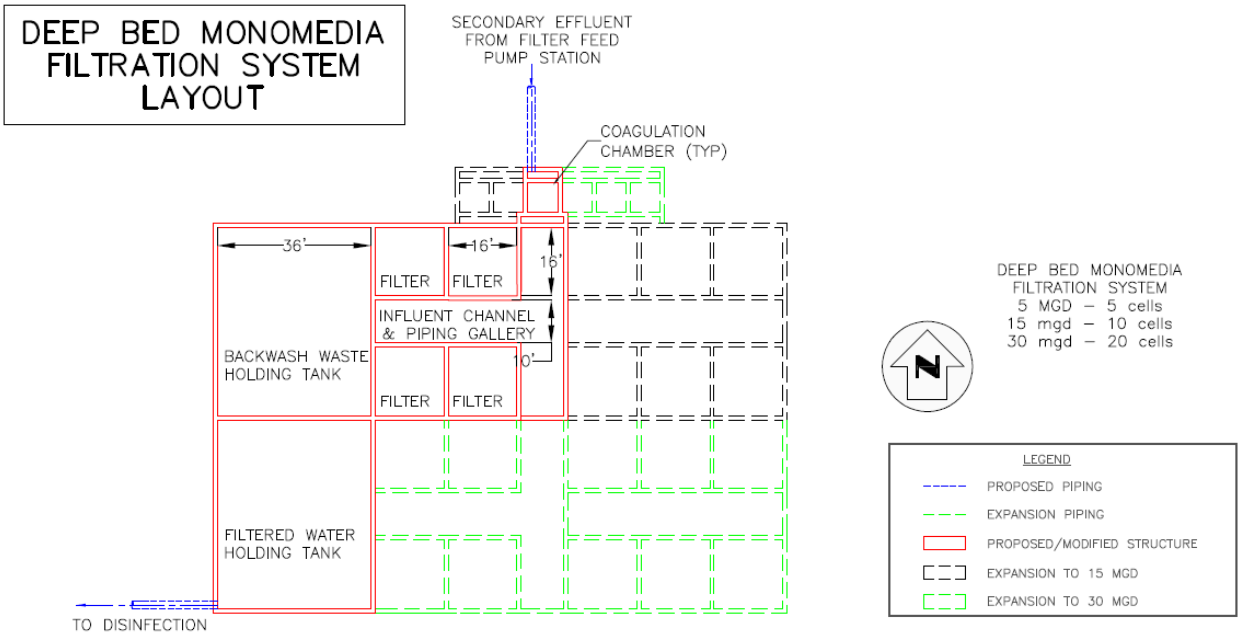


Figure 4-3: Preliminary Layout of 5 mgd Deep Bed Monomedia Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-8: Deep Bed Monomedia Filter Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,600,000
Total Capital Cost[a]	4,400,000
Total Annual O&M Cost[b]	90,000
20-Year Life Cycle Cost [c]	6,000,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[c]At a 5% discount rate and a 4% escalation rate.

4.2.3 Continuous Backwash Filters

Features of Operation

Continuous backwash filters, marketed under various names such as DynaSand, SuperSand, and TechnaSand, are deep bed granular media filters that are similar to the granular media filters discussed above in that solids are removed by straining, sedimentation, impaction, interception, and adhesion. However, there are a several major differences: the filter bed is continuously backwashed via an airlift pump and the filter operates as an up-flow filter rather than a down-flow filter. The filters are supplied in modules, either as packaged units (for low flow applications) or for installation in concrete basins (for high flow applications). Due to the continuous filter bed cleaning system, this type of filter requires a low operating head (about 3 feet). It also produces a continuous low rate of waste backwash flow to eliminate the need for flow equalization of the waste backwash before return to the main treatment plant. The backwash waste production rate is approximately 5% of the filter influent flow rate.

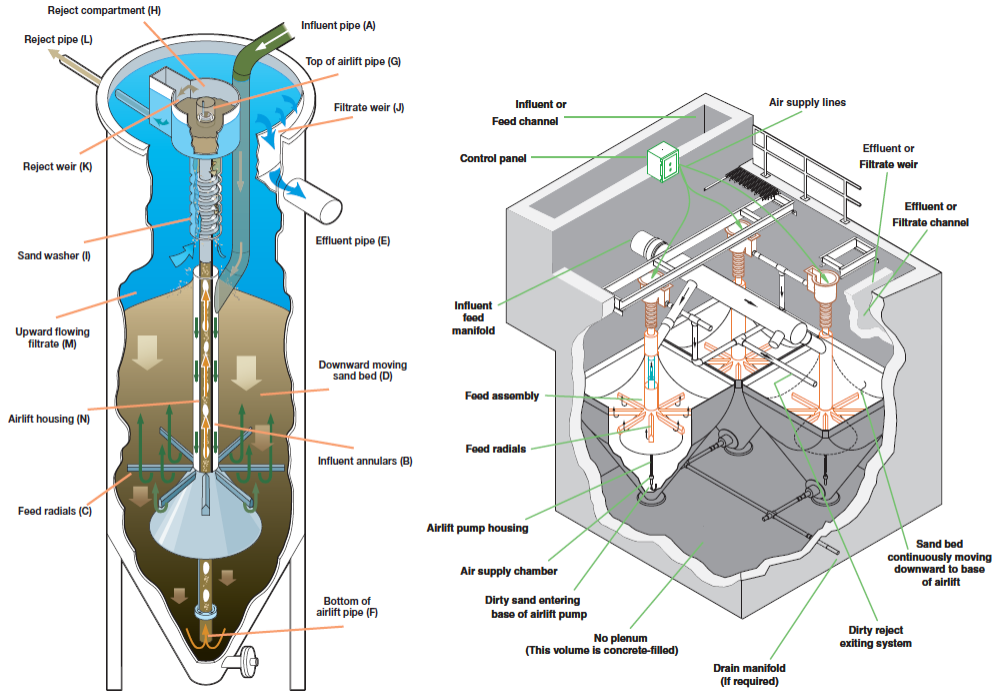


Figure 4-4: Continuous Backwash Filter (Figure from DynaSand®)

As shown in Figure 4-4 above, sand containing captured solids is drawn though an airlift pipe and into a reject compartment. The sand is scoured within the airlift pipe, cleaning the sand before it is collected in the reject compartment. The scoured solids, which are less dense than the sand media, flow over the reject weir and into the reject pipe. The clean sand then returns to the filter bed though a sand washer, in which any remaining solids are removed and carried back into the reject compartment by a small amount of filtrate. Figure 4-4 above shows filter cells arranged in 2 x 2 configuration. For the TTDF, a 4 x 1 module configuration is planned.

Advantages and disadvantages of continuous backwash filters are summarized in Table 4-9 and the design criteria are summarized in the Table 4-10. A preliminary layout for the continuous backwash filters at the TTDF is presented in Figure 4-5. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter cell is planned for the 5 mgd and 15 mgd systems and two redundant filter cells are planned for the 30 mgd system. Preliminary construction, O&M, and 20 year life-cycle cost estimates are presented in Table 4-11.

Advantages and Disadvantages

Table 4-9: Continuous Backwash Filter Advantages and Disadvantages

Advantages	Disadvantages
Continuous backwash filters are proven, with many long-operating installations.	The design of continuous backwash filters is proprietary.
Continuous backwash filters are, by virtue of their ample storage capacity, less susceptible to upsets and breakthrough than other filtration technologies that do not employ depth filtration.	Expansion of the filter requires the construction of additional filter cells.
Continuous backwash filters have no moving parts. The only mechanical component of this type of filter is an air compressor to produce the air needed for the airlift pumps.	Air flow must be precisely controlled in order to prevent the loss of media.
Continuous backwashing eliminates the need for taking a filter off-line for cleaning, storing backwash water and filtered water, and backwash waste return pumps.	Internal parts of the filter cannot be accessed for maintenance without taking the filter offline and removing the media.

Design Criteria

Table 4-10: Continuous Backwash Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	5
Number of Filter Cells	5
Dimensions of Each Cell, Length (ft) x Width (ft) x Depth (ft)	28.3 x 7.1 x 16.2
Total Filtration Area, ft^2	1,000
Filtration Rate with One Filter Backwashing, gpm/ft^2	4.3
Backwash	
Type	Air
Rate, Air	
Air, scfm per module (scfm per ft^2)	2 - 3 (>150)
Headloss Through Filter, ft (Operating)	3

Preliminary Layout

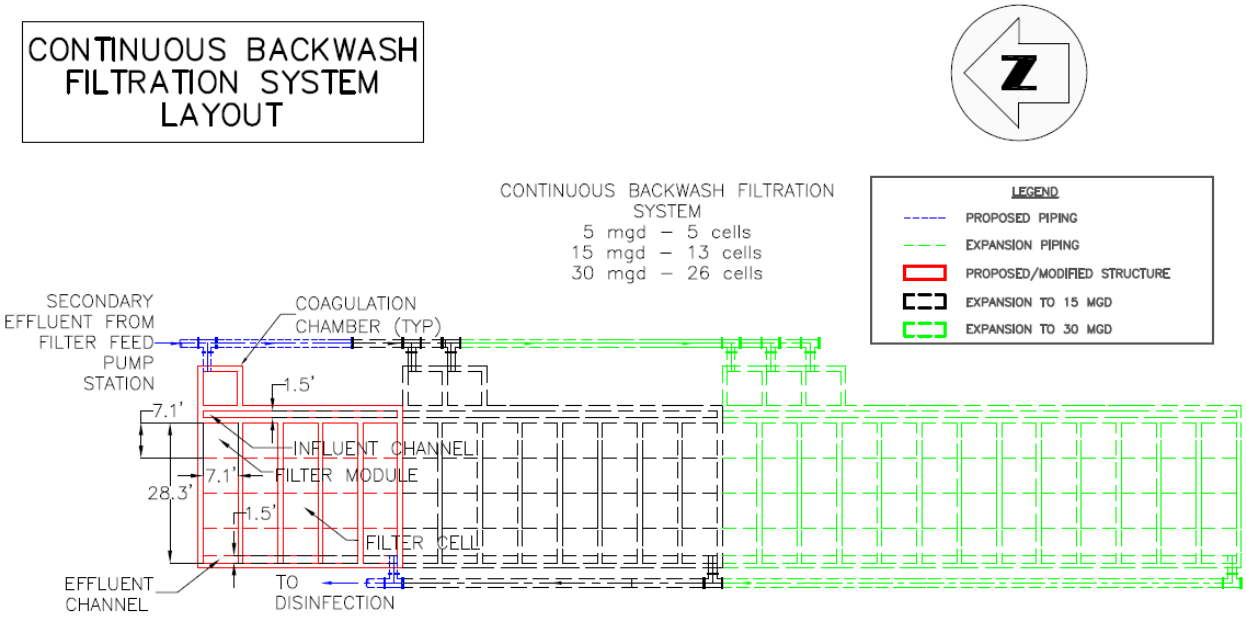


Figure 4-5: Preliminary Layout of 5 mgd Continuous Backwash Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-11: Continuous Backwash Filter Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,300,000
Total Capital Cost[a]	3,800,000
Total Annual O&M Cost[b]	105,000
20-Year Life Cycle Cost [c]	5,600,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[c]At a 5% discount rate and a 4% escalation rate.

4.2.4 Traveling Bridge Filters

Features of Operation

Traveling bridge filters, marketed under various names such as ABW, AquaABF, and Gravisand, are shallow bed (typically 11-inches) granular media filters that are installed in a segmented bed arrangement. The backwash system is suspended from a bridge that moves across the bed. A pump takes filtered water from the effluent channel and directs it back into a segment of the filter bed, forcing the water back up through the filter bed, dislodging the particles removed from the wastewater. A second pump, attached to a hood that covers the segment being backwashed, draws the waste backwash water into the hood and discharges it into a trough for return to the head of the treatment plant.

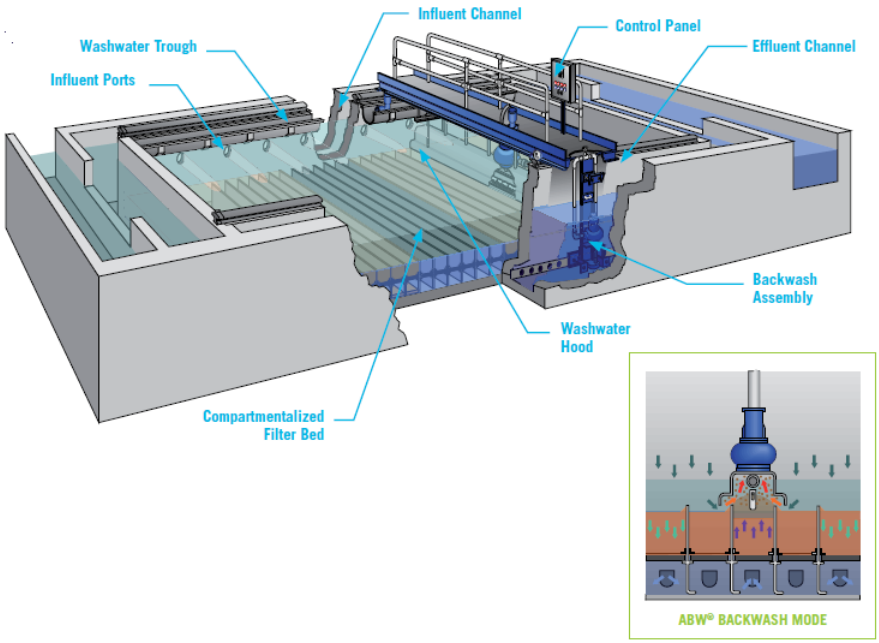


Figure 4-6: Traveling Bridge Filter (Figure from ABW®)

As with other filtration technologies, the backwash frequency and backwash waste production rate vary depending upon the filter influent quality; however, typically each filter is backwashed three times per day and the backwash waste production rate is typically 1 - 2% of the filter influent flow rate. The operating headloss across the filer is low, typically 2 - 12 inches of water. Typically, backwashing is initiated when a predetermined headloss across the filter bed is exceeded although the operator can choose to initiate backwashing after the filter effluent turbidity exceeds a predetermined set point.

Advantages and disadvantages of traveling bridge filters are summarized in Table 4-12 and design criteria are summarized in the Table 4-13. A preliminary layout for the traveling bridge filters at the TTDF is presented in Figure 4-7. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter cell is planned for the 5 mgd, 15 mgd, and

30 mgd systems. Preliminary construction, O&M, and 20 year life-cycle cost estimates for traveling bridge filters are presented in Table 4-14.

Advantages and Disadvantages

Table 4-12: Traveling Bridge Filter Advantages and Disadvantages

Advantages	Disadvantages
Traveling bridge filters are proven, with many long-operating installations.	The design of traveling bridge filters is proprietary.
The backwashing arrangement eliminates the need for taking a filter out-of-service for cleaning.	The CDPH approved filtration rate is low (≤2 gpm/ft^2), resulting in a large footprint.
Filter feed pump pressure requirements are lower due to the shallow filter bed depth.	Expansion of the filter requires the construction of additional filter cells.
	The backwash system bridge has many moving parts.
	The depth of the filter bed is shallow and the filter is more susceptible to upsets and breakthrough than deep bed filters.

Design Criteria

Table 4-13: Traveling Bridge Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	2
Number of Filter Cells	2
Dimensions of Each Cell, Length (ft) x Width (ft) x Depth (ft)	110 x 16 x 6.25
Total Filtration Area, ft^2	3,520
Filtration Rate with One Filter Offline, gpm/ft^2	1.97
Headloss Through Filter, ft (Operating)	1

Preliminary Layout

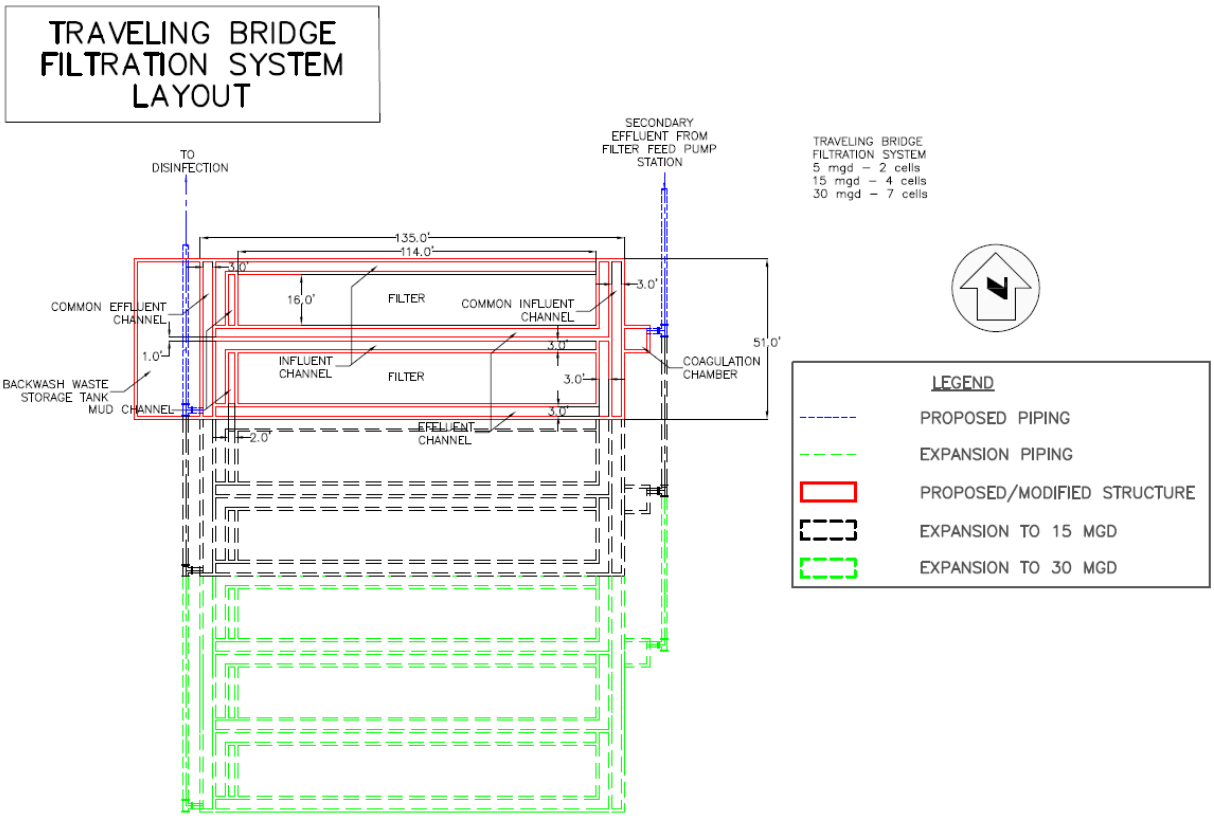


Figure 4-7: Preliminary Layout of 5 mgd Traveling Bridge Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-14: Traveling Bridge Filter Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,800,000
Total Capital Cost[a]	4,800,000
Total Annual O&M Cost[b]	80,000
20-Year Life Cycle Cost [c]	6,200,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[c]At a 5% discount rate and a 4% escalation rate.

4.2.5 Fuzzy Filters

Features of Operation

Fuzzy filter is a proprietary filtration technology from Schreiber, LLC utilizing media consisting of highly porous (~90%) 1.25-inch diameter synthetic fiber spheres. The media is compressible, which allows the properties of the filter bed (including bed depth and porosity) to be controlled by the operator in response to changes in filter influent quality, amount of solids accumulated in the filter bed, and desired effluent quality. The high porosity allows the filter to be operated at a filtration rate well in excess of conventional incompressible granular media filters (30 gpm/ft2 as opposed to 5 gpm/ft2), which translates to a very compact footprint. The filters are supplied as modular, packaged units.



Figure 4-8: Fuzzy Filter (Figure from Schreiber, LLC)

The media is retained between two perforated plates as shown in Figure 4-8, of which the top plate is adjustable. During the "Filtration Cycle", the influent is filtered in an up-flow configuration - it is introduced at the bottom of the filter and withdrawn at the top of the filter. When the headloss across the filter reaches a predetermined set point or when the effluent turbidity exceeds a predetermined set point, the filter enters into the "Wash Cycle." Typically, backwashing is initiated every 24 hours or after the headloss across the filter exceeds a predetermined set point, whichever occurs sooner. In the "Wash Cycle," the adjustable plate automatically rises and the filter media is expanded using the flow velocity of filter influent water. "Washing air" is then introduced to scour the media and remove the captured solids. The dirty wash water is withdrawn from the top of the filter and returned to the plant. Before the filter is brought back into service, the adjustable plate comes back to its original position and the filter is flushed to waste ("Flush Cycle") for approximately one minute. The entire backwash cycle takes about 30 minutes. The backwash waste production rate is approximately 1 - 5% of the influent filter flow rate, depending upon the filter influent quality.

Advantages and disadvantages of fuzzy filters are summarized in Table 4-15 and the design criteria are summarized in the Table 4-16. A preliminary layout for the fuzzy filters at the TTDF is presented in Figure 4-9. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter unit is planned for the 5 mgd, 15 mgd, and 30 mgd systems.

Preliminary construction, O&M, and 20 year life-cycle cost estimates for fuzzy filters are presented in Table 4-17 below.

Advantages and Disadvantages

Table 4-15: Fuzzy Filter Advantages and Disadvantages

Advantages	Disadvantages
The CDPH approved filtration rate for Fuzzy Filters is high (≤30 gpm/ft^2), resulting in a compact footprint.	Fuzzy filters are proprietary and would need to be sole sourced from Schreiber, LLC.
The properties of the bed (porosity, depth, etc.) are adjustable and, thus, the filter is able to handle variations in influent quality.	The media is proprietary and media replacement is expensive.
Filters are supplied as easy to install skid mounted, packaged units.	There are only small (less than 1 mgd filtration capacity) installations in California.
	The history and number of Title 22 installations is limited.
	Backwashing requires the shutdown of the entire filter unit.

Design Criteria

Table 4-16: Fuzzy Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	30
Number of Filter Units	3
Dimensions of Each Filter Bed, Length (ft) x Width (ft)	7 x 7
Total Filtration Area, ft^2	147
Filtration Rate with One Filter Backwashing, gpm/ft^2	35.4
Headloss Through Filter, ft (Operating)	4

Preliminary Layout

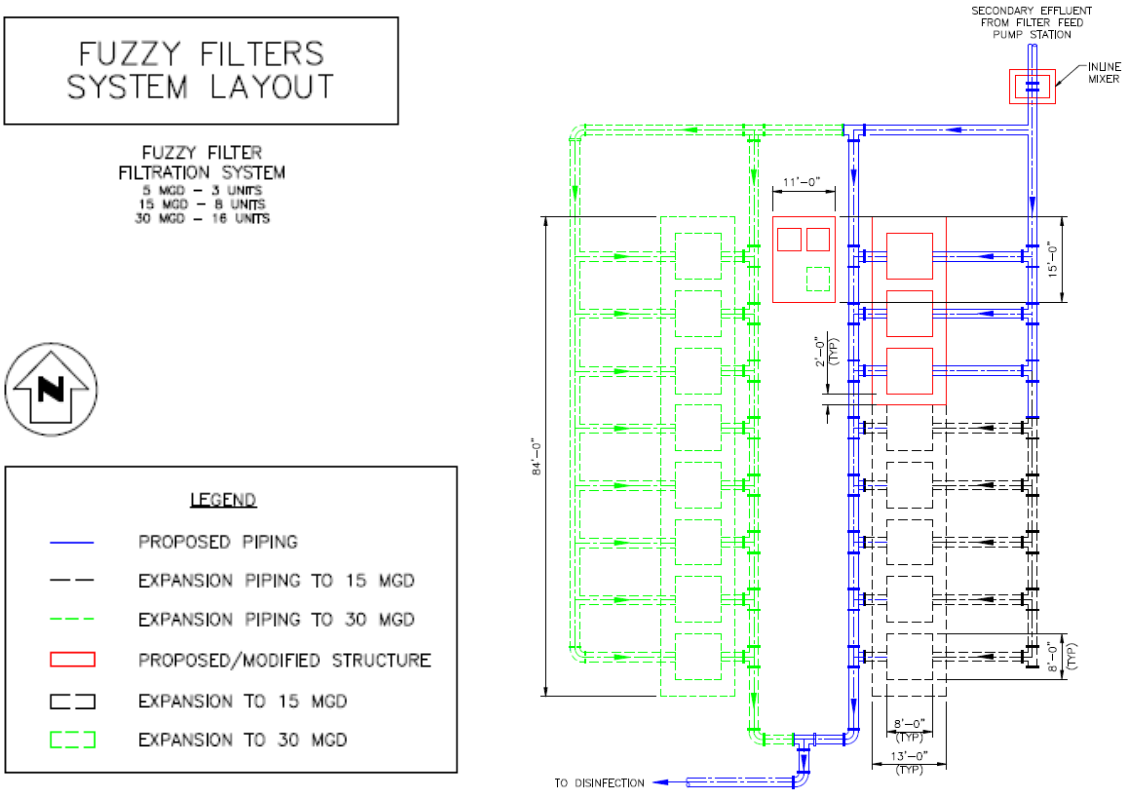


Figure 4-9: Preliminary Layout of 5 mgd Fuzzy Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-17: Fuzzy Filter Cost Summary(5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,350,000
Total Capital Cost[a]	4,100,000
Total Annual O&M Cost[b]	110,000
20-Year Life Cycle Cost [c]	6,000,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[c]At a 5% discount rate and a 4% escalation rate.

4.2.6 Cloth Media Filters

Features of Operation

Cloth media filters are type of filters consisting of segmented disks of synthetic media. Unlike in deep bed granular media filtration, cloth media filters remove solids primarily by straining and, while the media does have depth, the "filter bed" is essentially two-dimensional. There are many proprietary products that fall into this category, including: AquaDisk from Aqua Aerobics, Hydrotech from Veolia, and Forty X from Siemens. Aqua Aerobics also supplies AquaDiamond, which operates on the same principles as AquaDisk; however, it is primarily used as a retrofit to traveling bridge filters.

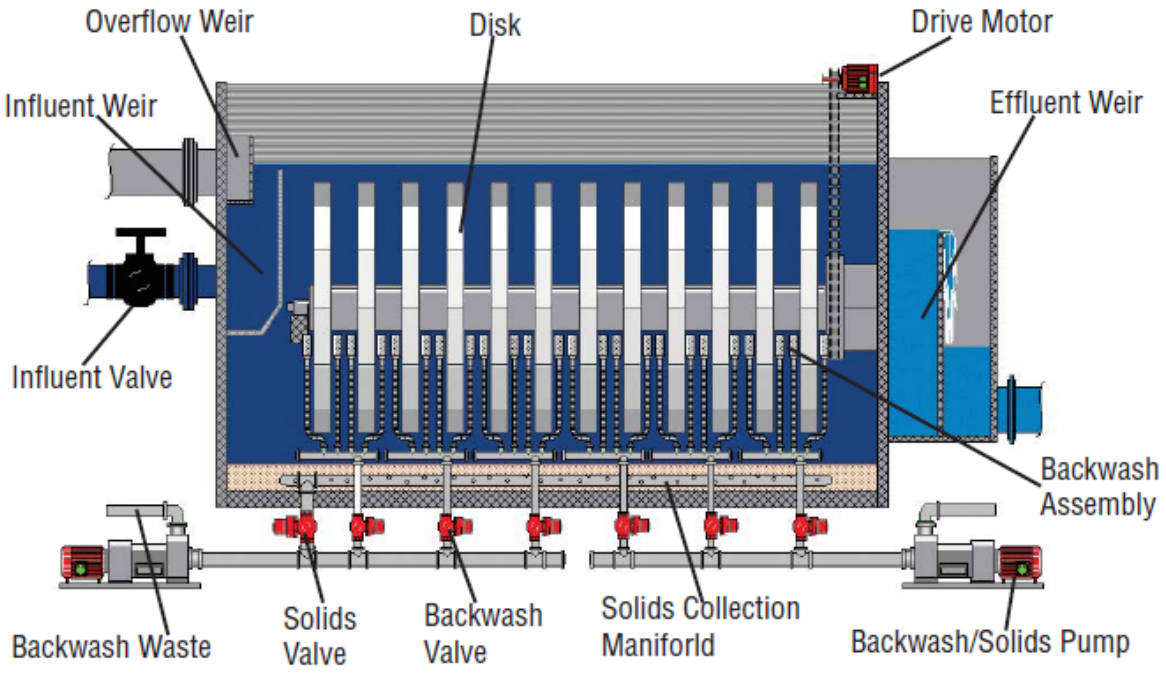


Figure 4-10: Cloth Media Filter (Figure from Aqua-Aerobic)

Depending upon the specific manufacturer, cloth media filters operate in both "inside-out" (filter influent is introduced within the center shaft of the disks, flows through the disk media, and filtered water is collected in the basin) and "outside-in" (filter influent is introduced in the basin, flows through the disk media, and filtered water is collected in the center shaft of the disks as shown in Figure 4-10) configurations. The description that follows describes a cloth media filter with an "out-to-in" configuration, such as AquaDisk. Inlet wastewater enters the basin, completely submerging the cloth media. Liquid passes through the cloth media. The filtered liquid enters the internal portion of the disk and is discharged through the center shaft. As the filter cloth collects solids on the outer surface, headloss across the media gradually increases and water level inside the tank rises to a set point elevation. At this point, the backwash cleaning system initiates backwash operation and cleans a set of two discs while the other discs in the tank continue filtration. During backwash, the disks undergoing backwash are rotated and a vacuum pump cleans the disk media. Influent will continue to be processed

during the backwash cleaning cycle, allowing for continuous filtration. Heavier solids are allowed to settle to the bottom portion of the filter tank. These solids are then pumped on an intermittent basis. All components of the system are constructed from corrosion resistant materials designed for continuous operation.

The backwash waste production rate varies depending upon filter influent quality, but typically ranges from 5 - 10% of the filter influent flow rate. The number of backwashes per day also varies widely depending upon influent water quality. Typically, disks are backwashed every 30 to 40 minutes and the backwash duration for one 12 disk unit is 12 minutes.

Advantages and disadvantages of cloth media filters are summarized in Table 4-18 and the design criteria are summarized in the Table 4-19. A preliminary layout for the cloth media filters at the TTDF is presented in Figure 4-11. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter unit is planned for the 5 mgd, 15 mgd, and 30 mgd systems and that the structure that is planned for the 5 mgd system is sufficient for housing disks with a filtration capacity of up to 9 mgd. Preliminary construction, O&M, and 20 year life-cycle cost estimates for cloth media filters are presented in Table 4-20.

Advantages and Disadvantages

Table 4-18: Cloth Media Filter Advantages and Disadvantages

Advantages	Disadvantages
Filtration capacity can be increased without adding tanks. The cloth media filter considered for the TTDF is expandable to 9 mgd with just the addition of disks.	The design of cloth media filters is proprietary.
There are no moving parts during filtration.	The media for cloth media filters is proprietary and relatively expensive.
There is no downtime during backwashing (only a set of two disks are backwashed at a time).	There are pronounced spikes in effluent turbidity for ~5 minutes following backwash - more so than in conventional deep bed granular media filters.
Backwash volume requirements are low.	
The footprint is relatively small (since the disks allow for a high filter surface area per ft^2 of physical footprint).	
There is a good customer base in California with many Title 22 installations.	
The headloss across the filter is low.	
Media replacement is simple.	

Design Criteria

Table 4-19: Cloth Media Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	6
Number of Filter Units	3
Number of Disks per Unit	8
Total Filtration Area, ft^2	1291
Filtration Rate with One Filter Offline, gpm/ft^2	4.0
Headloss Through Filter, ft (Operating)	3

Preliminary Layout

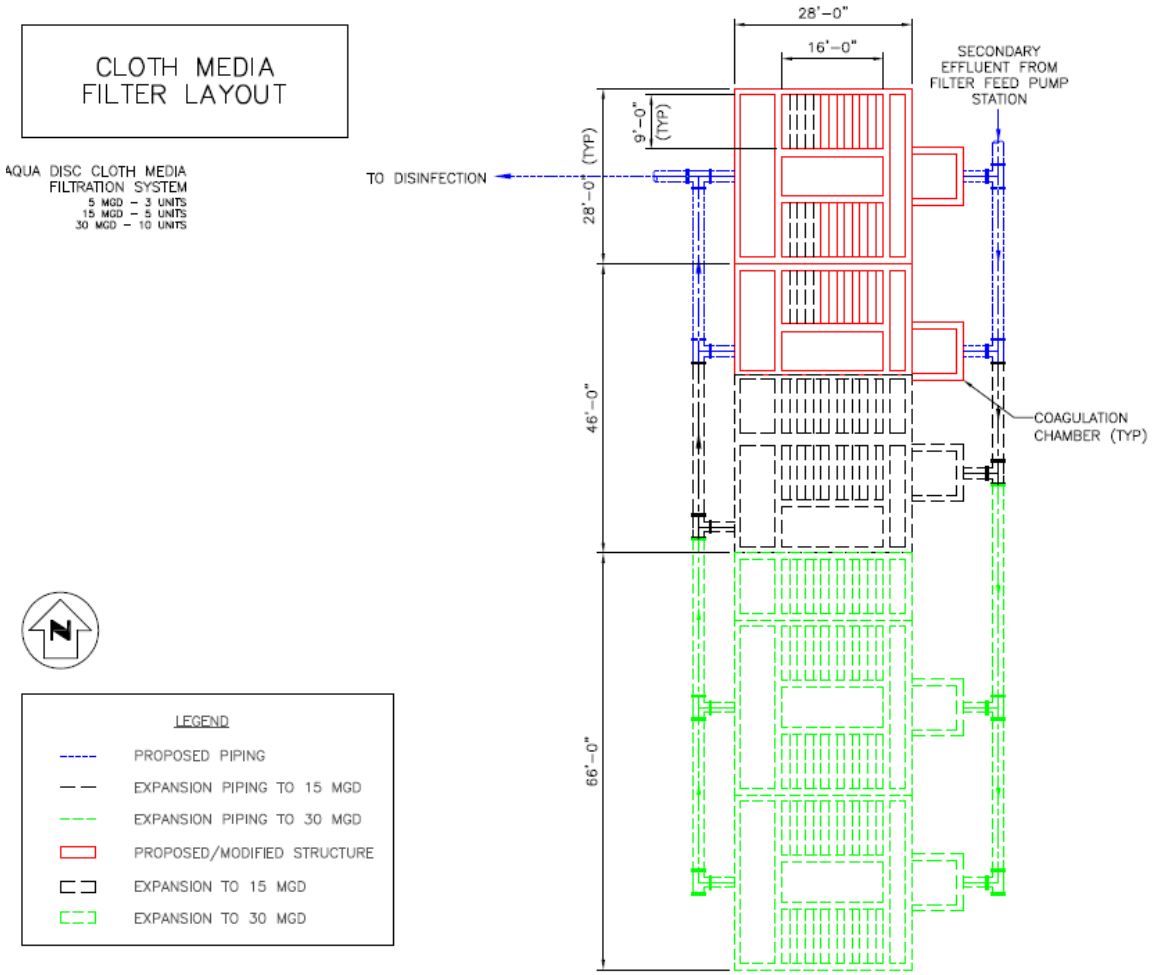


Figure 4-11: Preliminary Layout of 5 mgd Cloth Media Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-20: Cloth Media Filter Cost Summary (5 mgd Constant Flow[d])

Parameter	Cost ($)
Equipment and Structures Cost	1,400,000
Total Capital Cost [a]	4,100,000
Total Annual O&M Cost [b]	90,000
20-Year Life Cycle Cost [c]	5,700,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.
[d]Concrete structure is capable of housing additional disks with a filtration capacity of 4 mgd i.e. the concrete structure is designed for a total filtration capacity of 9 mgd.

4.2.7 Nova Ultrascreen Filters

Features of Operation

The Nova Ultrascreen® filter is a proprietary filter from Nova Water Technologies that, like cloth media filters, utilizes segmented disks for filtration. The key difference between Nova Ultrascreen filters and cloth media filters is the filtration media - Nova Ultrascreen filters use precision woven stainless steel micronic screen mesh with precise perforation sizes depending upon the application. The media has no depth and the mechanism of solids removal is exclusively straining (i.e. operates as a surface filter). The filter operates in an “inside-out” configuration - the filter influent is directed to the inside of the disks, flows through the stainless steel mesh, and is collected in a clear well (see Figure 4-12 below). Nova Ultrascreen filters are supplied as modular, fully enclosed, packaged units constructed in full stainless steel.

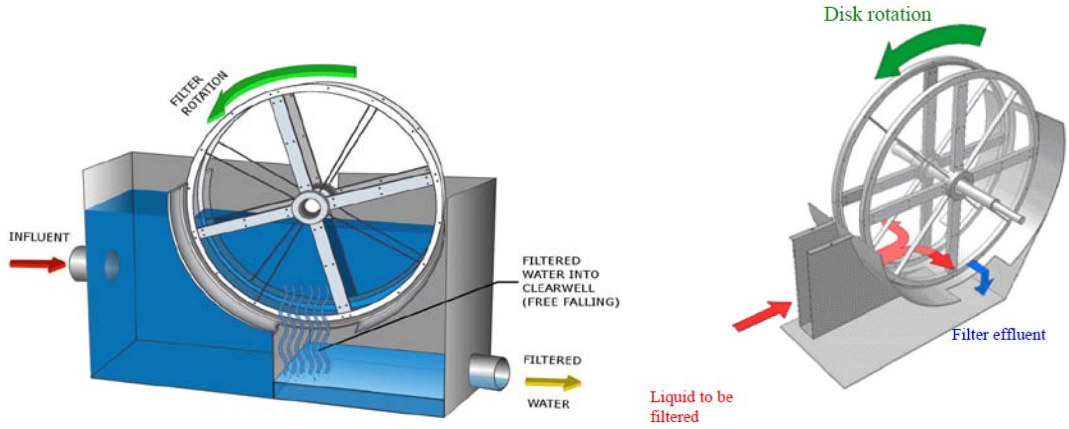


Figure 4-12: Nova Ultrascreen Filter (Figure from Nova Water Technologies)

The other major difference when compared to cloth media disc filters is that here the disks rotate continually during filtration in order to achieve "dynamic tangential filtration," a phenomenon that the supplier claims increases solids rejection and limits the build-up of solids on the screen. By continuously rotating the disks during filtration, the angle of approach taken by a particle will be less than 90^{o}, making the projected area of perforations in the media smaller than their rated size. Per the manufacturer, these filters are able to remove a target particle size of 10 microns with a mesh opening size of 20 microns due to "dynamic tangential filtration".

Nova Ultrascreen discs are partially submerged as shown in Figure 12. The backwash is initiated in a manner similar to cloth media disc filters upon the water level in the basin reaching a preset elevation. However, unlike the cloth media filters, the backwash is carried out via a set of backwash arms installed on both sides of the discs and fitted with nozzles. Per the manufacturer, the disks undergo "pulsed backwashing", which is a short burst of backwashes lasting 10-15 sec and occur quite frequently throughout the day. The number of backwashes per day varies widely depending on the quality of the influent. The filtration cycle continues during the backwash as the discs continually rotate. Upper half of the discs that are above the water level are backwashed while the lower half of the discs continue filtration. The backwash waste production rate also varies depending upon filter influent quality, but is typically less than 1% of the filter influent flow rate.

Advantages and disadvantages of Nova Ultrascreen filters are summarized in Table 4-21 and the design criteria are summarized in the Table 4-22. A preliminary layout for the Nova Ultrascreen filters at the TTDF is presented in Figure 4-13. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Note that one redundant filter unit is planned for the 5 mgd, 15 mgd, and 30 mgd systems. Preliminary construction, O&M, and 20 year life-cycle cost estimates for Nova Ultrascreen filters are presented in Table 4-23.

Advantages and Disadvantages

Table 4-21: Nova Ultrascreen Advantages and Disadvantages

Advantages	Disadvantages
The CDPH approved filtration rate for the Nova Ultrascreen filter is 16 gpm/ft^2, provided that the filter is coupled with a disinfection process that achieves a 5-log polio virus removal.	Nova Ultrascreen filters are proprietary and would need to be sole sourced from Nova Water Technologies.
Supplied as modular, packaged units that are easy to install.	The disks are continuously rotating, which could present reliability issues.
The filter occupies a small footprint.	Limited history of installations in operation (less than one year).
The media replacement is less frequent than for other non-granular media filters.	There are no operating municipal installations in California. All municipal installations are on the East Coast (total of eight installations, of which four are in Florida).
The disk rotation speed is variable, allowing the operator to adjust the speed based on the filter influent quality or the desired filtered water quality.	
The headloss across the filter is low.	
Effluent turbidity is relatively constant, even after a backwash.	

Design Criteria

Table 4-22: Nova Ultrascreen Filter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
CDPH Approved Filtration Rate, gpm/ft^2	16
Number of Filter Units	2
Number of Disks per Unit	10
Total Filtration Area, ft^2	444
Filtration Rate with One Filter Offline, gpm/ft^2	15.6
Headloss Through Filter, ft (Operating)	2.5

Preliminary Layout

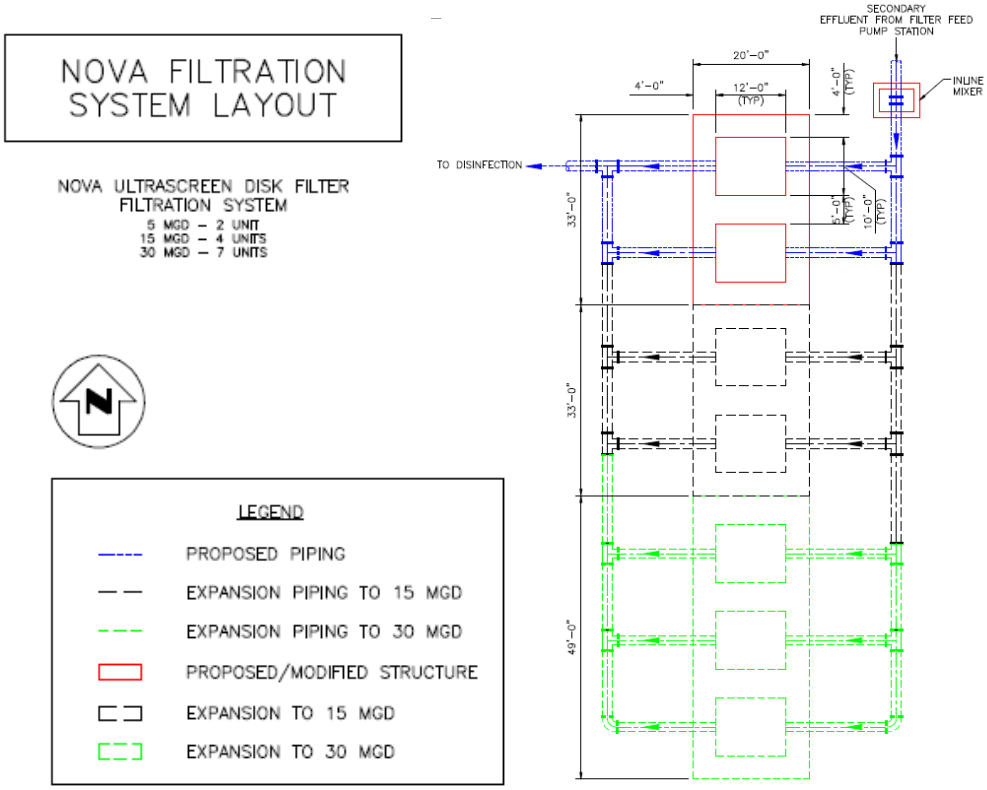


Figure 4-13: Preliminary Layout of 5 mgd Nova Ultrascreen Filter, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-23: Nova Ultrascreen Filter Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,200,000
Total Capital Cost[a]	3,500,000
Total Annual O&M Cost[b]	100,000
20-Year Life Cycle Cost [c]	5,300,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[c]At a 5% discount rate and a 4% escalation rate.

4.2.8 Microfilters

Features of Operation

Microfilters use membrane filtration to separate micron-sized particles from the filter influent water. Like the Nova Ultrascreen, the solids removal mechanism used is straining - however, the membrane pore sizes are much smaller, typically close to 0.1 microns. The membrane material varies depending upon the supplier, but is usually natural or synthetic polymers. For example, Pall's Microza LGV microfilters are made of PVDF (polyvinylidene fluoride) membranes.

Microfilters can be arranged in horizontal or vertical configuration, depending on the influent quality and manufacturer. Microfilter modules are arranged in racks and are pre-engineered to suit various flow rates.

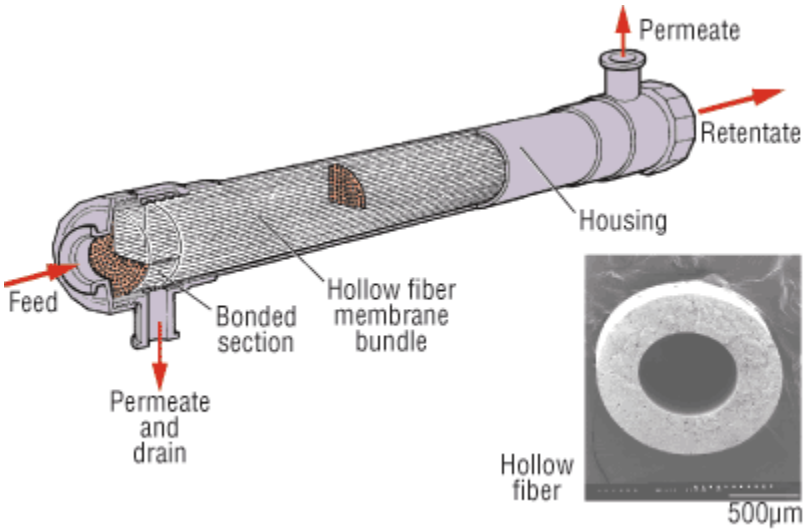


Figure 4-14: Microfilter Cross Section

Due to the small membrane pore sizes, the majority of solids and even some viruses are rejected and the quality of permeate produced is much higher than the quality of filtered water produced with media filtration technologies discussed earlier. Due to the high solids removal efficiency, the downstream disinfection efficiency is enhanced. If UV disinfection is used, the NWRI guidelines allow for a smaller UV system resulting in significant capital and operating cost savings when operating on microfilter permeate.

Advantages and disadvantages of microfilters are summarized in Table 4-24 and the design criteria are summarized in the Table 4-25. A preliminary layout for microfilters at the TTDF is presented in Figure 4-15. The footprint for 5 mgd, 15 mgd, and 30 mgd capacity is presented. Peliminary construction, O&M, and 20 year life-cycle cost estimates for microfilters are presented in Table 4-26.

Advantages and Disadvantages

Table 4-24: Microfilter Advantages and Disadvantages

Advantages	Disadvantages
Microfilters produce recycled water exceeding Title 22 requirements.	Microfilters have a higher capital cost when compared to media filters.
Microfilters remove most viruses, giardia, and crypto.	The influent pumping requirements increase the O&M costs when compared to media filters.
Available in modular, skid mounted units - lowering installation costs.	Membrane replacement is relatively expensive.
When coupled with a downstream UV disinfection system, substantial cost savings can be realized when compared to media filtration coupled with UV disinfection.	Microfilters are more O&M intensive than conventional media filters.

Design Criteria

Table 4-25: Microfilter Design Criteria

Parameter	Criteria
Design Flow, mgd	5
Flux Rate, gpd/ft^2	Not regulated[1]
Feed pressure, psi	20-30

[1] Flux rates are not regulated for Title 22 recycled water applications. The microfilter membranes used for Title 22 applications are similar to the ones approved for drinking water filtration applications, where the approved flux rates range from 75 – 120 gpd/sq.ft, depending on the manufacturer. However, based on current installations for Title 22 applications, the operating flux rates range from 30-50 gpd/sq.ft.

Preliminary Layout

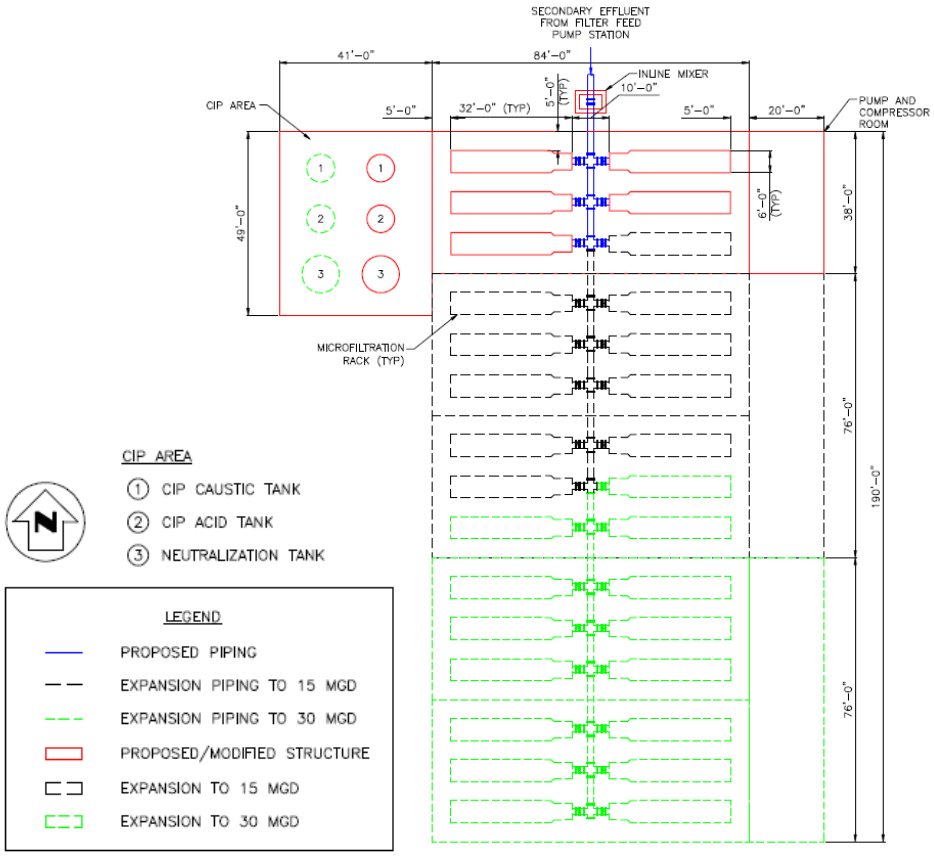


Figure 4-15: Preliminary Layout of 5 mgd Microfiltration System, with Future Footprint for Phased Expansion to 30 mgd

Cost Summary

Table 4-26: Microfilter Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	3,500,000
Total Capital Cost [a]	10,700,000
Capital Cost Credit for UV Disinfection [b]	(2,000,000)
Net Total Capital Cost	8,700,000
Total Annual O&M Cost [c]	400,000
Annual O&M Cost Credit for UV Disinfection	(100,000)
Net Total Annual O&M Cost	300,000
20-Year Life Cycle Cost [d]	14,200,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Credit due to higher UVT and lower UV dosage for microfilter permeate.
[c]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.
[d]At a 5% discount rate and a 4% escalation rate.

4.3 SUMMARY OF COSTS

Table 4-27 presents a summary of the construction, O&M, and 20-year life-cycle cost estimates for each of the eight filtration technologies evaluated. As can be seen below, Nova Ultrascreen filters are the lowest both in terms of capital cost (~$300,000 less than continuous backwash filters, the next lowest cost alternative) and 20-year life-cycle cost (~$400,000 less than cloth media filters, the next lowest cost alternative). See Appendix A for preliminary cost estimates.

Table 4-27: Summary of Costs of Each 5 mgd Constant Flow Filtration Alternative

Technology	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
Dual Media Gravity Filters	4.3	90	5.9
Deep Bed Monomedia Filters	4.4	90	6.0
Continuous Backwash Filters	3.8	105	5.6
Travelling Bridge Filters	4.8	80	6.2
Fuzzy Filters	4.1	110	6.0
Cloth Media Filters[1]	4.1	90	5.7
Nova Ultrascreen Filters	3.5	100	5.3
Microfilters[2]	8.7	300	14.2

[1]Concrete structure is designed for a filtration capacity of up to 9 mgd.
[2] Includes UV system credit.

SECTION 5 - DISINFECTION SYSTEM ALTERNATIVES ANALYSIS

5.1 BACKGROUND

Currently the RWRF does not disinfect the secondary treated effluent. The secondary effluent is discharged to percolation ponds through effluent canals A and B. As described earlier in this TM, in order to upgrade the discharge to California Title 22 standards for unrestricted reuse, the City has decided to construct a TTDF, which consists of filtration, disinfection and storage. This Section of the TM evaluates three alternatives for disinfection at the TTDF.

The two disinfection technologies evaluated are:

1. Ultraviolet (UV) Disinfection
    a. Open Channel UV Disinfection
    b. In-pipe UV Disinfection

2. Ozone Disinfection

The UV disinfection system considers low pressure, high intensity lamps, which are the result of progressive research and energy conservation measures over the years. The use of low pressure high intensity lamps results in a compact and more efficient UV disinfection system. Ozone disinfection, which is still considered an emerging technology for wastewater disinfection, considers generation of ozone from liquid oxygen. Ozone can also be generated from air, which however, may be cost prohibitive for a large plant such as TTDF.

5.2 UV DISINFECTION

UV disinfection utilizes ultra-violet portion of the light spectrum to render disease causing pathogens inactive. The UV lamps can be placed in several banks, in series, in an open channel system or may be placed inside a vessel (pipe) for an inline UV system. The design of UV system highly depends on the quality of water being disinfected. The UV system design criteria for tertiary-filter (media based) treated recycled water are more stringent than membrane treated recycled water, primarily due to the fact that the higher turbidity of former creates a shielding effect on pathogens thus reducing the effectiveness of UV light. According to National Water Research Institute (NWRI), May 2003 guidelines, the minimum UV transmittance for media filter effluent and membrane effluent shall be 55% and 65% at 254 nm, respectively. The minimum UV dose required for media filter effluent and membrane effluent are 100 mJ/cm2 and 80 mJ/cm2, respectively, under maximum flow. Besides the above criteria, end of lamp life and fouling factors are used in the design of UV system. The former addresses the loss in the output of UV lamps as they age and the latter compensates for the fouling of lamp sleeve. The values of these factors differ from manufacturer to manufacturer as approved by CDPH. To comply with CDPH standards for unrestricted reuse (Title 22) of wastewater effluent, the City will need to provide tertiary treatment (filtration) to reduce the effluent suspended solids to a

turbidity level less than 2 NTU in case of media filtration and less than 0.2 NTU for membrane filtration prior to final disinfection. By removing a majority of the solids, the effectiveness of the downstream disinfection process is enhanced.

5.2.1 UV Design Criteria

According to NWRI guidelines, the UV disinfection system for TTDF should include the following two parameters and should be designed according to Table 5-1:

1. The UV system should be capable of 5 – log polio virus inactivation and total coliform not to exceed 2.2 MPN/ 100 ML
2. The UV system should include one standby bank per train or a separate standby train must be provided.

Table 5-1: UV Disinfection Design Criteria

Parameter	Units	Media Filtration	Membrane Filtration
Capacity	mgd	5	5
UV Transmittance	UVT	55%	65%
Design Dose (Maximum daily design flow of 5 mgd)	mJ/cm2	100	80

5.3 UV OPEN CHANNEL EQUIPMENT AND STRUCTURE

Features of Operation

In an open channel disinfection system, the UV lamps are placed in modules and several modules make up for a bank. These banks may be placed in series in a channel to provide required disinfection (refer to Figure 5-1). For the TTDF, two identical parallel channels will be constructed to house UV banks; the channels will be located north of the effluent canal B. The channels will initially house 3 banks each to accommodate 5 mgd filtered water flow through the facility. The channels will be designed to have extra room for adding more banks in the future to disinfect up to a total of 10 mgd flow in the same structure as shown in Figure 5-2. The design characteristics of the UV channels are shown in Table 3. Each UV channel will have a level control gate / weir at the discharge end to ensure the UV lamps are submerged consistently. The disinfected water will be either conveyed by gravity or pumped into storage for distribution.

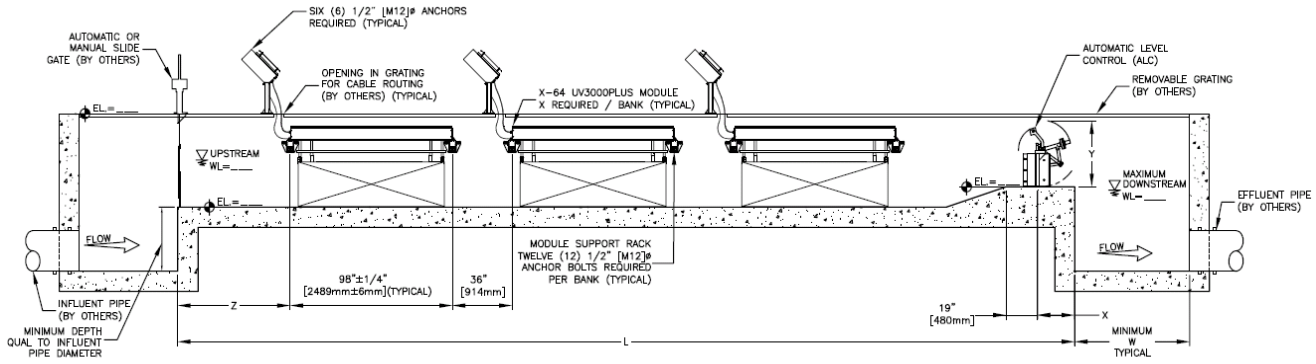


Figure 5-1: Simplified Schematic of a UV-Open Channel System

Advantages and Disadvantages

Advantages and Disadvantages are included in Table 5-2

Table 5-2: UV Disinfection Advantages and Disadvantages

Advantages	Disadvantages
Modular design - UV banks may be added to the same channel to increase capacity	Canopy/building may be required to protect the electronic ballasts from direct sunlight
Lamps are arranged in modules - each module can be taken out for maintenance without taking the bank offline.	Mechanical components like mechanical wiping system require more maintenance
Low head loss	Future compliance with EDC's and NDMA is expensive as it requires increasing the UV dose to 6-7 times by upgrading the facility by employing reverse osmosis and or increasing the number of UV banks.
Less process instrumentation and controls required when compared to other technologies considered for the project	
Extensive experience in wastewater disinfection	

Open Channel UV Design Characteristics

Key design criteria for open channel UV system are listed in Table 5-3 below.

Table 5-3: Design Characteristics of Open Channel UV System for Design Flow of 5 mgd

Parameter	Units	Design Value
Type of UV system	-	Low Pressure, High Intensity
Number of Channels	-	2
Length of channel	ft	62
Width of Channel	ft	4
Depth of Channel	ft	5.2
Total Number of Banks	-	6 (4 Duty, 2 Redundant)
Total Number UV lamps	-	528 (including redundancy)
Disinfection Capacity per Bank	mgd	1.25

Preliminary Layout

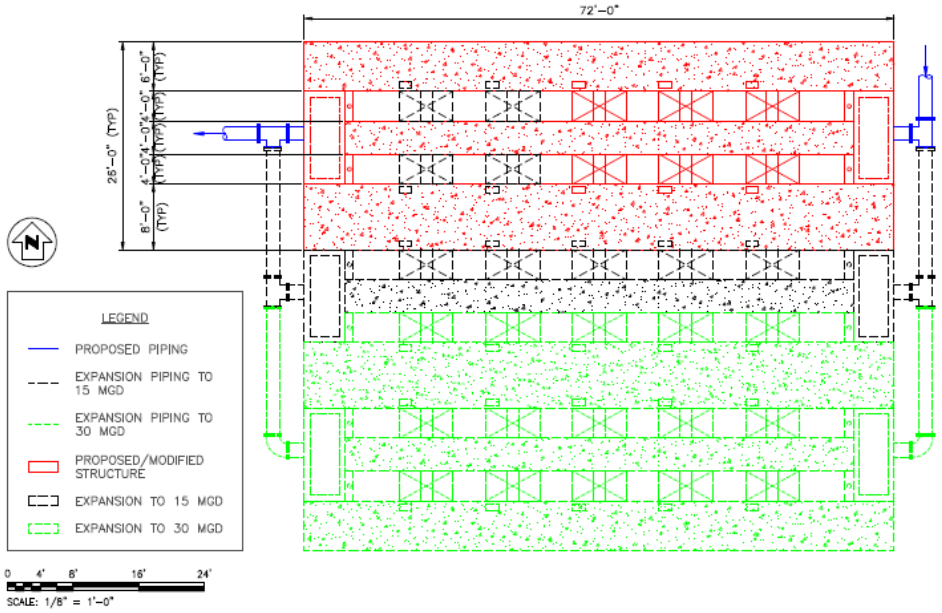


Figure 5-2: Preliminary Layout of 5 mgd UV Open Channel Disinfection System, with Future Footprint for Phased Expansion to 30 mgd

5.3.1 Expandability

The UV system layout is presented in Figure 5-2 above planned for 5 mgd, expandable to 15 mgd and ultimately to 30 mgd capacity. The initial expansion to 15 mgd shall be accomplished by providing additional banks (two banks each) in the existing two channels and constructing an additional identical channel with same number of banks. The ultimate 30 mgd expansion will require construction of three additional identical channels and populating them with equal number of banks.

5.3.2 Capital, O&M and Life Cycle Costs

The capital cost includes cost for 5 mgd UV equipment, concrete structure, canopy, distribution pipes and a building required to house the ballasts. Table 5-4 below presents preliminary capital, O&M and 20 year life cycle costs.

Table 5-4: Open Channel UV System Following Media Filtration Cost Summary (5 mgd Constant Flow[d])

Parameter	Cost ($)
Equipment and Structures Cost	1,450,000
Total Capital Cost [a]	4,500,000
Total Annual O&M Cost [b]	230,000
20-Year Life Cycle Cost [c]	8,700,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to mid point of construction (2012-2013).
[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.
[d]Concrete structure designed to house additional banks with a disinfection capacity of 5 mgd for a total disinfection capacity of 10 mgd.

5.4 UV IN-PIPE EQUIPMENT AND STRUCTURE

Features of Operation

UV in-pipe system consists of UV lamps that are housed in a stainless steel reactor. Each reactor has an inlet and an outlet and the flow can be controlled via a flow meter and a control valve. This system requires more instrumentation and control than the open channel UV systems. The capacity of each reactor considered (for workshop no. 1) is approximately 2.30 mgd for filtered water. For 5 mgd system four reactors (3 Duty + 1 Standby) would be necessary to reliably disinfect the required flow as shown in Figure 4. The reactors can be arranged in series or

parallel depending on the manufacturer, site constraints and capacity of the facility. Several trains can be installed parallel to each other to provide require disinfection capacity.

Based upon Parsons' discussions with the in-pipe UV disinfection system manufacturers and CDPH, we understand that in-pipe UV disinfection systems are validated but are not approved for Title 22 unrestricted water reuse. It is our understanding that CDPH approves in-pipe UV disinfection systems on a case-by-case basis, only after a wastewater facility has installed the particular system under consideration.

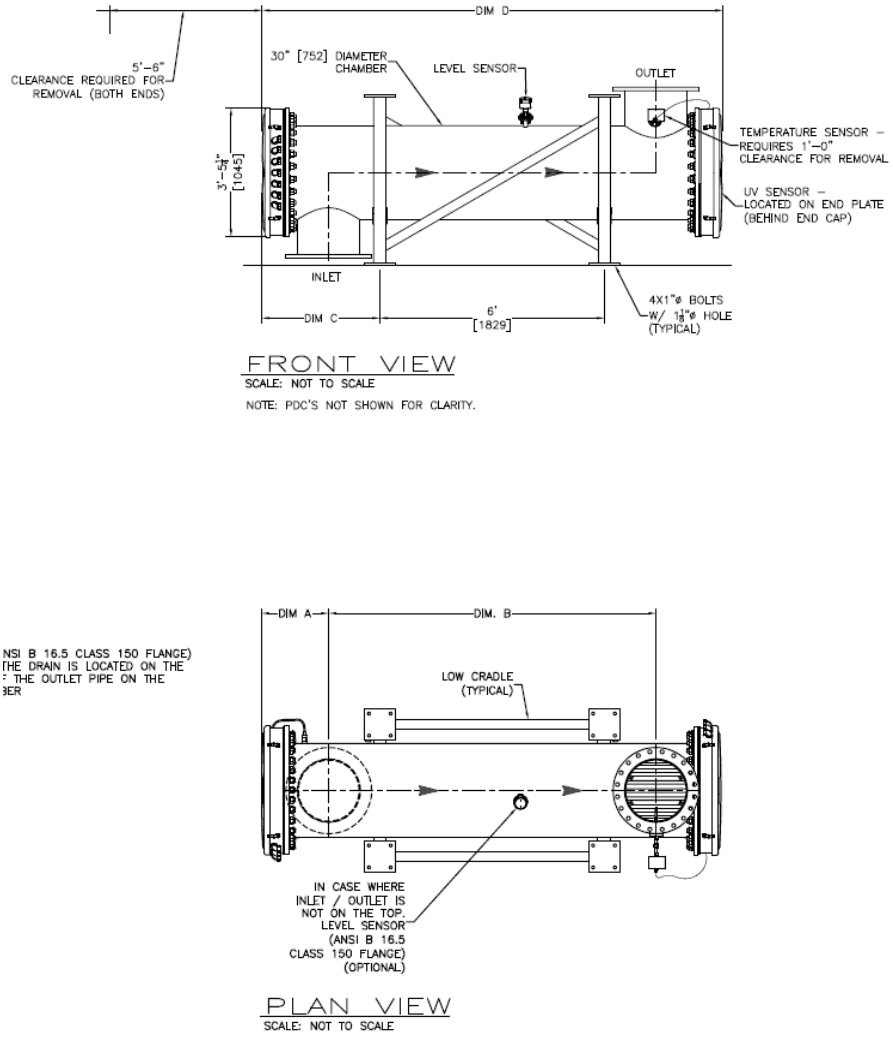


Figure 5-3: Simplified Schematic of an In-pipe UV Disinfection System

Advantages and Disadvantages

Table 5-5 below shows advantages and disadvantages for In-pipe UV disinfection system.

Table 5-5: In-pipe UV Disinfection System Advantages and Disadvantages

Advantages	Disadvantages
Modular design – UV inline system reactors are modular and can be places parallel or in series depending on design capacity	Lamps are enclosed in the reactor and it needs to be taken off line for servicing
Ease of expandability	More modulating valves required to control flow
Less civil and site work is required compared to other disinfection technologies considered in the project.	More process instrumentation and control required
Little to no site excavation required	CDPH approves the system on a case by case basis; CDPH has not given any blanket approved for inline systems.
Lamps are serviceable from the reactor end	

In-pipe UV Design Characteristics

Key design criteria for in-pipe UV system are listed in Table 5-6 below.

Table 5-6: Design Characteristics of In-pipe UV System for Design Flow of 5 mgd

Parameter	Units	Design Value
Type of UV system	-	Low Pressure, High Intensity
Number of Reactors	-	4
Length of Reactor	ft	13
Total number of lamps in each Reactor	-	144
Total Number UV lamps	-	576 (including redundancy)
Disinfection Capacity per Reactor	mgd	2.3

Preliminary Layout

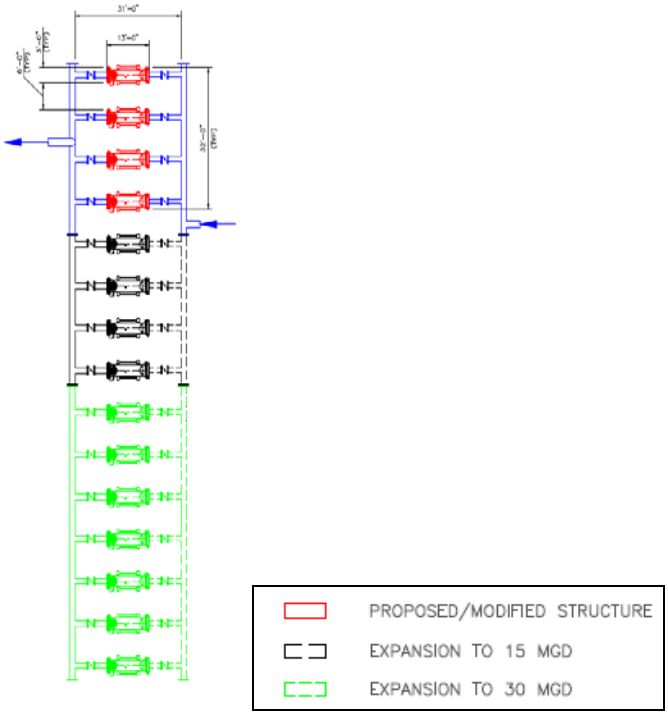


Figure 5-4: In-pipe UV Disinfection System

5.4.1 Expandability

The initial 5 to 15 mgd expansion of the facility will be accomplished by adding 4 additional reactors of the same capacity. Similarly expansion to 30 mgd will be accomplished by adding 7 additional reactors. However several automatic actuated control valves and flow meters will be required to ensure proper flow distribution and control to each reactor. This will lead to higher instrumentation and control costs and operational complexity compared to open channel UV system.

5.4.2 Capital, O&M and Life Cycle Costs

The capital cost includes cost for 5 mgd inline UV equipment, concrete pad, canopy, distribution pipes and a building required to house the ballasts. Table 5-7 below presents preliminary capital, O&M and 20 year life cycle costs.

Table 5-7: In-pipe UV Disinfection System following Media Filtration Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	1,460,000
Total Capital Cost [a]	4,800,000
Total Annual O&M Cost [b]	230,000
20-Year Life Cycle Cost [c]	8,900,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

5.5 OZONE DISINFECTION

Features of Operation

Ozone is a much stronger disinfectant than chlorine, UV and other common disinfectants. Unlike chlorine (or sodium hypochlorite) which diffuses through the cell wall of the microorganisms and disinfects, ozone oxidizes the cell wall causing the microbes to disintegrate. Ozone is a very strong oxidizing agent with 1.5 times the oxidizing potential of chlorine.

Ozone is produced from either air or oxygen. Typically, the concentration of ozone is about 3 % (maximum) when produced by air versus 10% when produced using oxygen. Therefore ozone generation using air could be cost prohibitory for smaller installations. For purposes of this evaluation, ozone generation system using liquid oxygen is considered. The system is designed for a dose of 10mg/L with a contact time of 15 minutes to be conservative and to keep a factor of safety for the system. Pilot testing is highly recommended to establish a design dose and contact time for ozone disinfection of recycled water specific to TTDF, which is an additional cost to the project.

Ozone Disinfection Equipments and Structure

Ozone disinfection system comprises a liquid oxygen tank that provides liquid oxygen to ozone generators via ambient vaporizers (used to eliminate moisture). Nitrogen gas is introduced in the ozone generators as a catalyst. The ozone is produced by several dielectrics in the generators and is introduced into the filtered water via coarse bubble diffusers in a contact basin. Excess ozone is collected and destroyed in the ozone destruct system as shown in

schematic Figure 5-5. A preliminary layout for ozone disinfection system is included as Figure 5-6.

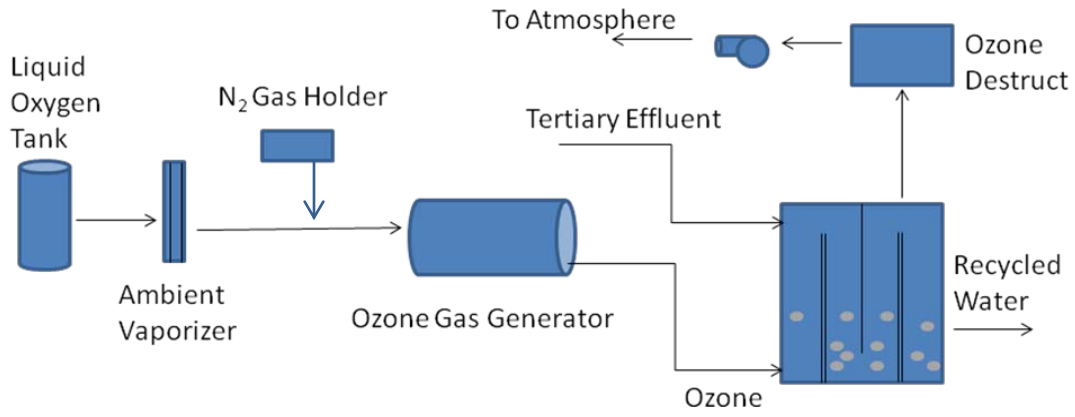


Figure 5-5: Schematic of Ozone Generation

Advantages and Disadvantages

Table 5-8 includes advantages and disadvantages for Ozone disinfection system.

Table 5-8: Ozone Disinfection System Advantages and Disadvantages

Advantages	Disadvantages
Skid mounted system	Dose and contact time are critical and must be decided carefully
Less civil and site work required for the equipment	Regular liquid oxygen supply is required
Compact design	Second and third phase expansion will require larger units than the one proposed for initial installation
More economical for future removal of Endocrine Disruptive Chemicals and NDMA etc.	More process instrumentation and controls required
	Extensive mechanical equipment required for the system
	High power consumption
	Limited experience in wastewater disinfection

Ozone Disinfection Equipments and Structure

The ozone disinfection system design criteria are summarized in the Table 5-9 below.

Table 5-9: Design Characteristics of Ozone Disinfection System for Design Flow of 5 mgd

Parameter	Units	Design Value
Ozone Dose	mg/L	10
Contact Time	Minutes	15

Preliminary Layout

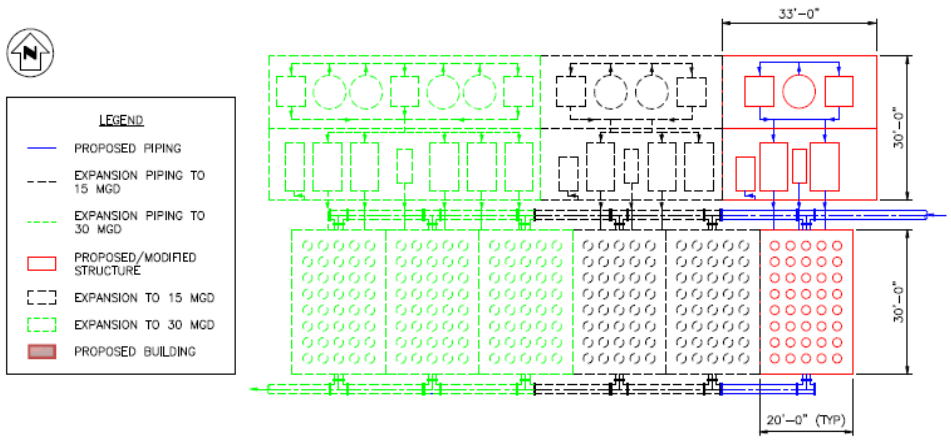


Figure 5-6: Ozone Disinfection System

5.5.1 Expandability

The Ozone system is skid mounted but may not be expandable as easily as UV disinfection systems. Increasing the capacity of the system may be accomplished by including more reactors of the same size or larger Ozone reactors and larger contact basins which need to be carefully designed. Alternatively, the larger Ozone Generators may be installed initially and similar Ozone generators may be added depending on the capacity of expansion.

5.5.2 Capital, O&M and Life Cycle Costs

The capital cost for the ozone disinfection system includes 5 mgd ozone equipment, concrete pad, distribution pipes and building required to house ozone reactors. Table 5-10 below presents preliminary capital, O&M and 20 year life cycle costs.

Table 5-10: Ozone Disinfection System Cost Summary (5 mgd Constant Flow)

Parameter	Cost ($)
Equipment and Structures Cost	2,200,000
Total Capital Cost [a]	6,600,000
Total Annual O&M Cost [b]	450,000
20-Year Life Cycle Cost [c]	14,800,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

5.6 SUMMARY OF COSTS

Table 5-11: Summary of Costs for Disinfection System Alternatives (5 mgd Constant Flow)

Technology	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
UV – Open Channel[1]	4.5	230	8.7
UV – In-pipe	4.8	230	8.9
Ozone	6.6	450	14.8

[1]Concrete structure designed to house banks with a total disinfection capacity of 10 mgd.

SECTION 6 - STORAGE SYSTEM ALTERNATIVES ANALYSIS

6.1 BACKGROUND

As pointed out in Section 1, the City's goal is to produce 25,000 acre-ft/year of recycled water by 2025. This TM will present the four storage alternatives that were evaluated for the TTDF.

The following four storage alternatives were considered:

- Earthen basins, lined and covered
- Steel tank
- Pre-stressed concrete tank
- Conversion of Train A aeration basin into a storage reservoir

The last option (the conversion of a Train A aeration basin into a storage tank) is only an option if the City decides to select MBR alternative. A detailed discussion of the MBR option is presented in Section 7.

6.2 STORAGE ALTERNATIVES

6.2.1 Earthen Basins, Lined and Covered

Description

Earthen basins are constructed by excavating and forming earthen berms with the excavated soil, resulting in basins that are partially above grade and partially below grade. In order to function as a storage reservoir, the basins must be lined (to prevent loss of recycled water via percolation) and covered (to prevent the loss of recycled water via evaporation and the contamination of recycled water). While there are many options for lining and covering earthen basins, the use of gunite lining and a hypalon membrane cover have been considered in the evaluation of this alternative. Gunite lining is proven, cost effective, easy to install, and has been used by the City in the past. Hypalon membrane covers, while more expensive than polypropylene or high density polyethylene (HDPE) membrane covers, are of a superior quality, and come with a standard 30-year material warranty.

Advantages and disadvantages of earthen basins are summarized in Table 6-1 and the design criteria are summarized in Table 6-2. A preliminary layout for the earthen basins at the TTDF is presented in Figure 6-1. Preliminary construction, O&M, and 20 year life-cycle cost estimates for the planned earthen storage basins at the TTDF are presented in Table 6-3. The typical life of storage structures is at least 50 years; however, a 20 year life-cycle cost analysis is presented for consistency.

Advantages and Disadvantages

Table 6-1: Earthen Basins Advantages and Disadvantages

Advantages	Disadvantages
Lined and covered earthen basins are typically less expensive than steel tanks or concrete tanks.	Periodic maintenance and replacement of floating membrane covers are required.
Earthen basins are easily constructed.	Membrane covers need to be removed to access the basin internals for maintenance.
Permits recycled water from the treatment system to flow by gravity into the storage	Leak detection is difficult.
Partitions within the basin allow for taking one cell offline for maintenance while keeping the others in operation.	Floating covers are prone to vandalism.
	Less conducive to water circulation, which may impact water quality.

Design Criteria

Table 6-2: Earthen Basins Design Criteria

Parameter	Criteria
Design Capacity, MG	5
Number of Basins	2
Dimensions of Each Basin, Length (ft) x Width (ft) x Depth (ft) (Free Board (ft))	255 x 180 x 10 (3)
Side Wall Slope (H:V)	3:1
Number of Distribution Pumps	2 (1 duty + 1 standby)
Distribution Pump Capacity, Each	3,500 gpm
Distribution Pump Discharge Head	230 feet
Distribution Pump Motor hp, Each	300 hp

Preliminary Layout

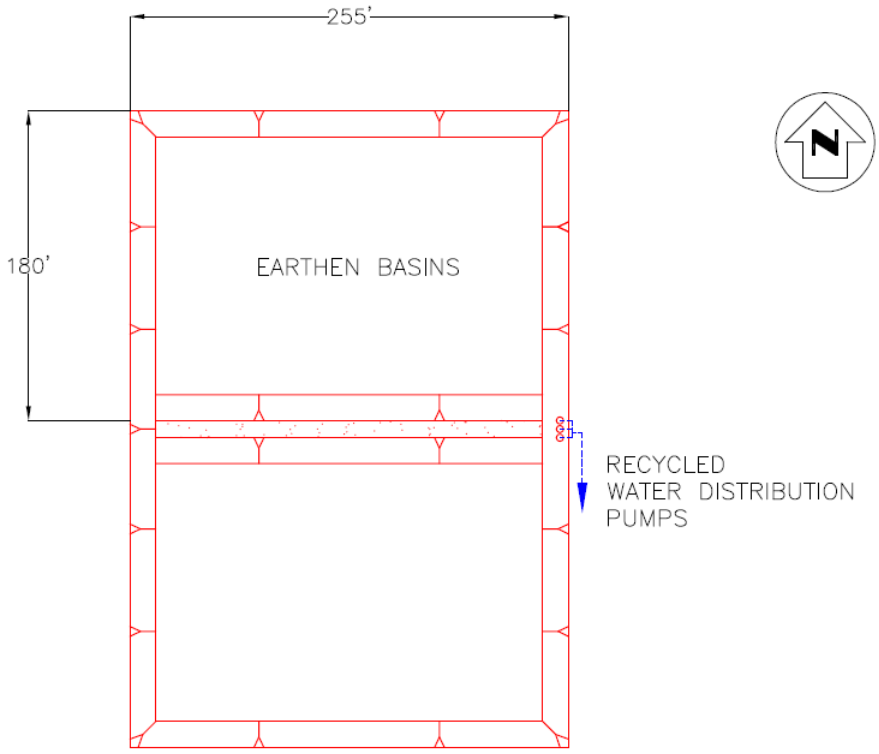


Figure 6-1: Preliminary Layout of 5 MG Earthen Basins

Cost Summary

Table 6-3: Earthen Basins and Recycled Water Pump Station Cost Summary

Parameter	Cost ($)
Total Capital Cost[a]	4,000,000
Total Annual O&M Cost[b]	310,000
20 Year Life-Cycle-Cost[c]	9,600,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power for distribution pumps and general maintenance. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

6.2.2 Steel Tank

Description

A single welded steel storage tank with a welded steel roof and a concrete ring wall foundation has been considered in the evaluation of this alternative. Advantages and disadvantages of steel tanks are summarized in Table 6-4 and the design criteria are summarized in Table 6-5. A preliminary layout for the steel tank at the TTDF is presented in Figure 6-2. Preliminary construction, O&M, and 50 year life-cycle cost estimates for the planned steel storage tank at the TTDF are presented in Table 6-6.

Advantages and Disadvantages

Table 6-4: Steel Tank Advantages and Disadvantages

Advantages	Disadvantages
Steel storage tanks are typically less expensive than concrete storage tanks.	Since steel storage tanks are installed above grade, pumping to the steel storage tank will be required - adding to O&M costs.
Circular shape promotes water circulation, improving water quality.	Steel storage tanks require maintenance (e.g. painting of the interior surface) and typically have lower lifetimes when compared to concrete tanks.
Leakage can be readily detected.	Cathodic protection is required to prevent corrosion.
	When maintenance is required, entire tank needs to be taken out of service.

Design Criteria

Table 6-5: Steel Tank Design Criteria

Parameter	Criteria
Design Capacity, MG	5
Number of Tanks	1
Dimensions of Tank, Diameter (ft) x Depth (ft) (Free Board (ft))	210 x 24 (4)
Number of Feed Pumps	2 (1 duty + 1 standby)
Feed Pump Capacity, Each	3,500 gpm
Feed Pump Discharge Head	20 feet
Feed Pump Motor hp, Each	30 hp
Number of Distribution Pumps	2 (1 duty + 1 standby)
Distribution Pump Capacity, Each	3,500 gpm
Distribution Pump Discharge Head	230 feet
Distribution Pump Motor hp, Each	300 hp

Preliminary Layout

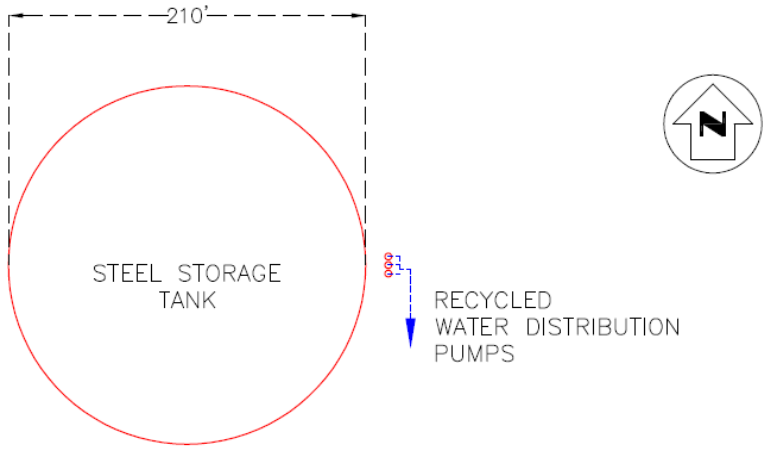


Figure 6-2: Preliminary Layout of 5 MG Steel Tank

Cost Summary

Table 6-6: Steel Tank and Recycled Water Pump Station Cost Summary

Parameter	Cost ($)
Total Capital Cost[a]	6,400,000
Total Annual O&M Cost[b]	370,000
20 Year Life-Cycle-Cost[c]	13,100,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power for feed and distribution pumps and general maintenance. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

6.2.3 Prestressed Concrete Tank

Description

A single partially buried, strand-wrapped circular prestressed concrete storage tank has been considered in the evaluation of this alternative. Advantages and disadvantages of prestressed concrete tanks are summarized in Table 6-7 and the design criteria are summarized in Table 6-8. A preliminary layout for the prestressed concrete tank at the TTDF is presented in Figure 6-3. Preliminary construction, O&M, and 50 year life-cycle cost estimates for the planned prestressed concrete storage tank are presented in Table 6-9.

Advantages and Disadvantages

Table 6-7: Prestressed Concrete Tank Advantages and Disadvantages

Advantages	Disadvantages
Prestressed concrete storage tanks are lower maintenance than both steel tanks or lined and covered earthen basins.	Prestressed concrete storage tanks are typically more expensive than both steel tanks and lined and covered earthen basins.
Prestressed concrete storage tanks have a longer life than steel tanks or lined and covered earthen basins.	Leak detection for partially buried tank is difficult - an observation vault is required for leak detection.
Circular shape promotes water circulation, improving water quality.	Piping and tank repairs are more costly due to buried depth.

Design Criteria

Table 6-8: Prestressed Concrete Tank Design Criteria

Parameter	Criteria
Design Capacity, MG	5
Number of Tanks	1
Dimensions of Tank, Diameter (ft) x Depth (ft) (Free Board (ft))	178 x 30 (2)
Number of Distribution Pumps	2 (1 duty + 1 standby)
Distribution Pump Capacity, Each	3,500 gpm
Distribution Pump Discharge Head	230 feet
Distribution Pump Motor hp, Each	300 hp

Preliminary Layout

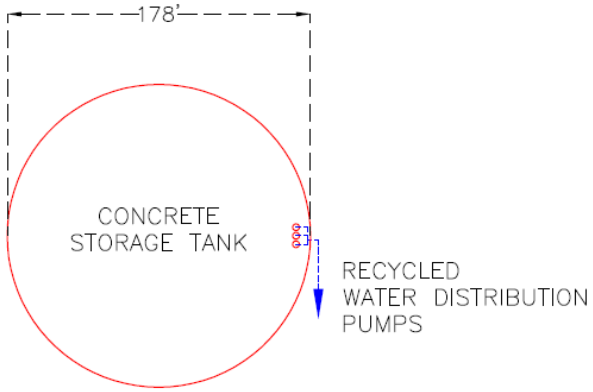


Figure 6-3: Preliminary Layout of 5 MG Prestressed Concrete Tank

Cost Summary

Table 6-9: Prestressed Concrete Tank and Recycled Water Pump Station Cost Summary

Parameter	Cost ($)
Total Capital Cost[a]	7,500,000
Total Annual O&M Cost[b]	290,000
20 Year Life-Cycle-Cost[c]	12,700,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power for distribution pumps and general maintenance. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

6.2.3 Conversion of Train A Aeration Basin

Description

The conversion of a Train A aeration basin into a storage tank requires the removal of all mechanical internals including aeration piping (with diffusers) and the old mechanical aerators (with the associated supports and platforms). In addition, the converted aeration basin requires modifications to support a cover, including a supporting curb around the perimeter of the basins and support columns within the basin. Due to the long life and minimal maintenance associated with aluminum covers, a flat aluminum cover has been considered in the evaluation of this alternative.

Advantages and disadvantages of using a converted Train A aeration basin as a recycled water storage tank are summarized in Table 6-10. The design criteria for this alternative are summarized in Table 6-11. A preliminary layout of the converted Train A aeration basin is presented in Figure 6-4. Preliminary construction, O&M, and 50 year life-cycle cost estimates for the conversion of a Train A aeration basin are presented in Table 6-6.

Advantages and Disadvantages

Table 6-10: Conversion of Train A Aeration Basin Advantages and Disadvantages

Advantages	Disadvantages
This alternative uses an existing structure, reducing costs and minimizing footprint.	The conversion of a Train A aeration basin is only feasible if a MBR is used.
	Due to conversion of existing aeration basin, the storage capacity is limited to about 2.7 MG.

Design Criteria

Table 6-11: Conversion of Train A Aeration Basin Design Criteria

Parameter	Criteria
Design Capacity, MG	2.7
Number of Tanks	1
Dimensions of Tank, Length (ft) x Width (ft) x Side Water Depth (ft)	170 x 170 x 16
Number of Distribution Pumps	2 (1 duty + 1 standby)
Distribution Pump Capacity, Each	3,500 gpm
Distribution Pump Discharge Head	230 feet
Distribution Pump Motor hp, Each	300 hp

Preliminary Layout



Figure 6-4: Train A Aeration Basin Converted to Storage Basin

Cost Summary

Table 6-12: Conversion of Train A Aeration Basin and Recycled Water Pump Station Cost Summary (2.7 MG Storage Capcity)

Parameter	Cost ($)
Total Capital Cost[a]	2,900,000
Total Annual O&M Cost[b]	290,000
20 Year Life-Cycle-Cost[c]	8,100,000

[a]Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).
[b]Including power for distribution pumps and general maintenance. Unit power cost is considered as $ 0.14/kWh.
[c]At a 5% discount rate and a 4% escalation rate.

6.3 SUMMARY OF COSTS

Table 6-13 presents a summary of the construction, O&M, and 20 year life-cycle cost estimates for each of the four storage alternatives evaluated. As shown in the Table, excluding the option of converting a Train A aeration basin into a storage tank (only an option if MBR option is selected), earthen basins are the lowest cost both in terms of capital cost (~$2,400,000 less than a steel tank, the next lowest cost alternative) and 20 year life-cycle cost (~$3,100,000 less than a prestressed concrete tank, the next lowest cost alternative).

Table 6-13: Summary of Cost for Each Storage and Distribution Pump Station Alternative

Alternative	Storage Capacity (MG)	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20 Year Life Cycle Cost ($ Millions)
Earthen Basins, Lined and Covered	5.0	4.0	310	9.6
Steel Tank	5.0	6.4	370	13.1
Prestressed Concrete Tank	5.0	7.5	290	12.7
Train A Aeration Basin Conversion	2.7	2.9	290	8.1

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SECTION 7 – MEMBRANE BIOREACTOR (MBR) OPTION

7.1 BACKGROUND

As an alternative to tertiary filters, which were discussed in Section 4, MBR system can be used to produce Title 22 recycled water. This section first describes the MBR technical concept and how its different components are tied together and later briefly discusses the MBR alternatives considered prior to Workshop No. 1. A detailed analysis of the selected alternative will be presented in Section 9. Refer to Section 9 for information regarding the design criteria and specifications of equipment.

7.2 TECHNICAL CONCEPT

The MBR is a multi-purpose process providing secondary treatment for organic and nitrogen removal, and using membrane filters to separate the mixed liquor solids from the wastewater. The membranes take the place of the clarifiers and tertiary filters of the conventional treatment plant. By removing the secondary clarifiers from the mainstream through the plant, problems controlling the settling characteristics of the solids, as measured by Sludge Volume Index (SVI) are eliminated. This allows the aeration basin (bioreactor) mixed liquor to be increased in concentration by almost three times the usual levels, i.e. from 3,500 mg/L to 10,000 mg/L, reducing the volume of aeration basin required to less than one-half that of the conventional treatment process.

The MBR process dates back 50 years. In the last ten years, the process has been applied in numerous installations of increasing size. Several plants today have design capacities in excess of 10 mgd, with larger facilities in design and construction. The worldwide application of the process over the last ten years has taken it from an emerging technology to one that is regarded as proven based on its long term consistent performance at numerous plants.

The general concept of the MBR is similar to that of conventional treatment, except it takes advantage of the latest in membrane technology to minimize the footprint of the secondary and tertiary treatment facilities and to enhance the performance of the plant to produce an effluent of exceptional quality.

To consistently achieve NDN, i.e. to meet a Total Inorganic Nitrogen (TIN) level of 10 mg/L in the effluent, a treatment plant should be designed to reliably produce an effluent TIN level in the range of 5 to 8 mg/L. This can be accomplished by upgrading the treatment to provide biological nutrient removal (BNR). Further, addition of membranes will result in an effluent containing low levels of organics (BOD), solids (TSS) and nitrogen allowing for effective disinfection so that the final effluent complies with water quality standards for unrestricted reuse.

The current plant uses conventional activated sludge consisting of aeration basins followed by clarification to significantly reduce the level of BOD and TSS in the effluent and to achieve partial NDN. The City has a significant investment in the process and with some modifications it

can be converted into a BNR facility to provide full secondary treatment.

Figure 7-1 shows a schematic of the overall liquid treatment train. This section of the TM will focus on the technical concepts of the fine screening, bioreactor and membrane portions of the plant.

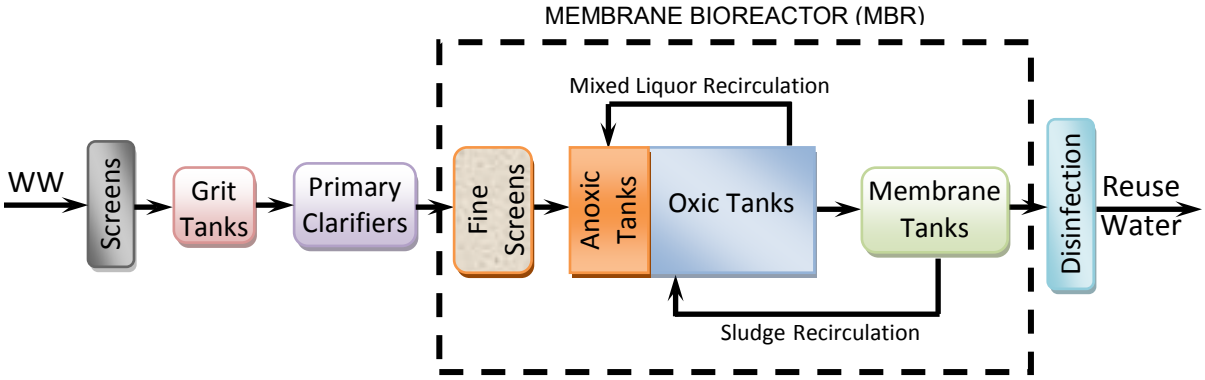


Figure 7-1: Membrane Bioreactor (MBR) Consisting of Activated Sludge Bioreactor and Membrane Filtration

7.2.1 Fine Screening

Hair, stringy material and other deleterious matter passing through the preliminary treatment (coarse bar racks and grit tanks) and primary settling tanks can damage the MBR membranes. To protect the membranes, ultra-fine screens are installed ahead of the MBR system on the primary effluent flow stream. Openings through the screens are in the range of 1 to 3-mm in size. The screens are of the band or drum type comprised of a series of perforated plates. The screen cleaning operation is automatically controlled based on differential level or time. These types of screens have been found to be the most efficient for removal of fine material. The screens are equipped with washing systems to clean odorous organic material from the screenings and return it back to the flow stream for treatment. The washed screenings are compacted to reduce the water content and volume prior to hauling off-site for disposal.

7.2.2 Secondary Treatment – Bioreactor (Aeration Basin)

The bioreactor portion of the MBR process is very similar to that in the conventional activated sludge system. The aeration basin will be divided into anoxic and oxic zones for denitrification, organic removal and nitrification. Primary effluent will enter the anoxic zones where it will be mixed with mixed liquor recirculated from the oxic zones. However, because of the high level of dissolved oxygen in the sludge return from the membrane chambers, this recycled sludge will be returned to the start of the oxic zones.

The anoxic zones are equipped with mixers to maintain the mixed liquor biomass in suspension without introducing ambient air (oxygen). This promotes the scavenging of oxygen from the

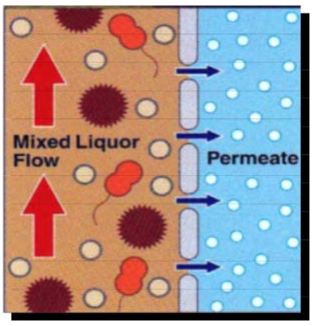
nitrates present in the recirculated sludge and exhausting of the resultant nitrogen gas, which reduces the nitrogen content in the wastewater. The oxic zones are equipped with fine bubble diffusers to create an oxygen rich environment for the biomass.

The most significant difference between conventional activated sludge and the bioreactor portion of an MBR system is the ability to raise the mixed liquor concentration in the bioreactor from a conventional 3,500 mg/L to 10,000 mg/L, resulting in a reduction in the tankage volume required to provide an equal level of secondary treatment.

A consequence of the higher mixed liquor concentration is that the oxygen transfer efficiency is slightly lower (i.e. lower alpha), reducing the overall efficiency of the aeration system and increasing the aeration energy. This difference may add 10 to 15% to the amount of air required in the oxic zones of an MBR system. However, the oxygen contained in the membrane chamber's recycled sludge will typically balance the extra air/oxygen required in the aeration basins.

7.2.3 Tertiary Treatment - Membrane Filtration

Membrane technology started in the water treatment field, and has been successfully used in water treatment plants for more than 20 years. Membrane filtration can consistently reduce the level of solids and contaminants in the effluent to below detection limits. Though membranes are an effective physical barrier, straining out many contaminants, further treatment through a disinfection process is necessary to remove the remaining contaminants. This provides a "dual-barrier" to enhance the safety of the final effluent, complying with CDPH requirements for unrestricted reuse of the plant effluent.



Operating experience of several membrane manufacturers have shown that the membranes are consistently capable of producing an effluent essentially approaching non-detectable levels of organics, solids and pathogens. The clarity of the membrane effluent is significantly superior to that produced by traditional filtration processes. The high quality effluent is ideal for reuse applications and public acceptance.

In the MBR process, the membranes can be located externally from the mixed liquor tanks in tubes, but typically are submerged in tanks in direct contact with the mixed liquor and function as the clarification and filtration steps. Externally installed membranes are configured in pressure vessels with pumps transferring flow from the bioreactors to the vessels. In submerged membrane applications, pressure differential across the membranes in the form of a vacuum is provided using either the hydraulic grade (gravity) or a filtrate pump suction to siphon liquid (permeate) through the membrane material. In all cases, permeate or membrane effluent, passes through the membrane material leaving the solids behind for recirculation back to the bioreactors.

Unlike a media type tertiary filter, in an MBR system, the membranes are not backwashed, but rather, the solids are air scoured from the membrane surface and recycled back to the

activated sludge bioreactor. The main waste from an MBR system is the waste activated sludge (WAS), similar to the WAS currently pulled from the secondary clarifiers.

Chemical cleanings of the membranes, performed using a clean-in-place (CIP) system, is dependent on the feed water quality and membrane manufacturer; thus, the frequency of cleaning can range from once or twice a week to three or four times a year. Extensive cleaning of the membranes beyond this routine cleaning is required approximately once or twice per year.



There are two types of membranes commonly used in an MBR system; hollow-fiber and flat-sheet. Both membrane types are able to reliably produce high quality water and therefore, the choice of membranes will be mostly a matter of capital and operational costs evaluated on a life cycle cost basis. Hollow-fiber membranes can be installed in a smaller footprint. Flat-sheet membranes require more area, but a lower operating differential pressure across the membranes (transmembrane pressure, TMP), and reportedly (per manufacturers) have a higher maximum flow capacity (flux rate).



Because both membrane types are a viable alternative for application at the Fresno TTDF, it is recommended that pre-selection be undertaken during the early stages of detailed design to select a membrane manufacturer and facilitate the design of the MBR system specific to that manufacturer.

7.3 LOCATION AND CAPACITY OF MBR

Two locations were considered for MBR system: Train A and Train B (Figures 7-2 through 7-5):

- Train A:
    - Convert one of the secondary clarifiers to aeration basin of MBR (due to age of structure and sloping walls of the existing aeration basins in Train A, it was decided not to use them for this purpose)
    - Construct the membrane tanks in vicinity of secondary clarifiers
- Train B:
    - Use aeration basin No. 5 as the aeration basin of MBR
    - Modify secondary clarifier No. 6 to accommodate membrane tanks

Two flow rates were considered for analysis: 5 and 10 mgd. Primary effluent will be pumped to fine screens and then will flow by gravity to aeration basin and then membrane tanks. The flow for 5 mgd scenario is constant, while the flow for 10 mgd scenario includes a peaking factor of 1.23. For both flows, nitrogen removal (NDN) is included in the design.

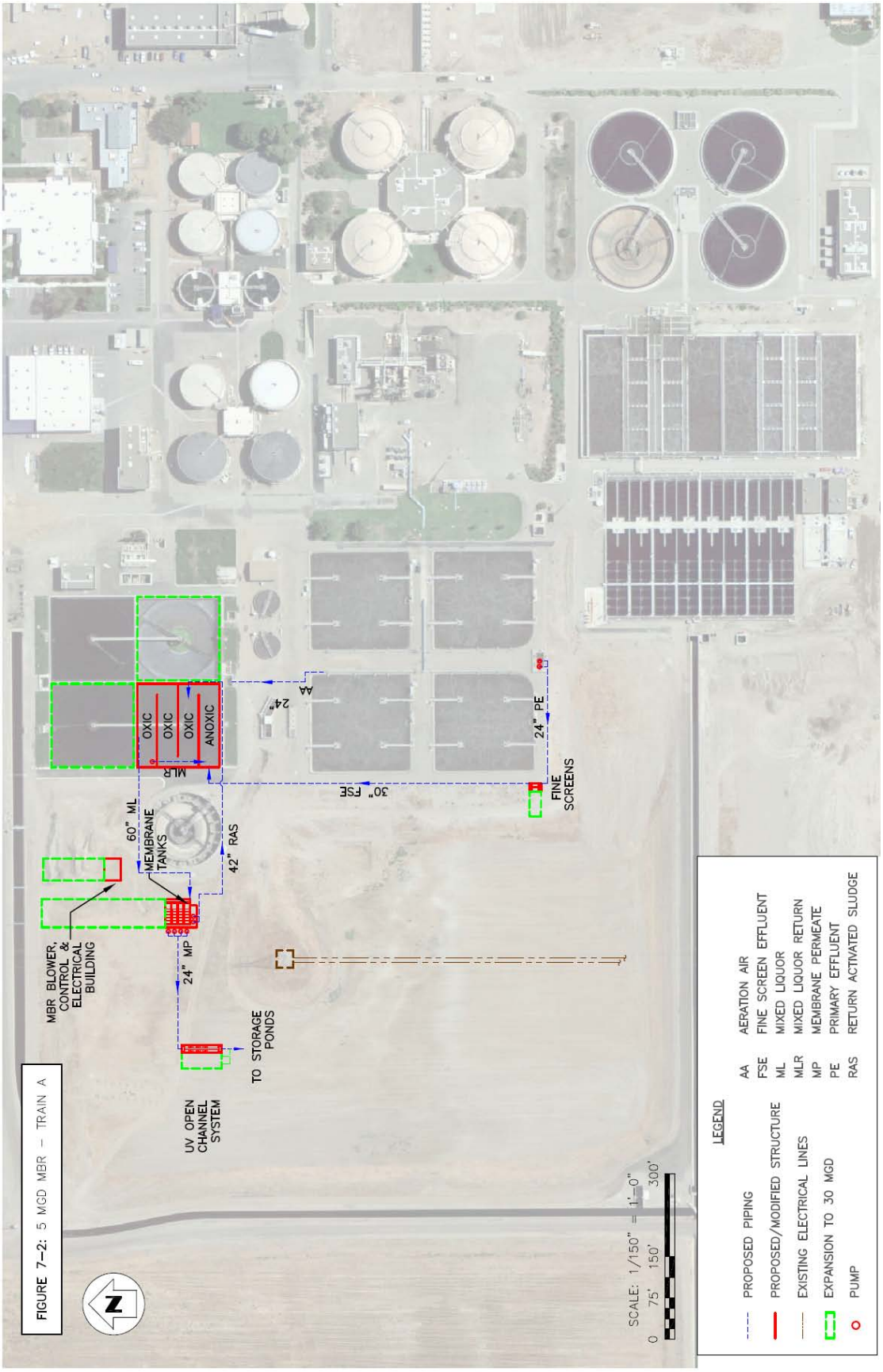


FIGURE 7-2: 5 MGD MBR – TRAIN A

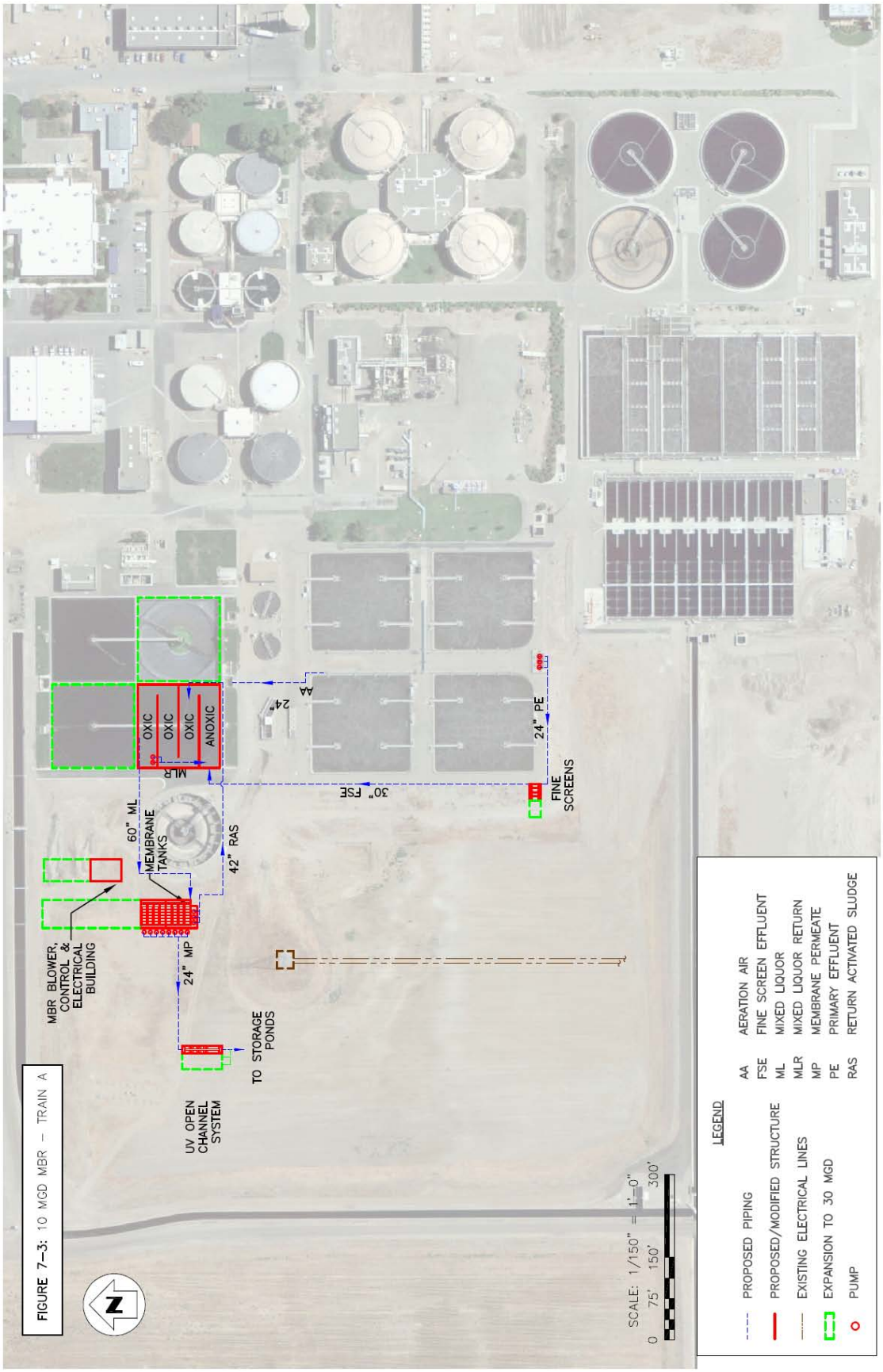


FIGURE 7–3: 10 MGD MBR – TRAIN A

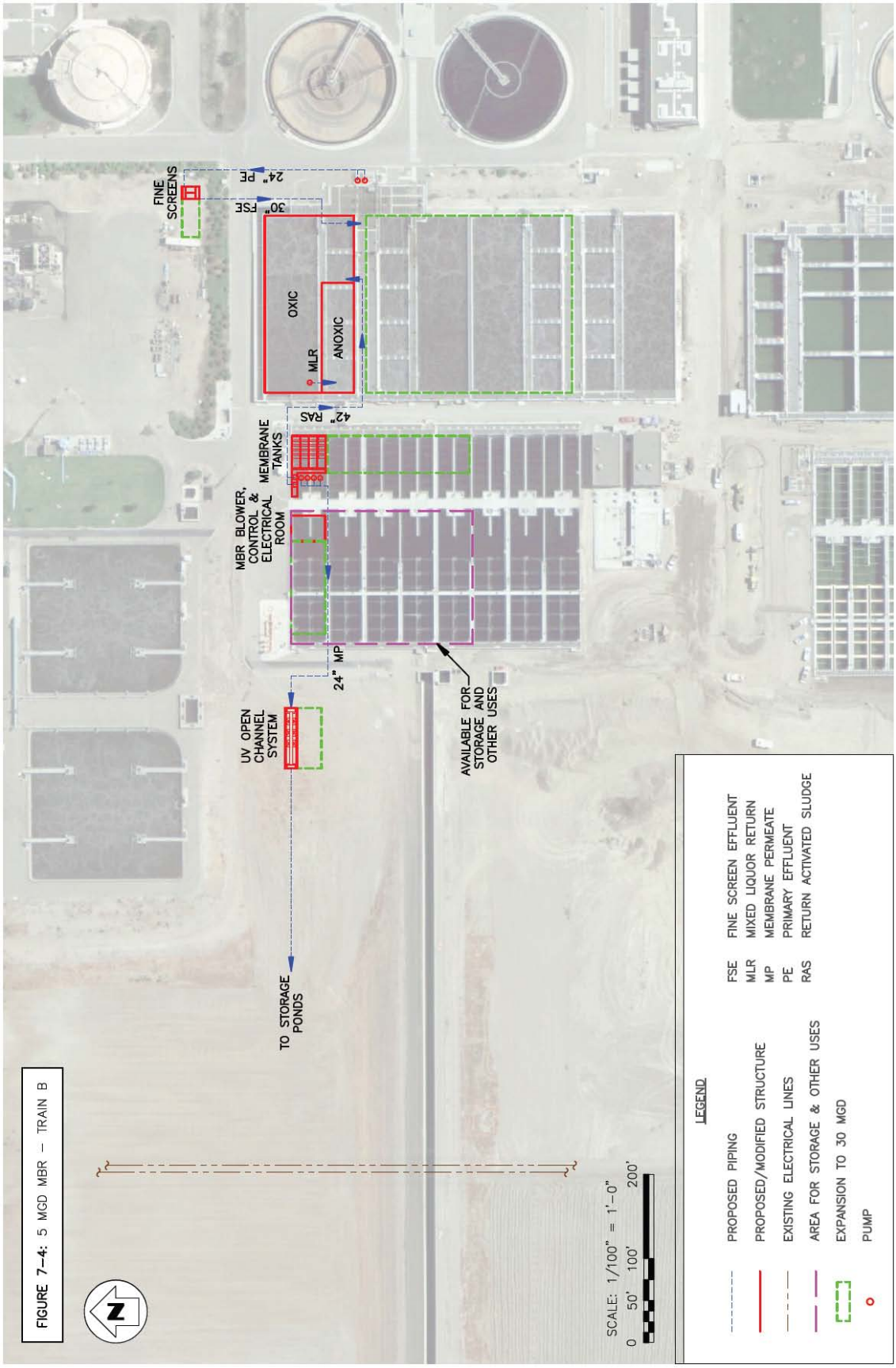


FIGURE 7-4: 5 MGD MBR – TRAIN B

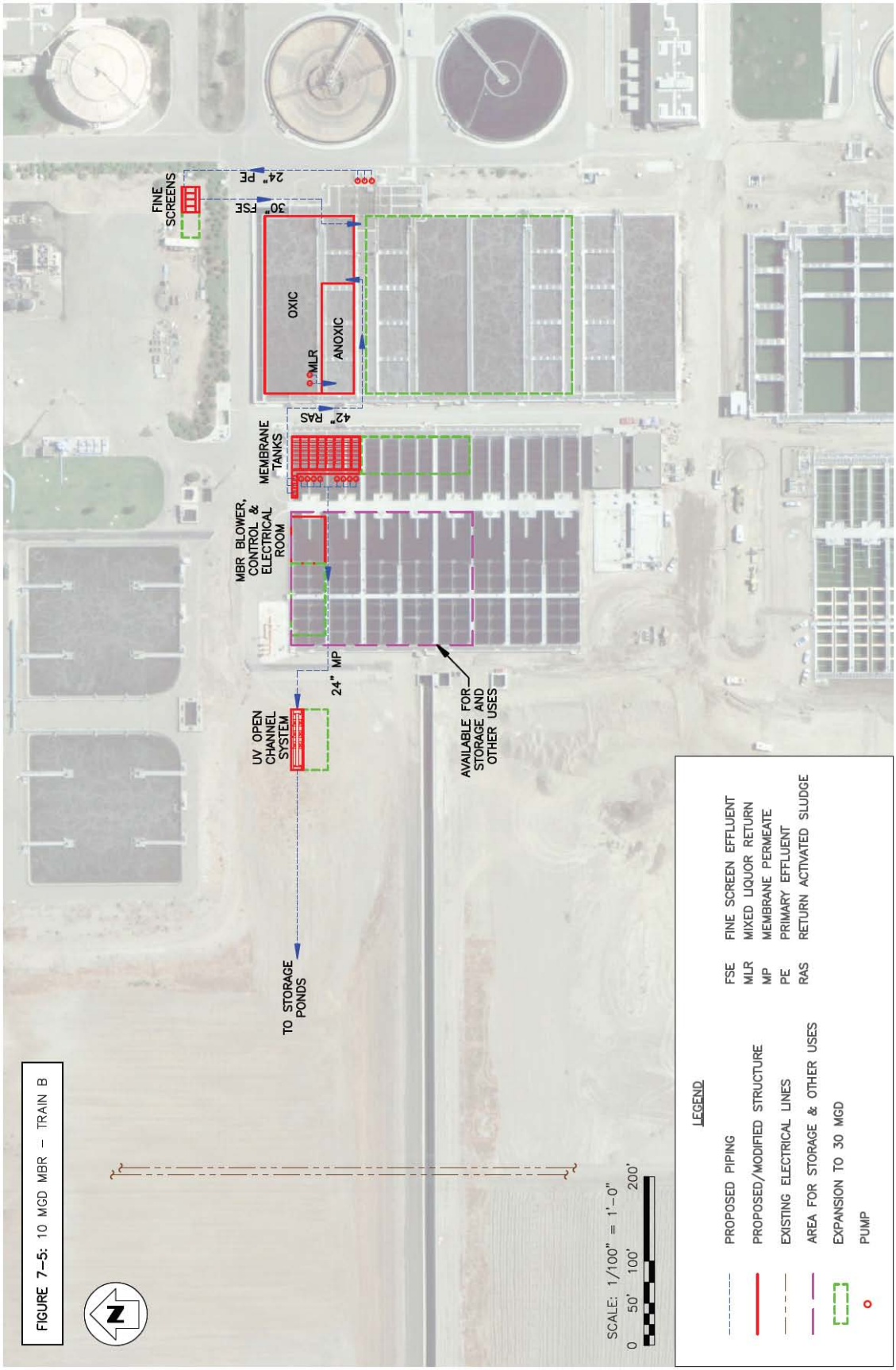


FIGURE 7-5: 10 MGD MBR – TRAIN B

7.4 COSTS

The capital costs for Train A and Train B (5 and 10 mgd) are shown in Tables 7-1 and 7-2, respectively. A credit for conventional NDN is included. This is the investment the City would need to make on secondary treatment system, if the plant had to be upgraded to NDN process using conventional tertiary filters rather than MBR. As can be seen, using Train A for MBR would result in higher cost. This is due to the extensive modifications needed in Train A.

Table 7-1: MBR Capital Cost – Train A [a]

Parameter	Capital Cost ($ Million)	
Flow	**5 mgd**	**10 mgd**
Equipment and Structures Cost	7.0	12.1
Total Capital Cost [b]	20.2	34.9
Credit for Conventional NDN [b,c]	(0)	(8.2)
Total Capital Cost Including NDN Credit	**20.2**	**26.7**

[a] UV credit not included.
[b] Including installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013)
[c] NDN credit based on constructing additional facilities (one aeration basin and installing new equipment such as mixed liquor recycle pumps) if the City were to choose conventional filters instead of MBR and were required to achieve NDN in the conventional secondary treatment process.

Table 7-2: MBR Capital Cost – Train B [a]

Parameter	Capital Cost ($ Million)	
Flow	**5 mgd**	**10 mgd**
Equipment and Structures Cost	5.9	10.9
Total Capital Cost [b]	17.0	31.5
Credit for Conventional NDN [b,c]	(0)	(8.2)
Total Capital Cost Including NDN Credit	**17.0**	**23.3**

[a] UV credit not included.
[b] Including installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013)
[c] NDN credit based on constructing additional facilities (one aeration basin and installing new equipment such as mixed liquor recycle pumps) if the City were to choose conventional filters instead of MBR and were required to achieve NDN in the conventional secondary treatment process.

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SECTION 8 – SUMMARY OF WORKSHOP NO.1

8.1 BACKGROUND

A Workshop was conducted with the City on November 4, 2010 to present and discuss various system alternatives for filtration, disinfection and storage systems for the proposed TTDF. These alternatives are discussed in detail in Sections 4, 5 and 6, respectively, of this TM. This Section of the TM summarizes the discussion carried out at the Workshop and highlights the important decisions made for subsequent work.

8.2 FILTRATION SYSTEM ALTERNATIVES ANALYSIS

Eight filtration technologies were analyzed and summarized during the Workshop. The technologies discussed were:

1. Dual media gravity filters
2. Deep bed mono media filters
3. Continuous backwash filters
4. Traveling bridge filters
5. Fuzzy filters
6. Cloth media filters
7. Nova Ultrascreen filter
8. Microfilters

The Workshop presentations & discussions included the following:

1. Introduction and filter history
2. Photos and cross-sections
3. Features of operation
4. Pros and Cons
5. Title 22 design criteria including reliability
6. Preliminary layout for 5 mgd expandable to 15 mgd and ultimately to 30 mgd.
7. Capital, O&M and life cycle cost analysis

Based on the discussions, the City indicated their preference for cloth media filters and Nova Ultrascreen filters. The City expressed their concern about possibility of air-borne dust contaminating the recycled water and directed that all filtration units be covered. City requested that revised cost estimates be prepared for the two preferred filtration technologies including a building to house cloth media filters and a canopy for Nova Ultrascreen filters. Subsequently, the City asked Parsons to consider a building for Nova filters as well. The City also asked Parsons to inquire Nova about potential effluent turbidity spikes following backwash with Nova filters. Parsons will revise the cost estimates and will contact Nova to inquire about the potential effluent spike problems immediately following the backwash.

8.2.1 Subsequent Developments

Following the Workshop, Parsons submitted revised cost estimates to the City for cloth media filters and Nova Ultrascreen filters. Table 8-1 presents a summary of revised costs for the two systems (including CMU buildings to house each type of filters) for 5 mgd constant flow rate.

Table 8-1: Revised Cost Summary for Cloth Media and Nova Ultrascreen Filters (5 mgd Constant Flow)

Parameter	Cloth Media Filters[e] ($)	Nova Ultrascreen Filters ($)
Equipment and Structures Cost[a]	1,870,000	1,325,000
Total Capital Cost[b]	5,000,000	3,800,000
Total Annual O&M Cost[c]	90,000	100,000
20 Year Life Cycle Cost[d]	6,700,000	5,650,000

[a] Includes CMU building to house the filters.

[b] Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[c] Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[d] At a 5% discount rate and a 4% escalation rate.

[e] Concrete structure designed for a total filtration capacity of 9 mgd.

Per City's request, Parsons contacted Nova to inquire about possible effluent turbidity spikes immediately following backwash operation. Staff at Nova clarified that Nova filters do not experience the effluent turbidity spikes, unlike cloth media filters, immediately following backwash. They attribute this to what they call "pulse backwashing". Nova filter discs go through much frequent backwash cycles; one backwash every 6-10 minutes each lasting for about 10-15 sec. This "pulse backwashing" not only eliminates effluent turbidity spikes but the volume of backwash is significantly less (less than 1% of feed water volume) when compared to cloth media filters. Nova also claims that due to the fact that Nova filter discs use a filter medium (precision woven SS mesh) which provides fine pore size control, their filtration system does not depend on cake filtration as is the case with cloth media filters. To substantiate their claim against effluent turbidity spikes following backwash, Nova supplied an evaluation report for Orange County South Regional Water Reclamation Facility – Sand Lake Road in Florida, where cloth media filters and Nova filters were tested side-by-side. The report supports Nova's claim that their filters do not experience effluent turbidity spikes as in the case of cloth media filters. This report is attached in Appendix C. The graphs presented in pages 5 and 6 of the report clearly document relatively constant effluent turbidity from Nova filters when compared to distinct spikes in effluent turbidity after every backwash in case of cloth media filters.

Based on the above analysis and fact finding, City selected Nova Ultrascreen filters as their system of choice for filtration for comparison against MBR system. Parsons would like to highlight the Nova's lack of experience in meeting Title 22 regulations in California. Nova Ultrascreen® filters have a long history (~10 years) of use in overseas installations; however, the history of use in the US on municipal wastewater is limited. There are currently no installations in California and the longest operating municipal wastewater installation in the US has been in operation for less than one year (in Orange Park, FL) and has a rated capacity of 3.0 mgd. If the City should consider this filtration system, Parsons strongly recommends a minimum of two (2) site visits to operating installations by Parsons and City staff to gain first-hand knowledge of the performance and operation of Nova filters before finalizing this choice.

In addition, disc filters in general, require the upstream biological treatment system to have a minimum SRT of 5 days prior to filtration (including Nova Ultrascreen filters) for consistent effluent quality. Without such a high SRT, the extra cellular enzymes secreted by the microorganisms will potentially plug the fine pores on the disk media. If the existing biological system does not provide an SRT of at least 5 days, modifications to the pertinent secondary treatment facilities' operations will be required.

8.3 DISINFECTION SYSTEM ALTERNATIVES ANALYSIS

Three disinfection technologies were analyzed and summarized during the Workshop. The technologies discussed were:

1. Open channel UV Disinfection
2. In-pipe UV Disinfection
3. Ozone Disinfection

Each disinfection technology was discussed in detail and consisted of the following:

1. Introduction
2. Photos and cross-sections
3. Features of operation
4. Pros and Cons
5. Title 22 design criteria including reliability
6. Preliminary layout for 5 mgd expandable to 15 mgd and ultimately to 30 mgd.
7. Capital, O&M and life cycle cost analysis

Based on the discussions, the City expressed their preference for in-pipe UV disinfection system similar to neighbouring Clovis Water Reuse Facility. At the Clovis facility, the City noted the operator's positive experience with operating and maintaining the in-pipe UV system. The City asked Parsons to revise the cost estimates to include 1.0 mgd capacity UV reactors instead of 2.3 mgd capacity reactors considered earlier by Parsons. City also wanted the cost estimate to include a canopy for in-pipe UV reactors. Table 8-2 presents a summary of the revised cost estimates for the 1 mgd in-pipe UV system compared to the 2.3 mgd in-pipe UV system. Final

selection of the UV system will be made during detailed design and will be based on competitive bidding between 1 mgd reactors and lager size reactors (2.3 mgd and others, as applicable).

Table 8-2: Revised Cost Summary for In-pipe UV Disinfection Following Meida Filtration (5 mgd Constant Flow)

Parameter	2.3 mgd Reactors ($)	1 mgd Reactors ($)
Equipment and Structures Cost	1,460,000	2,000,000
Total Capital Cost[a]	4,800,000	6,500,000
Total Annual O&M Cost[b]	230,000	230,000
20 Year Life Cycle Cost[c]	8,900,000	10,600,000

[a] Including typical installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013).

[b] Including power, media replacement, general maintenance, and labor. Unit power cost is considered as $ 0.14/kWh.

[c] At a 5% discount rate and a 4% escalation rate.

8.4 STORAGE AND PUMPING SYSTEM ALTERNATIVES ANALYSIS

Three storage alternatives were analyzed and summarized during the Workshop. The alternatives discussed were:

1. Earthen basins (lined and covered)
2. Steel tanks
3. Pre-stressed concrete tanks
4. Converted Train A Aeration Basin

The pros and cons of each alternative along with capital, O&M and life cycle costs were discussed during the Workshop.

If modifications to Train A are required as part of the proposed treatment system (as in case of MBR alternative), then converting an aeration basin (Train A) into storage will be the preferred choice for the City. On the other hand, if a new storage tank needs to be constructed (for conventional filtration alternative), the City prefers pre-stressed concrete tanks due to their low maintenance cost, avoided costs for pumping the recycled water to the storage tanks (as in case of a steel tank) and aesthetics.

8.5 MEMBRANE BIO-REACTOR (MBR) OPTION

Parsons presented MBR system as an alternative to conventional filtration. The advantages with MBR include the ability to remove nitrogen, producing higher quality effluent exceeding Title 22 standards, utilizing existing basins, and enhancing the existing treatment capacity without addition of tanks and lowering the cost of downstream UV system.

The presentation included analysis of MBR system in Train A versus Train B. City likes the idea of utilizing Train A infrastructure (aeration basins and clarifiers), which reportedly are at the end of their useful life. In contrast, Train B is a newer and well operated system, which the City prefers not to make any modification to at this time. City directed Parsons to use exclusively Train A for MBR system analysis.

Parsons presented an MBR system that made the best use of existing infrastructure at Train A. Pre-aeration for MBR comes from modifying one of the four existing square secondary clarifiers. The City suggested Parsons to utilize the currently decommissioned secondary clarifier no. 5 to install membrane cassettes. In-pipe UV reactor system will be used for disinfection as in case of filtration alternatives. Parsons proposed the idea of converting one of the existing four square aeration basins (app. 2.7 MG each) into a recycled water storage tank; the City concurred with this recommendation.

City requested Parsons to evaluate the option of using a portion of the air from the existing aeration blowers for membrane air scouring. Parsons has addressed this issue in Section 9 of this TM.

8.6 THREE PLANS (PLANS A, B AND C)

At the end of the Workshop, City decided to have three Plans to be developed in further detail and to be included as part of this TM. The three Plans are called A, B and C, which are described below.

PLAN A (12 mgd MBR)

1. This MBR alternative will be based on Train A with 12 mgd average dry weather flow (maximum capacity of each basin to provide nitrification & denitrification) and 14.76 mgd peak dry weather flow (12 mgd times 1.23 peaking factor). The MBR alternative with 5 mgd average constant flow will only be discussed but not evaluated, since it involves de-rating of Train A (also Train B) capacity significantly.

2. This plan will include conversion of a Train A clarifier (one only) into pre-aeration basins preceding the membrane tanks.

3. This plan will evaluate conversion of clarifier no. 5 (circular) into membrane tanks versus construction of separate membrane tanks.

4. In-pipe ultraviolet (UV) is the preferred process for disinfection and will be designed and used as the basis for cost estimates for the same flows as above. Based on discussion at the Workshop, 1-mgd UV reactors will be used as the basis for the construction cost estimate. A canopy to cover the UV reactors will also be considered.

5. One aeration basin at Train A will be converted into a recycled water storage facility (about 2.7 MG).

PLAN B (5 mgd Filtration)

1. Plan B will incorporate a 5 mgd constant flow filtration system. Both Nova and Disk filter systems will be evaluated. Revised cost estimates including a canopy for the Nova filters and a building for the Disk filters will be submitted to the City. Furthermore, Parsons will contact Nova to investigate the issue of potential turbidity spikes in filtrate immediately after backwash. The cloth media disk filter system has reflected this phenomenon, although it is not of much concern since the effluent quality is mandated based on averages. Nova is preferred subject to resolution of this issue.

2. This plan will take 5 mgd of constant flow from the effluent junction box downstream of Train B for filtration and disinfection. There is no nitrification-denitrification (NDN) requirement right now for this flow. However, it may be required in the future, so leave space for any future facilities needed for this to be accomplished.

3. In-pipe UV is the preferred process for disinfection (a system using 1-mgd reactors with canopy).

4. Storage will be accomplished with a partially buried 5 MG pre-stressed concrete tank.

PLAN C (12 mgd Filtration)

1. Plan C will incorporate a 12-mgd constant flow filtration system. Here again, the flow will be taken from the effluent junction box downstream of Train B. There is no nitrification-denitrification (NDN) requirement right now for this flow. However, it may be required in the future, so leave space for any future facilities needed for this to be accomplished.

2. Nova and Disk filters will be evaluated as for Plan B. Nova is preferred subject to the resolution of the effluent quality issue as in Plan B.

3. In-pipe UV as for Plans A and B is the preferred process for disinfection (a system using 1-mgd reactors with canopy).

4. Storage will be accomplished with a partially buried 5 MG pre-stressed concrete tank.

8.7 POWER SUPPLY OPTIONS FOR TTDF

Per the scope of work, Parsons was to evaluate the feasibility of feeding the proposed TTDF facilities from an existing switchgear at RAS/WAS pump station located adjacent to the secondary clarifiers in train B. However, during the Workshop the City indicated that, for MBR system, it may be better to take the power feed from either four existing transformers or a 12kV switchgear located east of secondary clarifier no.1 in Train A. Parsons' evaluation of various options of power supply for TTDF are presented under Section 12 of this TM.

8.8 EFFLUENT ELECTRICAL CONDUCTIVITY (EC)

The City staff brought up an important issue that needs to be considered for design of the TTDF. The RWRF's discharge currently has a limit for electrical conductivity (EC) of 500 micro mhos/cm + EC of the source water. Meeting this limit is a challenge and may require various measures including source water treatment or replacement, expensive systems to remove salts in wastewater, industrial source control and/or public education on waste minimization. The various alternatives presented, including MBR, may not be effective removing all salts from the final effluent. However, MBR technology could help reduce EC levels through its nitrification/denitrification (NDN) abilities. Parsons estimates that effluent EC can be reduced by about 150 micro mhos/cm through NDN, as ammonia is converted to nitrogen gas and escapes into the atmosphere.

During the past few years, the RWRF has experienced a reduction of the effluent EC through an incidental NDN process that reduced ammonia to nitrogen gas. The reduction in the effluent was estimated between 8% to 9.5% of the total EC influent, enough to maintain compliance with the Waste Discharge Requirements (WDR) discharge limit.

8.9 OTHER KEY DECISIONS MADE

Aside from the discussion above, the following are the other key decisions made during the Workshop.

1. Site preparation (filling and compacting the percolation basins to grade) will be performed by the City.
2. All facilities (for Plans A, B and C) will be located north of Canal B.

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SECTION 9 – PLAN A: MBR, UV DISINFECTION AND STORAGE SCHEME (12 MGD CAPACITY)

9.1 BACKGROUND

Per Workshop No. 1 (Section 8 of this TM), Plan A which incorporates an MBR system, disinfection, and storage is discussed under this Section. The technical concept of MBR system was discussed in Section 7. During Workshop No.1, several key decisions were made regarding the analysis of Plan A, as mentioned briefly below:

- Design the system to achieve organics as well as nitrogen removal (NDN). This is to maximize the benefits which can be obtained from MBR considering the possible future effluent nitrogen requirements.
- Use the existing facilities of Train A – and not of Train B – to build Plan A scheme. Train A is the oldest amongst the three existing Trains, is obsolete in design, and is the best candidate for modifications and conversion to MBR.
- Due to age and sloping walls of the aeration basins in Train A, do not consider conversion of any of these basins to MBR bioreactor. This will be very expensive for retrofitting and/or very inefficient. Instead, use one of the secondary clarifiers in this Train for such purpose.
- In Train A, the rated capacity of each existing aeration basin and associated clarifiers is 8 mgd. Therefore, do not consider 5 mgd design flow as the basis for analysis because this would result in significantly de-rating the exiting train. Instead, use the maximum capacity that each aeration basin (in this case converted secondary clarifier) can handle to achieve NDN.
- UV Inline System (1 mgd capacity) will be used for disinfection of MBR permeate. Final selection of the UV system will be made during detailed design and will be based on competitive bidding between 1 mgd reactors and lager size reactors (2.3 mgd and others, as applicable).
- One of the aeration basins in Train A will be used to store the recycled water (approximate capacity of 2.7 MG).

Based on the above items, MBR system as discussed later in the section will be located in Train A and designed for maximum capacity that one converted secondary clarifier can handle.

9.2 DESIGN DEVELOPMENT

This Section of the TM takes the technical concepts discussed above and develops the mainstream treatment system: i.e. membrane bioreactor (MBR), to upgrade a portion of the RWRF from a carbonaceous BOD removal facility to a simultaneous nitrification and denitrification (nitrogen removal) Title 22 water reclamation facility capable of producing a high

quality, low nitrogen effluent. Primary effluent is treated through an MBR system, providing oxidation, nitrification-denitrification and solids separation in a single process.

Primary effluent will be first pumped through fine screens and will then flow into the bioreactor (aeration basin) and then into the membrane tanks. The membrane permeate will be pumped to the UV system for disinfection prior to transfer into the storage basin. Two alternative locations are considered for membrane tanks – 1) conversion of secondary clarifier 5 2) a separate membrane tank. Figures 9-1 and 9-2 show the overall layouts for the MBR system for these two options. Detailed analysis of each option is presented later on in this document.

9.2.1 Capacity Analysis

As mentioned above and agreed upon during Workshop No.1, one of the secondary clarifiers in train A will be converted to the aeration basin associated with MBR. The capacity of the MBR system will be determined based on the amount of flow that the converted secondary clarifier can handle to achieve NDN. The basin will be compartmentalized to incorporate anoxic and oxic zones. The design criteria in Table 9-1 were developed as the basis for capacity analysis.

Table 9-1: Design Criteria for Capacity Analysis of MBR Aeration Basin to Achieve NDN

Item	Units	Design Value	Remarks
Flow Peaking Factor	-	1.23	Peak:Average ratio
Primary Effluent	-	-	Max month values
BOD	mg/L	224	70% of raw wastewater
TSS	mg/L	120	40% of raw wastewater
TKN	mg/L	30	65% of raw wastewater
MLSS	mg/L	10,000	
SRT (Minimum)	days	6	Oxic zone
Anoxic:Oxic Zone Ratio (Minimum)	-	0.3	
Total Volume of Basin	MG	2.3	One secondary clarifier
Maximum Oxygen Uptake Rate	mg/L-hr	135	For peak flow

Based on the above design criteria, the average flow that a converted secondary clarifier in Train A can handle was determined to be 12 mgd, corresponding to a peak flow of 14.76 mgd. These values were used to size the other equipment and structures associated with the MBR system.

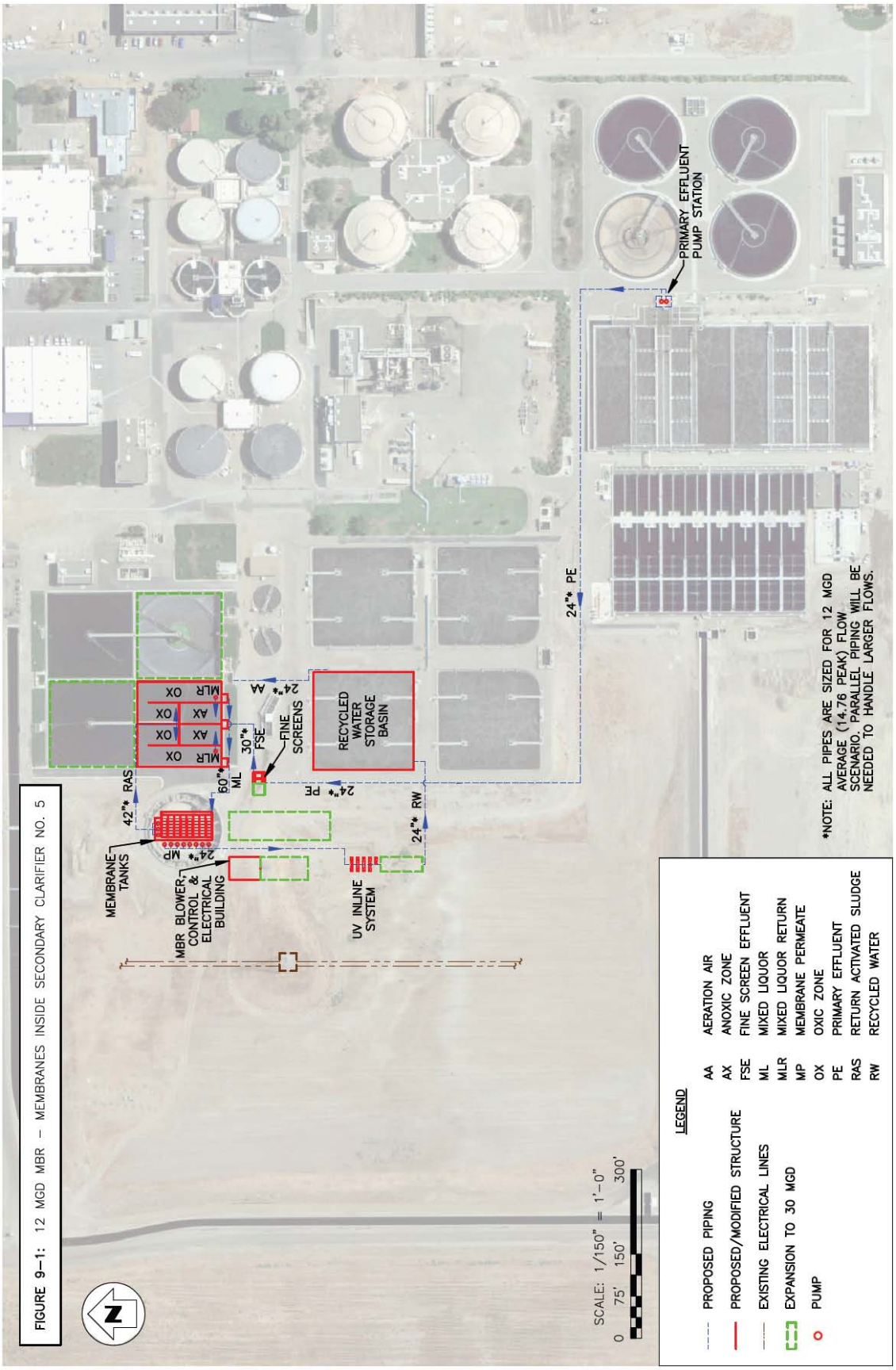


FIGURE 9–1: 12 MGD MBR – MEMBRANES INSIDE SECONDARY CLARIFIER NO. 5

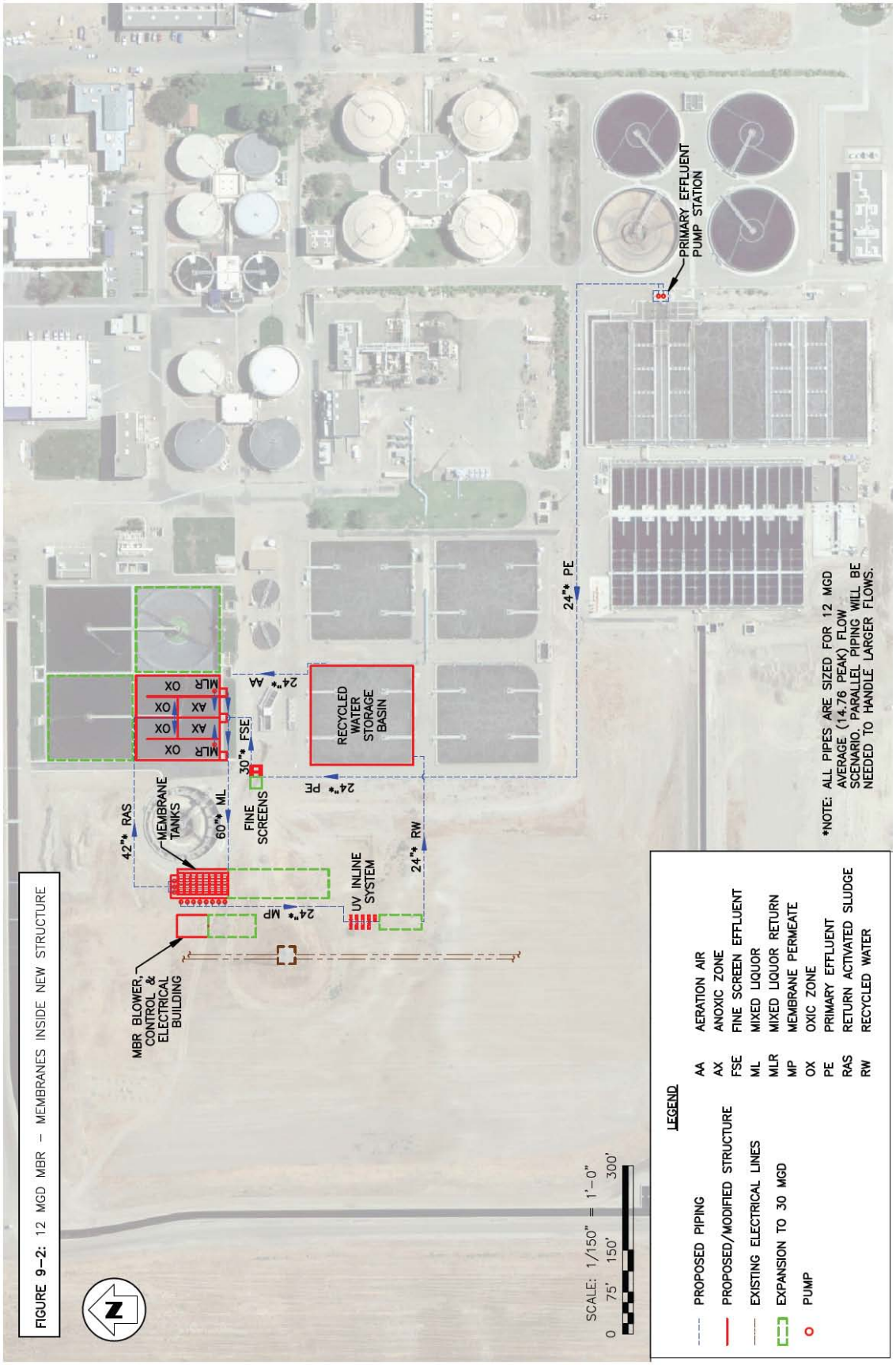


FIGURE 9–2: 12 MGD MBR – MEMBRANES INSIDE NEW STRUCTURE

9.2.2 Primary Effluent Pumps

The existing aeration basin distribution structure located on the east side of Train B will be modified to house the primary effluent pumps. These pumps will pump the desired flow from the distribution structure to fine screens. Table 9-2 shows the design characteristics for the pumps.

Table 9-2: Primary Effluent Pumps Design Characteristics

Item	Units	Design Value	Remarks
Type			Vertical propeller
Number	-	2 (1+1)	
Capacity, Each	gpm	10,300	Wet weather peak will not be handled in MBR
TDH	ft	20	
Horsepower	hp	100	
Drive			Variable speed

9.2.3 Fine Screens

There are different types of fine screens which could be used in an MBR facility; in-channel rotary drum screen, internally-fed rotary drum screen, and band screen. The first type, i.e. **in-channel rotary drum**, consists of an inclined screen basket, placed within a channel, and is equipped with an integrated auger for dewatering/compaction of collected screenings. The second type, i.e. **internally-fed rotary drum**, is a skid-mounted unit. The screen basket is installed in a horizontal configuration. Wastewater is fed into the unit, flows over the weirs and free falls into the screen basket. The screenings need to be handled by a separate dewatering unit. This type of screen requires more available head due to the free-fall condition. The third type, i.e. **band screen**, consists of several perforated plates joined together similar to a conveyor belt. The unit is installed vertically in a channel. Wastewater is fed into the center of the unit and flows across the plates out of the unit. There have been performance issues associated with this type of screen in the past during operation. The product, however, has reportedly been improved over the past few years.

The in-channel rotary drum screen was selected for consideration in this technical memorandum due to its apparent simplicity. By way of illustration, collection and dewatering of screenings are accomplished in a single unit as noted above. A dispenser holding a roll of plastic tubes is mounted at the discharge of the screenings dewatering auger such that the plant operator can pull down a portion of the plastic tube to form a bag to receive the screenings, thus containing the odor of the screenings in the bag and avoiding nuisances like flies or other insects. Nonetheless, it is Parsons' intent that if the MBR alternative is selected, all three types of fine screens will be evaluated for their reliability and cost-effectiveness, as well as odor control requirements and ease of screenings removal during the detail design. The best screens will be provided accordingly.

As shown on Figures 9-2 and 9-3, the fine screens will be located southwest of secondary clarifier No. 4 of Train A. Two fine screens would be installed with one of the units as standby. Each screen would be capable of handling the peak flow of 14.76 mgd. The units would be installed in concrete channels equipped with isolation gates to allow for maintenance without interfering with the plant's operation. Each fine screen would be equipped with an integrated washer/compactor for cleaning and concentrating the screenings prior to disposal off site.

The design characteristics for the fine screens and washer/compactors are shown in Table 9-3.

Table 9-3: Design Characteristics of Fine Screens and Washer/Compactors

Item	Units	Design Value	Remarks
Screens			
Type	-	-	In-channel perforated-plate drum
Number	-	2 (1+1)	
Capacity, Each	mgd	14.9	
Effective Opening Size	mm	2	
Channel Width	ft	8.5	Width at screen
Screenings Handling			
Type	-	-	Washer, dewatering, compactor unit
Number	-	2 (1+1)	Integrated with screens
Motor Power, Each	hp	3	Also powers screen basket

9.2.4 Bioreactors and Associated Equipment

This subsection describes the structures and equipment located downstream of fine screens and upstream of membrane tanks.

Bioreactor (Aeration Basin):

As mentioned above, one of the secondary clarifiers of Train A (clarifier No. 4) will be converted to aeration basin. To provide redundancy, the clarifier will be retrofitted to accommodate two bioreactors, each divided into anoxic and oxic zones, with the first quarter of each bioreactor dedicated to the anoxic zone. Baffles would be placed in the bioreactors to separate the anoxic and oxic zones to minimize back-mixing as the flow passes through in a plug flow regime. Additional baffling would be used to divide each anoxic and oxic zone into 3 compartments, again to minimize back-mixing. The plug flow conditions increase the efficiency of biological treatment, optimizing carbonaceous matter removal, nitrification and denitrification. Submersible mixers would be used to provide mixing in the anoxic zones. Table 9-4 provides the design characteristics of the bioreactors.

Table 9-4: Bioreactors Design Characteristics

Item	Units	Design Value	Remarks
Bioreactors			
Number (In Parallel)	-	2	Converted secondary clarifier No. 4
Volume, Each	MG	1.15	
Anoxic Zone			
Number per Bioreactor	-	1	
Dimensions of Zone (L x W x SWD), Each	ft x ft x ft	75 x 37 x 14	
Number of Compartments per Zone	-	3	Equal volume (in series)
Oxic Zone			
Number per Basin	-	1	
Dimensions of Zone (L x W x SWD), Each	ft x ft x ft	225 x 37 x 14	
Number of Compartments per Zone	-	3	Equal volume (in series)
Anoxic Zone Mixers			
Type			Submersible
Number per Compartment	-	1	
Total Number	-	7 (6+1)	One shelf spare
Horsepower, Each	hp	4	

Aeration System:

The air will be transferred to the oxic zones in the bioreactors through fine bubble diffusers. Either EPDM Membrane disks or more efficient aerator strips (e.g. AEROSTRIPTM), would be used to provide aeration. The aeration would be tapered so that approximately 70% of the oxygen is provided in the first half of the oxic zone to satisfy the high oxygen demand as the substrate enters the oxic zone.

The required air will be supplied to the oxic zones by the existing blowers. These blowers are of single-stage centrifugal type and have enough capacity to serve the biological needs of the MBR process as well as the remaining plant. The existing 24 inch air pipeline of aeration basin No. 3 will be used and extended to supply the air to the bioreactors. As discussed in Section 6, aeration basin No. 3 will no longer be in service and will be used as recycled water storage in the future.

The design characteristics for the aeration system are presented in Table 9-5.

Table 9-5: Aeration System Design Characteristics

Item	Units	Design Value	Remarks
Diffusers			
Type			Fine bubble, membrane (EPDM) disk or strip type
Aeration Pattern			Tapered along bioreactor length
Process Air Blowers			
Type			Single-stage centrifugal
Number	-	6 (5+1)	Existing blowers
Capacity, Each	scfm	27,000	
Discharge Pressure	psig	7.8 or 8.5	4 units at 7.8 and 2 units at 8.5
Horsepower	hp	1,500	

Mixed Liquor Return and Sludge Recirculation Pumps:

Two recirculation lines are provided in the MBR system; mixed liquor return and sludge recirculation. The mixed liquor return system transfers mixed liquor from the tail end of the oxic zone back to the head of the anoxic zone at a rate up to four times the average flow. This system transfers nitrates resulting from nitrification back to the anoxic zone for denitrification as the oxygen molecules associated with nitrates are used by the biomass.

The sludge recirculation system transfers sludge from the membrane tanks to the head of the oxic zone at a rate also up to four times the average flow. The recirculation system prevents the solids concentration in the membrane tanks from increasing excessively as permeate is removed from the mixed liquor. This sludge is highly oxygenated and provides a portion of the process oxygen needed for BOD removal and nitrification.

Sludge will be wasted from the MBR system from the membrane tanks. New pumps will be installed for this purpose.

The design characteristics for the recirculation and waste pumps are presented in Table 9-6.

Table 9-6: Sludge Pumping Systems Design Characteristics

Item	Units	Design Value	Remarks
Mixed Liquor Return Pumps			Returning flow from oxic zone to anoxic zone
Type			Axial propeller
Number	-	3 (2+1)	One shelf spare
Capacity, Each	gpm	16,700	
TDH	ft	3	
Horsepower	hp	30	
Drive			Variable speed
Sludge Recirculation Pumps			Returning flow from membrane tanks to oxic zone
Type			Vertical propeller
Number	-	3 (2+1)	
Capacity, Each	gpm	16,700	
TDH	ft	20	
Horsepower	hp	150	
Drive			Variable speed
WAS Pumps			
Type			Centrifugal
Number	-	2 (1+1)	
Capacity, Each	gpm	1,000	
TDH	ft	20	
Horsepower	hp	7.5	
Drive			Variable speed

9.2.5 Membranes

The membranes will be installed in 8 independent tanks. Two options were considered for the location of membranes; inside secondary clarifier No. 5 (Figure 9-2) and in a completely new structure (Figure 9-3). In the first option, the existing secondary clarifier No. 5 would be modified by removing the mechanisms and raising the bottom to house the membrane tanks. In the second option, the membrane tanks will be constructed east of secondary clarifier No. 5.

For the purpose of this Section, hollow-fiber membranes were considered. The following design criteria were developed as the basis for sizing the membranes:

- Minimum wastewater temperature of 16°C.
- Maximum flux rate of 14 gfd at average flow (all membrane tanks in service).
- Maximum flux rate of 20 gfd at peak flow (one membrane tank out of service).

Eight membrane tanks, each housing 6 membrane cassettes plus space for a future cassette, would have enough capacity to handle 12 mgd of flow. The tankage would be configured to allow isolation of a tank for maintenance and cleaning.

Permeate pumps will draw the MBR effluent through the membranes, directing it to the disinfection system. A building would house new air scouring blowers and membrane control and electrical system. The building would be located adjacent to the membrane structure.

As an alternative to installing new air scouring blowers, the existing single-stage blowers could be used for membrane scouring and also to provide the process air with proper piping and valves to address the different pressure requirements at membrane tanks and bioreactors. Although this approach is technically feasible, based on Parsons' experience, this would complicate the operation of the plant and result in inefficient long term operation. Dedicating one or two of the single-stage blowers to air scouring is not recommended as the maximum required scour air for the 12-mgd plant is only about half of the capacity of each blower. Using these blowers would require them to operate at half the full rated capacity and will result in an inefficient operation of the blowers. Therefore, separate air scour blowers are recommended.

Table 9-7 summarizes the design characteristics of the MBR membrane system.

Table 9-7: MBR Membrane System Design Characteristics

Item	Units	Design Value	Remarks
Tanks			
Number	-	8	
Cassettes per Tank			
Number of Installed	-	6	
Space for Future	-	1	
Total Membrane Surface Area	ft^2	852,480	
Air Scouring Blowers			
Type			High-speed turbo
Number	-	3 (2+1)	
Capacity, Each	scfm	7,900	
Discharge Pressure	psi	5	
Horsepower, Each	hp	250	
Drive			Variable speed

Item	Units	Design Value	Remarks
Permeate Pumps			
Type			Horizontal end suction
Number	-	9 (8+1)	One shelf spare
Capacity, Each	gpm	1,700	
TDH	ft	25	
Horsepower, Each	hp	20	
Drive			Variable speed
Backpulse Pumps			
Type			Horizontal end suction
Number	-	2 (1+1)	
Capacity, Each	gpm	1,480	
TDH	ft	25	
Horsepower, Each	hp	30	
Drive			Variable speed
Instrument Air Compressors			If Plant air not available
Number	-	2 (1+1)	
Horsepower, Each	hp	15	
Chemical Cleaning			
Sodium Hypochlorite			12.5% Solution
Frequency			
Recovery	Yearly	2	Per tank
Maintenance	Weekly	1	Per tank
Annual Consumption	gal	7,900	
Citric Acid			50% Solution
Frequency	Yearly	1-2	Part of Recovery Clean
Annual Consumption	gal	1,500	

9.3 DISINFECTION

During Workshop No.1, as is the case with Plans B and C, the City directed Parsons to consider in-pipe UV disinfection for Plan A. It was also decided during the workshop that smaller (1 MGD capacity) reactors be considered for preliminary design and cost estimates. The 1 MGD rating for each reactor is based upon high quality membrane permeate feed such as from the MBR system. Nine reactor trains (8 operating + one standby) will be required to disinfect 12 mgd average flow (12 x 1.23 = 14.7 peak flow) and each train will accommodate two reactors. Table 9-8 presents the design criteria for the in-pipe UV disinfection system. There are several larger in-pipe reactors currently available from other manufacturers that may be more economical for

the present project and may be considered later during detailed design.

Table 9-8: In-pipe UV Disinfection Design Characteristics

Parameter	Criteria
Design Flow (Average), mgd	12
Peaking Factor	1.23
Type of UV System	In-pipe, Low Pressure, High Intensity
Number of Reactors	18 (8 trains + 1 standby) each train has 2 reactors
Flow Capacity per Reactor, mgd	1.0
Length of Reactor (ft)	8
Number of Lamps per Reactor	40
Total Number of Lamps Provided	720

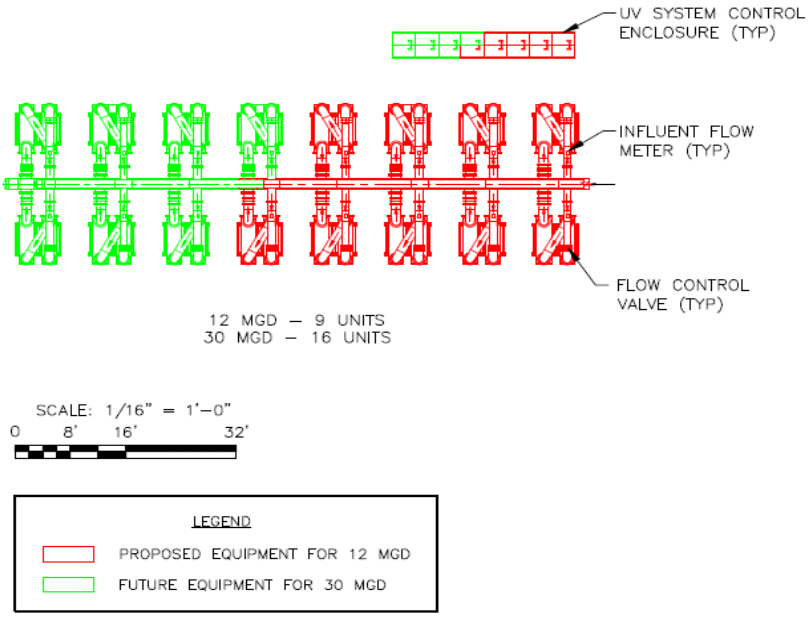


Figure 9-3: In-pipe UV Disinfection System Preliminary Layout

9.4 CONSTRUCTABILITY AND EXPANSION

It is critical that the treatment plant operation not be impacted by the construction activities. The plant must, at all times, be capable of performing at the level required to achieve the water quality standards set by its permit.

The major new construction associated with the MBR system will be the fine screens, bioreactors, membrane structure, and blower building. In case of fine screens, membrane structure, and blower building, construction will be performed in areas that are not associated with the present operation of the plant. This would allow the construction of these facilities to take place independent of the current operation. In case of bioreactors, modifications of one of the secondary clarifiers should not impact the plant operation as one of the square clarifiers is currently not being used. Minor construction activities, as necessary, can be performed

during periods of low flow to avoid negative impacts on the plant performance. Finally, sequencing of construction will be necessary when making connections to existing piping and the plant electrical and control systems; these constraints will be carefully developed and specified in the contract documents.

The ultimate capacity of the Fresno TTDF is planned to reach an average flow of 30 mgd. Additional fine screens, bioreactors, membrane tanks, and blowers will be needed to handle the ultimate capacity. As shown in Figures 9-2 and 9-3, space has been provided for the above equipment/structures, adjacent to the proposed facilities, to accommodate the future expansion.

9.5 PRELIMINARY COSTS

Preliminary costs are developed for two scenarios. The only difference between two scenarios is the location of the membranes; inside the secondary clarifier No. 5 and outside the clarifier in a completely new structure. At this point in the design process, these costs are preliminary and should be used only for comparative purposes.

The costs are estimated using several resources. The quotes from the manufacturers, information available from the similar projects performed by Parsons, and also our own experience, including construction in the Central Valley, were used to determine the costs.

The capital costs for the two scenarios are shown in Table 9-9. For both scenarios, a credit for conventional NDN is included. This is the investment the City would need to make on secondary treatment system, if the plant had to be upgraded to NDN process using conventional tertiary filters rather than MBR. As can be seen, locating the membranes inside the secondary clarifier No. 5 would result in $0.5 million additional cost to the City. This is mainly due to the substantial modifications required to the clarifier before it can accommodate the membranes.

Table 9-9: Plan A Capital Cost (12 mgd) [a]

Parameter	Capital Cost ($ Million)	
	Membranes Inside Secondary Clarifier No. 5	Membranes in New Structure
MBR Equipment and Structures Cost	15.5	15.1
MBR Total Capital Cost [b]	44.2	43.7
Credit for Conventional NDN [b,c]	(8.9)	(8.9)
MBR Total Capital Cost Including NDN Credit	35.3	34.8
UV Disinfection Total Capital Cost [b]	12.9	12.9
Storage (Aeration Basin No.3) Total Capital Cost [b]	3.1	3.1
Plan A Total Capital Cost	**51.3**	**50.8**

[a] For detailed cost analysis see Appendix A.
[b] Including installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013)
[c] NDN credit based on constructing additional facilities (one aeration basin and installing new equipment such as mixed liquor recycle pumps) if the City were to choose conventional filters instead of MBR and were required to achieve NDN in the conventional secondary treatment process.

An evaluation of the operation and maintenance (O&M) cost was also performed (Table 9-10). As was the case for capital cost, credit is given for operation of secondary treatment of a conventional NDN plant. The O&M cost for both scenarios is the same.

Table 9-10: Plan A O&M Cost (12 mgd) [a]

Parameter	O&M Cost ($)
MBR Total Annual O&M Cost [b,c]	1,834,000
Credit for Conventional NDN [b,c]	(670,000)
MBR Total Annual O&M Cost Including NDN Credit	1,164,000
UV Disinfection Total Annual O&M Cost [c]	271,000
Recycled Water Storage and Distribution Pumping Annual O&M Cost	680,000
Plan A Total Annual O&M Cost	2,115,000

[a] For detailed cost analysis see Appendix A.
[b] Including power and chemicals consumption, membrane/diffusers replacement, general maintenance, and labor.
[c] Assuming power usage rate of 14¢ per kWh.

Using the estimated capital and O&M costs, a 20-year life cycle cost analysis was performed. The results are shown in Table 9-11. The option of housing the membranes in new structure is presented in Table 9-11 as the Plan A Life-Cycle Cost.

Table 9-11: Plan A Life-Cycle Cost (12 mgd)

Parameter	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
MBR System	34.8[1]	1,165[1]	55.9
Disinfection (In-pipe UV)	12.9	270	17.8
Storage (Aeration Basin No.3) and Distribution Pumping	3.1	680	15.4[2]
TOTAL	50.8	2,115	89.1

[1]Includes credit for conventional NDN
[2]Although the life of the storage structure is 50 years, a 20 year life cycle cost is presented for consistency.

9.6 ADVANTAGES AND DISADVANTAGES OF PLAN A VERSUS PLANS C

Section 11 of this TM summarizes the advantages and disadvantages of Plan A versus Plan C. Both Plans A and C are of 12 mgd capacity, while Plan B is 5 mgd in capacity and therefore will not be used to compare against Plan A.

Subsequent to Workshop No.2 (Section 14), The City further refined the MBR alternative(s), which are discussed in detail in Section 15 of this TM.

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SECTION 10 - PLANS B AND C: NOVA FILTRATION, UV DISINFECTION AND STORAGE SCHEMES

10.1 BACKGROUND

Per Workshop No.1 (Section 8 of this TM), Plans B and C, which include Nova ultrascreen filter, are discussed under this Section.

Several key decisions regarding filtration schemes were made during Workshop No.1, which are summarized below.

- Nova ultrascreen filters will be used for both Plans B and C as filtration system of choice.
- UV Inline System (1 mgd capacity) will be used for disinfection of filtered effluent. Final selection of the UV system will be made during detailed design and will be based on competitive bidding between 1 mgd reactors and lager size reactors (2.3 mgd and others, as applicable).
- A pre-stressed concrete tank (5 MG capacity) will be used to store the recycled water.
- Plan B will have a treatment capacity of 5 mgd (constant flow – no peaking factor) with provisions for phased expansion to 30 mgd of ultimate capacity.
- Plan C will have a treatment capacity of 12 mgd (constant flow – no peaking factor) with provisions for phased expansion to 30 mgd of ultimate capacity.

Figure 10-1 below presents the schematic for Plans B and C.

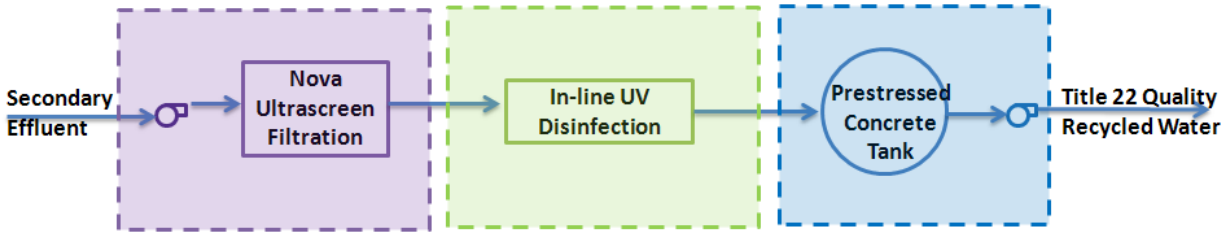


Figure 10-1: Selected Filtration, Disinfection, and Storage Scheme

10.2 EVALUATION OF CONVENTIONAL FILTRATION PLANS (PLAN B AND PLAN C)

10.2.1 Plan B (5 mgd Capacity)

Under this scheme, the TTDF will be fed from distribution canal "B" from which secondary effluent can be withdrawn at a constant rate of 5 mgd, even during periods of low influent flow. Considering this, the TTDF under Plan B will have a capacity of 5 mgd of constant flow (i.e. no flow peaking factor considered).

The design criteria for Plan B are summarized in Table 10-1 and the preliminary construction, O&M, and life-cycle cost estimates for Plan B are presented in Table 10-2. Note that, as per the

decision made during Workshop No. 1, 1 mgd capacity in-pipe UV reactors are considered; however, due to the lower quality of filtered water produced with conventional filtration, an in-pipe UV reactor rated at 1 mgd when treating high quality membrane permeate is de-rated to 0.55 mgd when treating conventional filtrate. Figures 10-2 and 10-3 present the preliminary layout drawings for the Nova Ultrascreen filters and the in-pipe UV disinfection system, respectively. The layout drawings show the facilities for initial capacity of 5 mgd (i.e. the equipment required for Plan B) as well as for phased expansions to 15 mgd and 30 mgd.

Table 10-1: Plan B Design Criteria

Parameter	Criteria
Design Flow, mgd	5 (constant flow)
Filtration – Nova Ultrascreen	
CDPH Approved Filtration Rate, gpm/ft^2	16
Number of Filter Units	2
Number of Disks per Unit	10
Total Filtration Area, ft^2	444
Filtration Rate with One Filter Offline, gpm/ft^2	15.6
Headloss Through Filter, ft (Operating)	2 - 2.5
Disinfection – Inline UV	
Type of UV System	In-pipe, Low Pressure, High Intensity
Number of Reactors	12 (5 trains + 1 standby) each train has 2 reactors
Flow Capacity per Reactor, mgd	0.55
Length of Reactor (ft)	8
Number of Lamps per Reactor	40
Total Number of Lamps Provided	480
Storage – Prestressed Concrete Tank	
Design Capacity, mg	5
Number of Tanks	1
Dimensions of Tank, Diameter (ft) x Side Water Depth (ft)	178 x 28

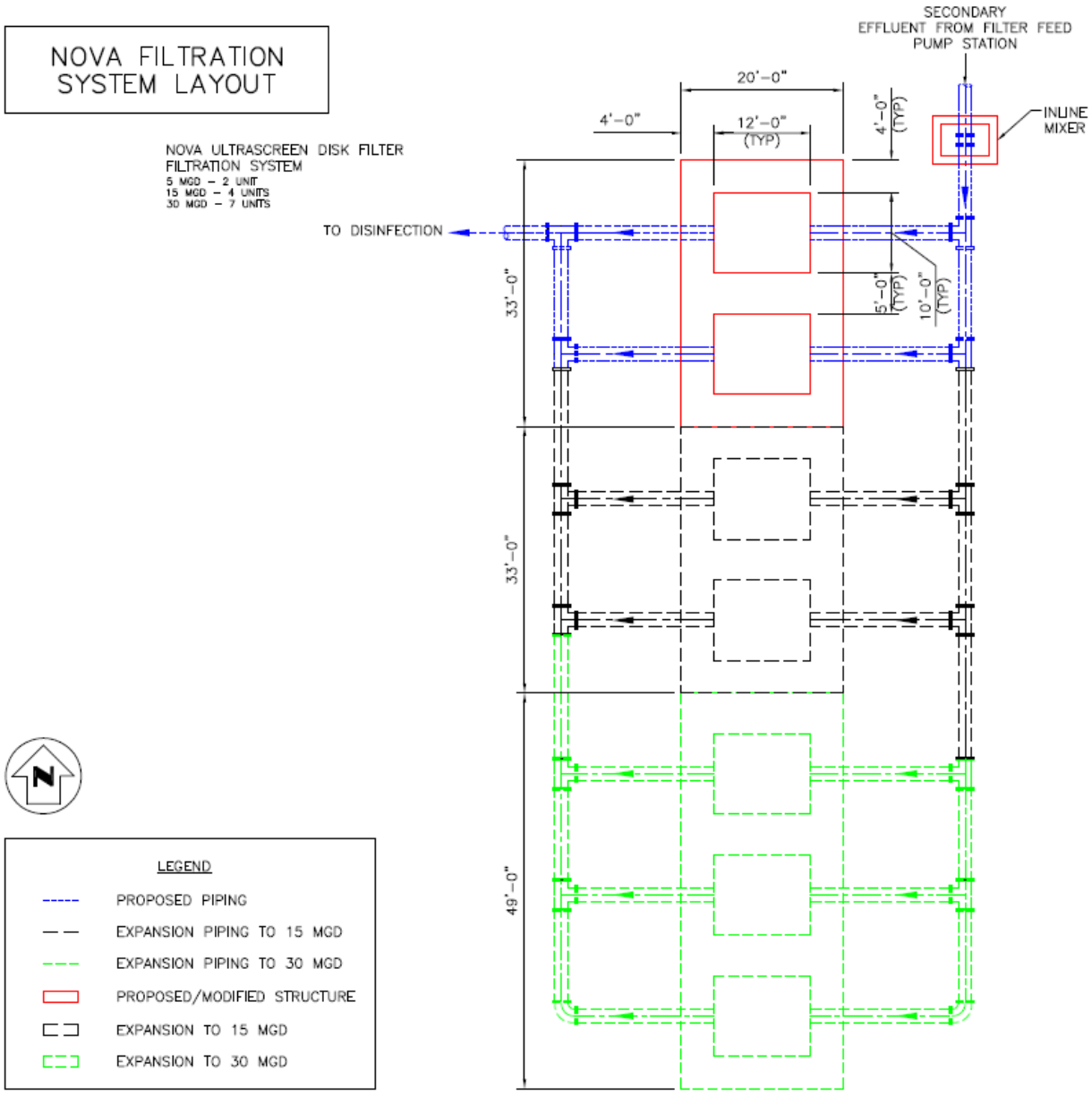


Figure 10-2: Plan B Nova Ultrascreen Filter Preliminary Layout

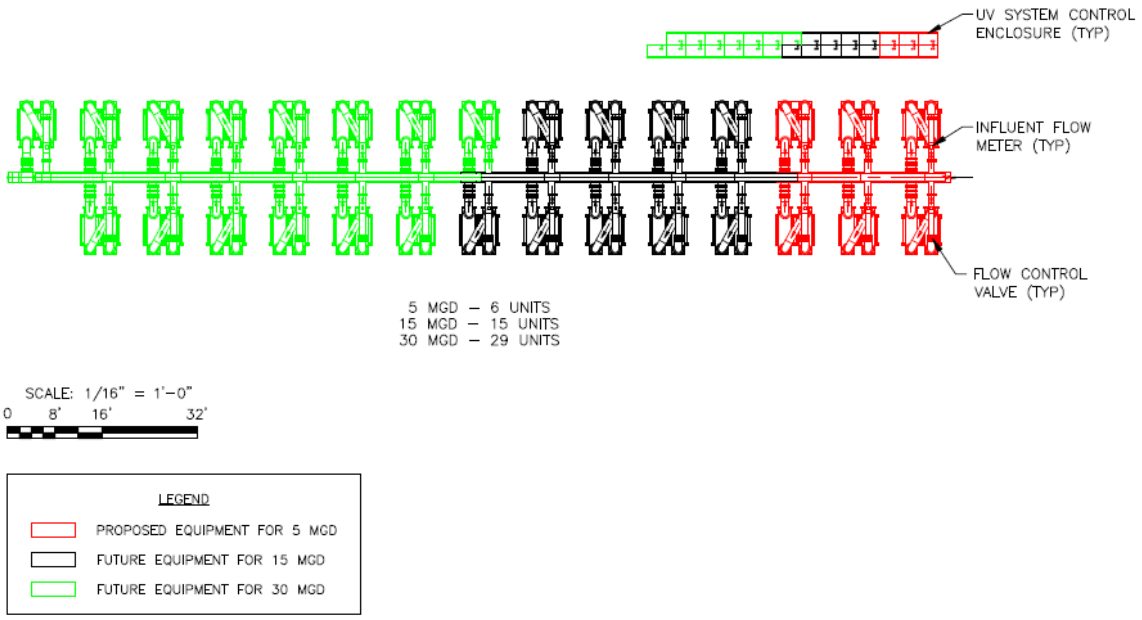


Figure 10-3: Plan B UV Disinfection System Preliminary Layout

Table 10-2: Plan B (5 mgd Capacity) Preliminary Cost Summary

Parameter	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
Filters (Nova Ultrascreen)	4.2	100	6.0
Disinfection (In-pipe UV)	6.5	230	10.6
Storage (5 MG Circular Prestressed Concrete Tank) and Distribution Pumping	7.5	290	12.7[1]
TOTAL	18.2	620	29.3

[1]Although the life of the storage structure is 50 years, a 20 year life cycle cost is presented for consistency.

10.2.2 Plan C (12 mgd Capcity)

The TTDF under Plan C is similar to Plan B discussed above, except that it has a capacity of 12 mgd of constant flow (i.e. no flow peaking factor considered). As discussed in Section 10, Plan A, which incorporates an MBR system in place of conventional filtration, has a capacity of 12 mgd. In order to compare the use of a MBR system to the use of conventional tertiary filtration, the design criteria, preliminary layout drawings, and preliminary construction, O&M, and life-cycle cost estimates for Plan C have been developed.

The design criteria for Plan C are summarized in the Table 10-3 and the preliminary construction, O&M, and life-cycle cost estimates are presented in Table 10-4. Figures 10-4 and 10-5 present the preliminary layout drawings for the Nova Ultrascreen filter and the in-pipe UV

disinfection system, respectively. Note that the Nova Ultrascreen units proposed for Plan C (16 disk units) are larger than the units proposed for Plan B (10 disk units). The layout drawings show the initial capacity of 12 mgd as well as the expansion to 30 mgd.

Table 10-3: Plan C Design Criteria

Parameter	Criteria
Design Flow, mgd	12 (constant flow)
Filtration	
CDPH Approved Filtration Rate, gpm/ft^2	16
Number of Filter Units	3
Number of Disks per Unit	16
Total Filtration Area, ft^2	1,056
Filtration Rate with One Filter Offline, gpm/ft^2	11.8
Headloss Through Filter, ft (Operating)	2 - 2.5
Disinfection	
Type of UV System	In-pipe, Low Pressure, High Intensity
Number of Reactors	24 (11 trains + 1 standby) each train has 2 reactors
Flow Capacity per Reactor, mgd	0.55
Length of Reactor (ft)	8
Number of Lamps per Reactor	40
Total Number of Lamps Provided	960
Storage	
Design Capacity, mg	5
Number of Tanks	1
Dimensions of Tank, Diameter (ft) x Side Water Depth (ft)	178 x 28

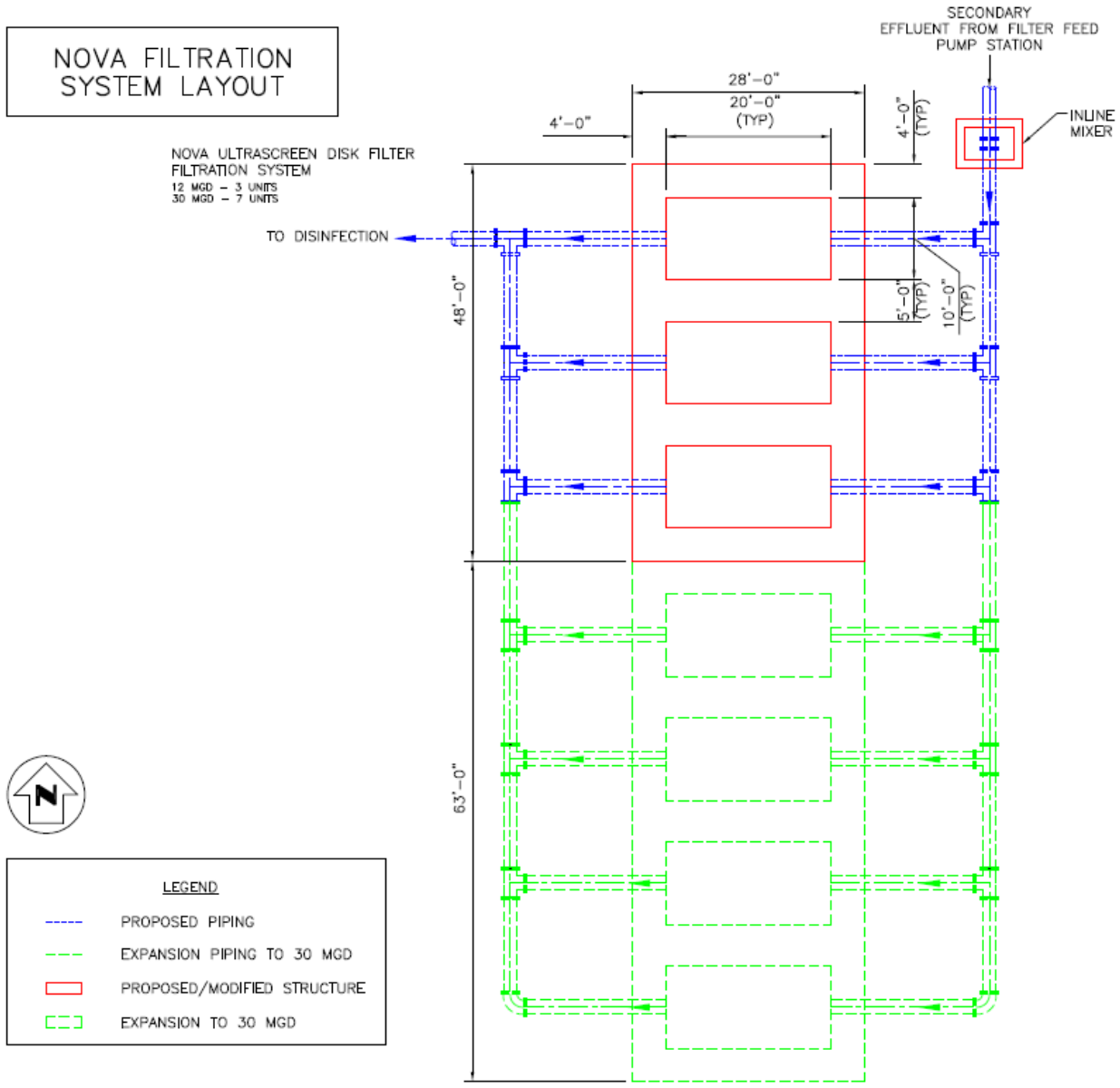


Figure 10-4: Plan C Nova Ultrascreen Filter Preliminary Layout

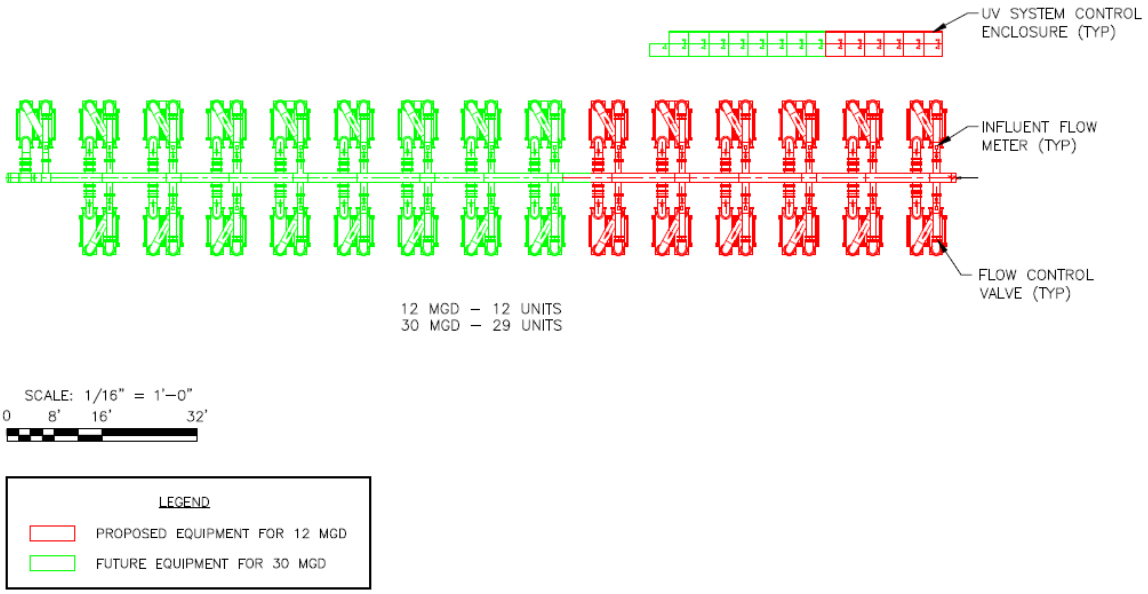


Figure 10-5: Plan C UV Disinfection System Preliminary Layout

Table 10-4: Plan C (12 mgd Capacity) Preliminary Cost Summary

Parameter	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
Filters (Nova Ultrascreen)	7.3	155	10.1
Disinfection (In-pipe UV)	13.5	465	21.9
Storage (5 MG Circular Prestressed Concrete Tank) and 12 mgd Distribution Pumping	7.7	680	19.9[1]
TOTAL	28.5	1,300	51.9

[1]Although the life of the storage structure is 50 years, a 20 year life cycle cost is presented for consistency.

10.3 ADVANTAGES AND DISADVANTAGES OF PLAN A VERSUS PLANS C

Section 11 of this TM summarizes the advantages and disadvantages of Plan A versus Plan C. Both Plans A and C are of 12 mgd capacity, while Plan B is 5 mgd in capacity and therefore will not be used to compare against Plan A.

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SECTION 11 – COMPARISON OF MBR SYSTEM WITH NOVA FILTRATION SYSTEM (PLAN A VS. PLAN C)

11.1 BACKGROUND

In this section, the Plan A (described in Section 9) and Plan C (described in Section 10) will be compared. The advantages and disadvantages of each Plan are presented along with preliminary construction, O&M, and life-cycle cost estimates of each Plan.

Under Plan A, the TTDF will produce an average of 12 mgd of denitrified Title 22 quality effluent and will be designed to handle peak flows of up to 14.76 mgd. The use of existing Train A facilities will be maximized: a secondary clarifier will be converted into a bioreactor for achieving organic and nitrogen (NDN) removal, a new structure will house the membranes, and Aeration Basin No. 3 will be converted into a recycled water storage tank. The option of housing the membranes in a new structure as opposed to inside secondary clarifier No. 5 is considered for Plan C due to lower cost (refer to Section 9). Under Plan C, the TTDF will produce 12 mgd of Title 22 quality effluent without a flow peaking factor. The TTDF feed water will be withdrawn from distribution Canal B at a constant rate of 12 mgd. No modifications to the upstream biological treatment facilities will be made - thus, the recycled water produced under Plan C will contain nitrogen in the form of ammonia, nitrates, and nitrites at concentrations approximately equal to current secondary effluent concentrations.

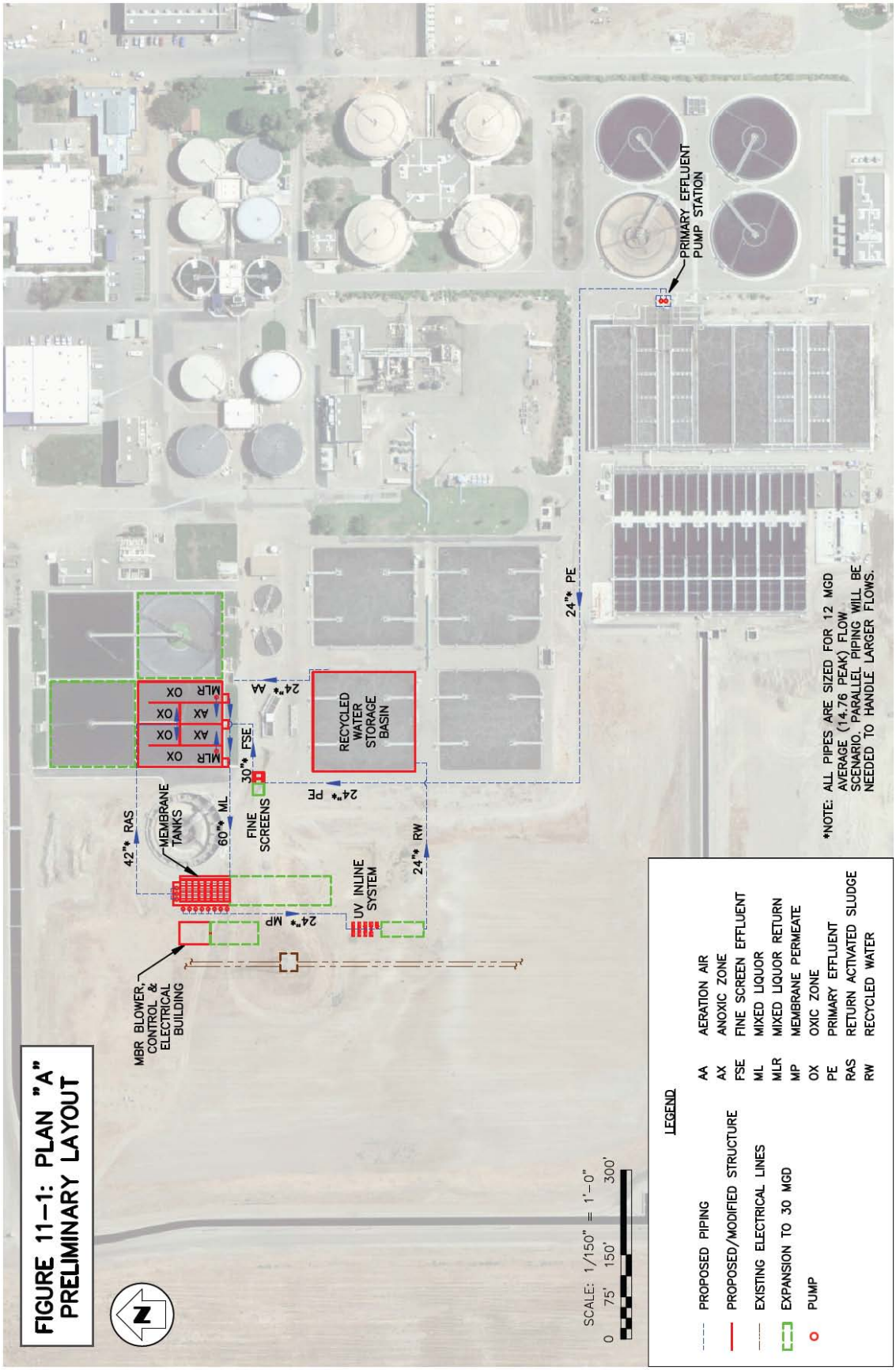
11.2 COMPARISON OF PLAN A AND PLAN C

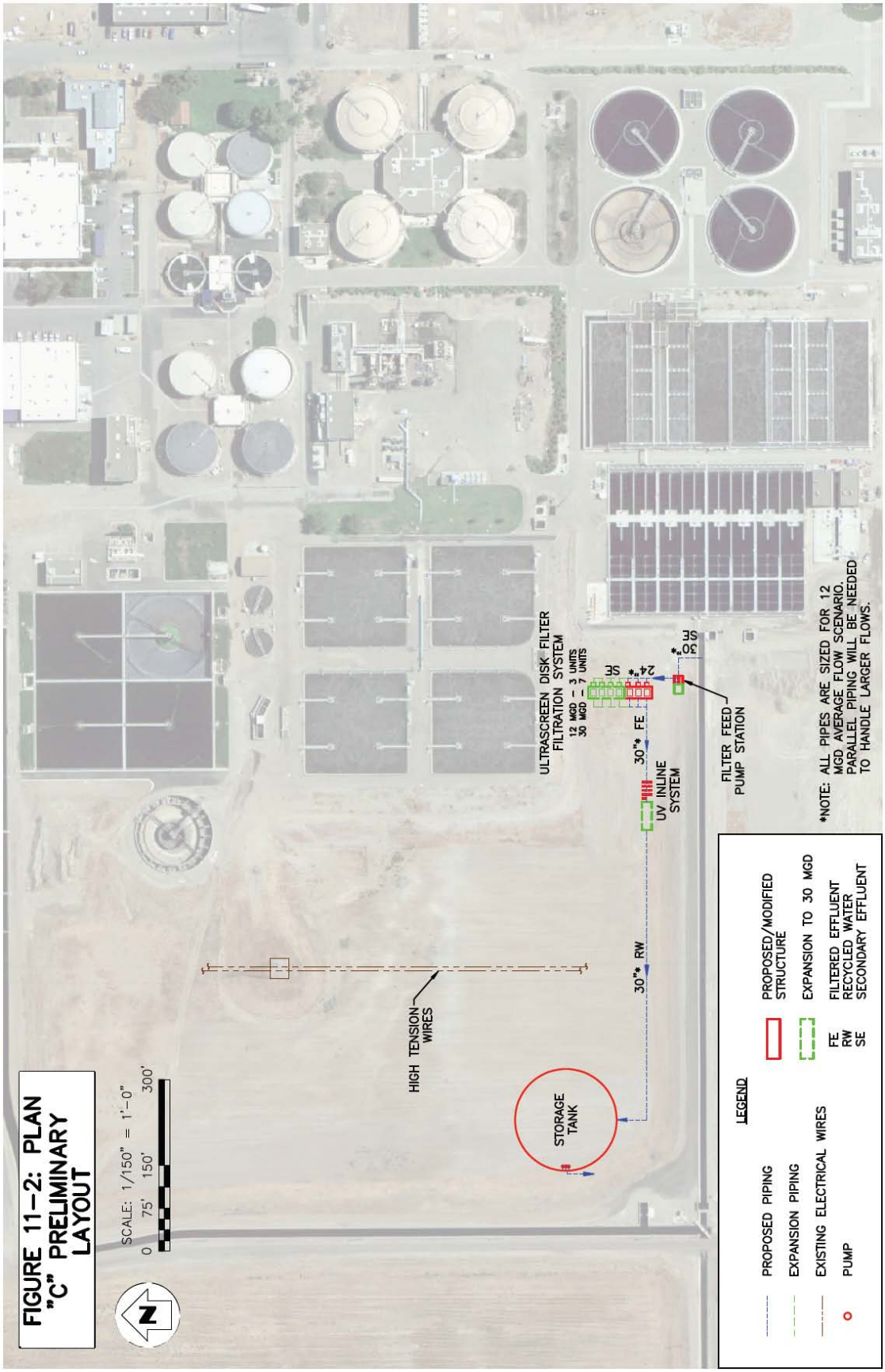
The major difference between Plan A and Plan C is the means of filtration: Plan A will utilize membrane filtration (MBR) while Plan C utilizes media filtration (Nova Ultrascreen). This section will primarily focus on the benefits and drawbacks of these technologies.

The difference in filtration technology allows Plan A to achieve nitrogen removal without additional tanks, use an existing aeration basin for recycled water storage, and achieve disinfection meeting NWRI guidelines with a smaller UV disinfection system. These benefits are reflected in the preliminary Plan A construction, O&M, and life-cycle cost estimate.

11.2.1 Ease of Expandability

Figures 11-1 and 11-2 below show the preliminary layout drawings for Plan A and Plan C, respectively. The preliminary layout drawings show the footprint for a 12 mgd TTDF (in red) and the future footprint for a 30 mgd TTDF (in green).


FIGURE 11-1: PLAN "A" PRELIMINARY LAYOUT
N
SCALE: 1/150" = 1'-0"
0 75' 150' 300'
LEGEND
PROPOSED PIPING
PROPOSED/MODIFIED STRUCTURE
EXISTING ELECTRICAL LINES
EXPANSION TO 30 MGD
PUMP
AA AERATION AIR
AX ANOXIC ZONE
FSE FINE SCREEN EFFLUENT
ML MIXED LIQUOR
MLR MIXED LIQUOR RETURN
MP MEMBRANE PERMEATE
OX OXIC ZONE
PE PRIMARY EFFLUENT
RAS RETURN ACTIVATED SLUDGE
RW RECYCLED WATER
*NOTE: ALL PIPES ARE SIZED FOR 12 MGD AVERAGE (14.76 PEAK) FLOW SCENARIO. PARALLEL PIPING WILL BE NEEDED TO HANDLE LARGER FLOWS.
PRIMARY EFFLUENT PUMP STATION
24"* PE
RECYCLED WATER STORAGE BASIN
24"* AA
30"* FSE
24"* PE
MEMBRANE TANKS
42"* RAS
60"* ML
FINE SCREENS
UV INLINE SYSTEM
24"* RW
24"* MP
MBR BLOWER, CONTROL & ELECTRICAL BUILDING
MLR OX
AX OX
AX OX
MLR OX


FIGURE 11–2: PLAN "C" PRELIMINARY LAYOUT
SCALE: 1/150" = 1'–0"
0 75' 150' 300'
N
HIGH TENSION WIRES
STORAGE TANK
30"ø RW
30"ø FE
UV INLINE SYSTEM
ULTRASCREEN DISK FILTER FILTRATION SYSTEM
12 MGD – 3 UNITS
30 MGD – 7 UNITS
SE
24"ø*
SE
30"ø*
FILTER FEED PUMP STATION
*NOTE: ALL PIPES ARE SIZED FOR 12 MGD AVERAGE FLOW SCENARIO. PARALLEL PIPING WILL BE NEEDED TO HANDLE LARGER FLOWS.
LEGEND
PROPOSED PIPING
EXPANSION PIPING
EXISTING ELECTRICAL WIRES
PUMP
PROPOSED/MODIFIED STRUCTURE
EXPANSION TO 30 MGD
FE FILTERED EFFLUENT
RW RECYCLED WATER
SE SECONDARY EFFLUENT

Under Plan C, additional facilities will need to be constructed in order to increase the TTDF capacity to 30 mgd; however, the expansion would be straightforward. Nova Ultrascreen filters are supplied as prefabricated, packaged units ready for "plug and play" installation. The site work will consist of the extension of the concrete equipment pad and an equipment canopy or a building.

Under Plan A, two additional secondary clarifiers will need to be converted to bioreactors and a new structure will need to be constructed to house the additional membrane modules required for increasing the TTDF capacity to 30 mgd. Even though new structures do not need to be built for the additional bioreactor capacity required, the existing secondary clarifiers will need to be modified and therefore the construction sequencing for the expansion of Plan A will be more complex than for the expansion of Plan C.

11.2.2 Reliability

Both Plan A and Plan C will be provided with features to ensure adequate reliability. As discussed in Section 4, the TTDF under Plan C will be designed with multiple Nova Ultrascreen filter units capable of treating the entire flow with one unit not in operation.

The TTDF under Plan A will be provided with eight independent membrane tanks, each with six membrane cassettes. Sufficient membrane area will be provided to allow for redundancy.

11.2.3 Constructability

Plan A maximizes the use of existing Train A facilities. The use of existing facilities will not impact the sequence of construction due to the fact that at least one of the units in Train A is typically out of service and construction can be performed on one unit at a time. The constructability of Plan C is slightly easier since no modifications of existing facilities are planned. The secondary effluent will simply be withdrawn from distribution Canal B and fed to the new TTDF.

It is our understanding that a minimum SRT of 5 days in the upstream biological treatment system is required prior to filtration with disk filters (including Nova Ultrascreen filters) for consistent effluent quality. If the existing biological system does not provide an SRT of at least 5 days, modifications to the pertinent secondary treatment facilities' operation will be required.

11.2.4 Simplicity of Operation

The treatment systems used in both Plan A and Plan C will be automated; however, since the MBR is a biological process as well as a filtration process, the operation of Plan A facilities will likely be somewhat more complex. However, trained and experienced City staff should be able to operate and maintain both the systems with similar ease.

11.2.5 History of Use

Nova Ultrascreen filters have a long history (~10 years) of use in overseas installations; however, the history of use in the US on municipal wastewater is limited. There are currently

no installations in California and the longest operating municipal wastewater installation in the US has been in operation for less than one year (in Orange Park, FL) and has a rated capacity of 3.0 mgd. If this filtration system is selected, site visits to a minimum of two operating installations is recommended to obtain firsthand knowledge of their performance and operation.

There are numerous MBR installations at municipal wastewater treatment plants producing water for recycle/reuse purposes and the history of use is well documented.

11.2.6 Environmental Impacts, Including Public Perception and Acceptance

While both Plan A and Plan C are capable of producing an effluent that meets the requirement for unrestricted reuse water as set forth by the Department of Public Health, Plan A far exceeds the requirements for unrestricted reuse water. In addition to conventional uses of reuse water, MBR treated water has been used by industry for cooling water applications because of its high quality as a feed to additional treatment units, such as reverse osmosis, ahead of manufacturing processes. MBR effluent is also being used as the feed water to advanced water treatment in indirect potable water systems.

In terms of environmental impacts such as energy efficiency, however, Plan A is more energy intensive - even when considering the credit of reduced UV disinfection power consumption. The estimated incremental power consumption for Plan A over Plan C is approximately 4,425 MWh per year (considering the power consumption credit for achieving nitrogen removal). This is primarily due to the power consumed by the air scour blowers and the sludge recirculation pumps.

11.2.7 Staffing Requirements

Plan A involving membrane system, requires relatively more operator attention due to the fact that periodic chemical cleaning and backwashing of membranes is required. Additionally more sophisticated controls are involved requiring skilled operators to run the system. Comparatively, Plan C is simpler to operate. For the purposes of this TM, we have estimated 1 FTE for Plan A. For Plan C the required hours are half of that of Plan A.

11.2.8 Preliminary Capital, O&M, and Life-Cycle Costs

Table 11-1 below presents preliminary capital, O&M, and life-cycle cost estimates for Plan A and Plan C.

Table 11-1: Comparison of Plan A and Plan C Preliminary Capital, O&M, and Life-Cycle Costs

Parameter	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20 Year Life-Cycle Cost ($ Millions)
MBR (Train A)[1]	34.8	1,165	55.9
Disinfection (In-line UV)	12.9	270	17.8
Storage (Converted Train A Aeration Basin) and Distribution Pumping	3.1	680	15.4[2]
Total Plan A Cost	**50.8**	**2,115**	**89.1**
Filters (Nova Ultrascreen)	7.3	155	10.1
Disinfection (In-line UV)	13.5	465	21.9
Storage (Circular, Prestressed Concrete Storage Tank) and Distribution Pumping	7.7	680	19.9[2]
Total Plan C Cost	**28.5**	**1,300**	**51.9**

[1]Includes credit of $8.9 million capital cost and $670,400 O&M cost for conventional NDN.
[2]Although the life of the storage structure is 50 years, a 20 year life cycle cost is presented for consistency.

Table 11-2: Comparison of Plan A and Plan C Non-Economic Features

Parameter	Plan A	Plan C
Ease of Expandability	Good	Good
Reliability	Good	Good
Constructability	Good	Good
Simplicity of Operation	Average	Good
History of Use	Good	Average
Environmental Impacts, Including Public Perception and Acceptance	Excellent	Average
Staffing Requirements	Good	Good

Per the above cost data, Plan C is far more economical than Plan A, approximately $22.3 million lower than Plan A in capital costs and approximately $815,000 lower than Plan A in O&M costs. However, per Table 11-2 above, Plan A does provide several non-economic advantages over Plan C that need to be considered in decision making. For more information on comparison of MBR system with conventional filtration system and key drivers for decision making, refer to Section 14. The results of this analysis including preliminary cost data were presented to the City during Workshop No. 2 (Section 14). Refer to Section 15 for an evaluation of further modified MBR alternatives.

SECTION 12 – EVALUATION OF POWER SUPPLY OPTIONS FOR TTDF

12.1 BACKGROUND

Per the contracted scope of work, an evaluation needs to be done to determine the feasibility of feeding the new loads of proposed TTDF from low voltage switchgear "R/W-SWG1" in the RAS/WAS Electrical Building. A draft version of this Section was submitted to the City in December 2010 as a part of the draft TM, which included evaluation of two power source options:

a. Utilizing low voltage switchgear "R/W-SWG1" in the RAS/WAS Electrical Building as the power source (per contract)

b. Utilizing the 4.16 KV medium voltage switchgear "BL-MVS3" at the Blower Building No.2 Electrical Room

Subsequent to the submission of a draft version of this TM, Parsons' electrical engineer met with the City's staff at the RWRF on January 20, 2011 to understand the facility's electrical system and to review the "as-built" electrical drawings. During the meeting, estimated electrical loads associated with a 12 MGD TTDF for both conventional filtration and MBR systems were discussed. The City's staff expressed keen interest in planning the electrical infrastructure for an ultimate future flow of 30 mgd.

The following electrical loads (operating) were estimated for each alternative.

Conventional Filtration System	- 12 mgd - 1,311 HP
	- 30 mgd – 3,307 HP
MBR System	- 12 mgd – 2,272 HP
	- 30 mgd – 5,617 HP

Detailed break-up of the loads are attached as Exhibit 1 at the end of this Section. Based on these estimated loads and discussions with the City's staff, it was determined that the two power source options, existing low voltage switchgear "R/W-SWG1" in the RAS/WAS pump station electrical building and existing 4.16 KV Switchgear "BL-MVS3", presented in the draft TM are no longer feasible. The estimated loads are deemed to be too large for the existing infrastructure at the two power sources.

During the meeting, the City's staff noted that there are four "under-utilized" electrical transformers, TD, TE, TF and TG, located near Train A aeration basins and preference should be given to maximize the use of existing infrastructure. In addition, the existing 12 KV Subservice Switchgear "12-MS2" was identified as another potential power source. This 12 KV switchgear has available spare power circuit breakers and are of adequate capacity to serve the estimated power loads for both conventional filtration and MBR alternatives.

12.2 EXISTING ELECTRICAL INFRASTRUCTURE

Currently, Pacific Gas and Electric Company (PG & E) is supplying power to the RWRF with one (1) 70 KV high voltage power line via one (1) 10 MVA power transformer (City owned) with secondary voltage of 12 KV. The secondary side of the transformer is connected to two (2) main circuit breakers 53-BKR-CMA and 53-BKR-CMB of Main 12 KV Service Switchgear,12-MS1. Switchgear 12-MS1 is equipped with a normally open (NO) tie circuit breaker, 53-BKR-CMT. This switchgear is rated at 12 KV, 2000A, 500 MVA short circuit capacity with Bus "A" and Bus "B" separated by the NO tie circuit breaker.

In addition, there is a 12 KV back-up line from PG&E that has a capacity of 5 MVA for emergency use. This back-up line is tied to the Switchgear 12-MVS1 thru 29-BKR-201Circuit Breaker. This breaker is normally open with kirk key interlock and is operated manually.

From the Switchgear 12-MVS1, feeder circuit breakers and cables feed several electrical Substations /Electrical Buildings throughout the facility. Feeder circuit breakers 29-BKR-103 and 29-BKR-203 and corresponding two feeder cables connect the 12 KV service to Subservice Switchgear 12-MS2.

For future expansion of the TTDF to 30 MGD capacity, it is anticipated that the City will rely on the cooling fans equipped on the existing 10 MVA step-down transformer to increase the capacity by up to 12% to meet the additional load. Per the City's staff, the facility's established summer peak demand is about 6500 KVA.

12.3 EVALUATION OF THE POWER SOURCES FOR CONVENTIONAL FILTRATION AND MBR SYSTEMS

As discussed earlier in this Section, the following two power source options will be discussed in detail.

A. 12 MGD Conventional Filtration System Expandable to 30 MGD Capacity

B. 12 MGD MBR System Expandable to 30 MGD Capacity

   1. Option 1 – Power from Swithgear 12-MS2 using spare circuit breakers and new duct banks

   2. Option 2 – Power from Swithgear 12-MS2 using existing circuit breakers and extending existing duct banks via transformers TG and TF.

A. 12 MGD Conventional Filtration System Expandable to 30 MGD Capacity

The proposed TTDF with conventional filtration and in-pipe disinfection will utilize the existing two (2) 12 KV circuit breakers 60-BKR-104 and 60-BKR-204 that are currently feeding existing transformers "TG" and "TF". The two transformers, per City's staff, are currently "under-utilized" with minimal to no load and therefore can be disconnected. The existing # 2 15 KV Class cables will be removed as they are inadequate to carry the estimated loads of TTDF. The

existing 4" conduits will be used to route the new # 3/0 15 KV Class cables to 12 MGD TTDF. The TTDF will have a 15 KV Class Switchboard with a 600A main isolation switch and two (2) 600A fused disconnect feeder switches. Each feeder switch will feed one step-down transformer. The first feeder switch will feed the 12 MGD facility step-down transformer and the other will feed the second step-down transformer for the future loads up to an additional 18 MGD to make the total capacity of 30 MGD. The secondary sides of the two (2) step-down transformers will be tied to a double ended 480 V Switchboard/MCC with a normally open (NO) tie circuit breaker. The 15 KV Class Switchboard and the transformers will be located outdoor in NEMA 3R enclosures.

The feeder cable length from the Subservice Switchgear 12-MS2 to the TTDF is approximately 1600 feet. Approximately 550 feet of two (2) new 4" conduit duct banks from the existing EMH-6 to the TTDF switchboard/transformer pad will be required. Refer to Sketch No. 1 and 2 for the single line diagrams of the proposed electrical system.

B. 12 MGD MBR System Expandable to 30 MGD Capacity

The proposed MBR and in-pipe disinfection Facility will have similar features like the conventional TTDF discussed above, with same size conduits but with larger step-down transformers, and larger feeder cables.

Option 1 - This option utilizes the existing two spare circuit breakers in Switchgear 12-MS2 as well as (2) 4" spare conduits on the north side of the Switchgear Building and extending them to the MBR Facility site. This route requires approximately 1,300 feet of cables from the power source to the MBR Facility. Refer to Sketch No. 3 and 4 for the single line diagrams.

Option 2 - The second option utilizes the existing circuit breakers 60-BKR-104 and 60-BKR-204 as well as existing conduits from the 12 KV Subservice Switchgear Building to the existing Transformers "TF" and "TG". As stated earlier, these transformers are under-utilized and can be disconnected. The existing # 2 - 15KV Class cables will be removed and the 4" conduits will be extended towards the West and up North to the MBR Facility transformer pad. The approximate length of the 1-4" conduit trench is about 1800 feet and the length of 2-4" conduit trench is about 600 feet. The approximate feeder cable length from the power source using the 4"conduit for transformer "TG" to the MBR Facility is about 2500 feet. For the feeder cables using the conduit for the Transformer "TF" to the MBR Facility is about 2200 feet. Refer to Sketch No. 5 and 6 for the single line diagrams.

12.4 LIST OF SINGLE LINE DIAGRAMS

The following sketches were developed as part of this technical memorandum and are enclosed in Appendix B for reference.

1. Sketch No. 1, Single Line Diagram - 12 MGD Conventional Filtration System

2. Sketch No. 2 , Single Line Diagram – Up to 30 MGD Conventional Filtration System

3. Sketch No. 3, Single Line Diagram – 12 MGD MBR System (Option 1)
4. Sketch No. 4, Single Line Diagram – Up to 30 MGD MBR System (Option1)
5. Sketch No. 5, Single Line Diagram – 12 MGD MBR System (Option 2)
6. Sketch No. 6, Single Line Diagram – Up to 30 MGD MBR System (Option2)
7. Dwg. E-1, City of Fresno Plant No. 1 – Site Plan Primary Distribution (Marked-up to show proposed TTDF)

12.5 FURTHER MODIFICATIONS

Subsequent to Workshop No.2 (See Section 14), further modifications to MBR system alternatives were made, which required certain revisions to the power source options discussed in this Section. These revisions are summarized under Section 15 of this TM.

EXHIBIT 1

ESTIMATED ELECTRICAL LOADS

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Table 12-1: Proposed TTDF (MBR) Electrical Loads (30 MGD)

Process Area	Description	Connected Load (HP)	Duty Load (HP)
MBR System	Primary Effluent Pumps	375	250
MBR System	Fine Screens	12	9
MBR System	Anoxic Mixers	72	72
MBR System	Mixed Liquor Return Pumps	180	180
MBR System	Sludge Recirculation Pumps	900	750
MBR System	WAS Pumps	22.5	15
MBR System	Air Scouring Blowers	1,500	1,250
MBR System	Permeate Pumps	400	400
MBR System	Backpulse Pumps	60	30
MBR System	Instruments Air Compressors	30	15
Disinfection	UV Lamp Ballasts	680	646
Distribution	Distribution Pumps	2,400	2,000
	Total (HP)	**6,631.5**	**5,617**

***Assume 1 KVA = 1 HP**

Primary Effluent Pumps: 2+1; 125 hp each (12,800 gpm at 23’ TDH)

Fine Screens: 3+1; 3 hp each

Anoxic Mixers: 18; 4 hp each

Mixed Liquor Return Pumps: 6; 30 hp each (13,900 gpm at 3-4’ TDH)

Sludge Recirculation Pumps: 5+1; 150 hp each (16,700 gpm at 20’ TDH)

WAS Pumps: 2+1; 7.5 hp each (1,000 gpm at 20’ TDH)

Air Scouring Blowers: 5+1; 250 hp each (7,900 scfm at 5 psi)

Permeate Pumps: 20; 20 hp each (1,700 gpm at 25’ TDH)

Backpulse Pumps: 1+1; 30 hp each (1,480 gpm at 25’ TDH)

Instruments Air Compressors: 1+1; 15 hp each

UV Lamps: 19 Duty Trains + 1 Standby Train; 34 hp per Train

Distribution Pumps: 5 + 1; 400 hp each (4,200 gpm at 230’ TDH)

Table 12-2: Proposed TTDF (MBR) Electrical Loads (12 MGD)

Process Area	Description	Connected Load (HP)	Duty Load (HP)
MBR System	Primary Effluent Pumps	200	100
MBR System	Fine Screens	6	3
MBR System	Anoxic Mixers	24	24
MBR System	Mixed Liquor Return Pumps	60	60
MBR System	Sludge Recirculation Pumps	450	300
MBR System	WAS Pumps	15	7.5
MBR System	Air Scouring Blowers	750	500
MBR System	Permeate Pumps	160	160
MBR System	Backpulse Pumps	60	30
MBR System	Instruments Air Compressors	30	15
Disinfection	UV Lamp Ballasts	306	272
Distribution	Distribution Pumps	1,200	800
	Total (HP)	**3,261**	**2,271.5**

***Assume 1 KVA = 1 HP**

Primary Effluent Pumps: 1+1; 100 hp each (10,300 gpm at 20' TDH)

Fine Screens: 1+1; 3 hp each

Anoxic Mixers: 6; 4 hp each

Mixed Liquor Return Pumps: 2; 30 hp each (16,700 gpm at 3' TDH)

Sludge Recirculation Pumps: 2+1; 150 hp each (16,700 gpm at 20' TDH)

WAS Pumps: 1+1; 7.5 hp each (1,000 gpm at 20' TDH)

Air Scouring Blowers: 2+1; 250 hp each (7,900 scfm at 5 psi)

Permeate Pumps: 8; 20 hp each (1,700 gpm at 25' TDH)

Backpulse Pumps: 1+1; 30 hp each (1,480 gpm at 25' TDH)

Instruments Air Compressors: 1+1; 15 hp each

UV Lamps: 8 Duty Trains + 1 Standby Train ; 34 hp per Train

Distribution Pumps: 2 + 1; 400 hp each (4,200 gpm at 230' TDH)

Table 12-3 : Proposed TTDF (Tertiary Filtration) Electrical Loads (30 MGD)

Process Area	Description	Connected Load (HP)	Duty Load (HP)
Tertiary Filtration	Filter Feed Pumps	240	200
Tertiary Filtration	Coagulant Dosing Pumps	1.0	0.75
Tertiary Filtration	Backwash Pumps	52.5	52.5
Tertiary Filtration	Washwater Return Pumps	80	60
Tertiary Filtration	Filter Drive	42	42
Disinfection	UV Lamp Ballasts	986	952
Distribution	Distribution Pumps	2,400	2,000
	Total (HP)	**3,801.5**	**3,307.25**

***Assume 1 KVA = 1 HP**

Filter Feed Pumps - 5 + 1; 40 hp each (4,200 gpm at 20' TDH)

Coagulant Dosing Pumps - 3 + 1 at 0.25 hp

Backwash Pumps – 7; 7.5 hp each

Washwater Return Pumps - 3 + 1; 20 hp each (2,000 gpm at 20' TDH)

Filter Drive – 7; 6 hp each

UV Lamps – 28 duty Trains + 1 standby Train; 34 hp per Train

Distribution Pumps - 5 + 1; 400 hp each (4,200 gpm at 230' TDH)

Table 12-4: Proposed TTDF (Tertiary Filtration) Electrical Loads (12 MGD)

Process Area	Description	Connected Load (HP)	Duty Load (HP)
Tertiary Filtration	Filter Feed Pumps	120	80
Tertiary Filtration	Coagulant Dosing Pumps	0.75	0.5
Tertiary Filtration	Backwash Pumps	22.5	22.5
Tertiary Filtration	Washwater Return Pumps	40	20
Tertiary Filtration	Filter Drive	18	18
Disinfection	UV Lamp Ballasts	405	370
Distribution	Distribution Pumps	1,200	800
	Total (HP)	**1,806.25**	**1,311**

***Assume 1 KVA = 1 HP**

Filter Feed Pumps - 2 + 1; 40 hp each (4,200 gpm at 20' TDH)

Coagulant Dosing Pumps - 2 + 1 at 0.25 hp

Backwash Pumps – 3; 7.5 hp each

Washwater Return Pumps - 1 + 1; 20 hp each (2,000 gpm at 20' TDH)

Filter Drive – 3; 6 hp each

UV Lamps – 11 duty Trains + 1 standby Train; 34 hp per Train

Distribution Pumps - 2 + 1; 400 hp each (4,200 gpm at 230' TDH)

SECTION 13 – INTEGRATION OF TTDF CONTROLS WITH EXISTING SCADA SYSTEM

13.1 BACKGROUND

This Section of the TM describes the present condition and expansion philosophy of the Supervisory Control and Data Acquisition (SCADA) system and Instrumentation at the RWRF. The expanded SCADA and Instrumentation, which will be consistent with the existing design, will be able to handle the control and communication requirements of the proposed TTDF.

13.2 EXISTING SCADA AND INSTRUMENTATION

Parsons reviewed the existing SCADA block diagram (refer to Carollo Engineers Dwg. 0N04, Rev. 1, dated 6/23/06). The existing SCADA consists of two independent communication networks: Modbus Plus and Remote I/O. Each loop uses different communication media that includes shielded twisted pair cables and coaxial cables, respectively. Fiber optic cables are used for communications between buildings.

The existing SCADA consists of several Programmable Logic Controllers (PLCs) and Operator Interface Stations (OISs) located throughout the plant. Each PLC system on the plantwide network operates in a redundant processor configuration. The fiber optic communication modules are also configured with redundancy.

13.3 DISCUSSION

Parsons will design SCADA and instrumentation systems to match and be compatible with the existing SCADA. A new PLC control panel will be provided in a redundant processor configuration with an uninterruptible power supply (UPS). The PLC panel will be located in a new Electrical and Control Building located close to the proposed TTDF. The PLC will be linked to the existing PLCs and OISs by fiber optic cables routed to the existing RAS/WAS Pump Station Electrical Room and will communicate via Modbus Plus. The PLC control panel will also be linked to the vendor-supplied PLC control panels by digital data communication cables. Under Plan A, the PLC control panel will be linked to the new Membrane Bioreactor system and Inline Ultraviolet Disinfection system control panels. Under Plans B and C, the PLC control panel will be linked to the new Nova Ultrascreen Filtration system and Inline Ultraviolet Disinfection system control panels.

A new OIS will be provided in the new Electrical and Control Building. The new OIS will be configured with graphics and symbols to match the existing OISs. Parsons will incorporate the new process areas into the new OIS, which will be accessible at the existing SCADA OISs. New SCADA screens will be added to monitor and control the new process areas. Parsons will conduct further investigation of the existing SCADA hardware and software during Design Development Phase.

The above discussion assumes that the existing Modbus Plus network has the capacity to handle the additional data transfers required by the new PLC and OIS. However, there is a concern that the network may be near or at its maximum capacity and that the additional nodes will overload the network. Further investigation of the Modbus Plus network is required to determine its capabilities. Plants of this size are usually designed with or have converted to Ethernet communications, which has a much larger bandwidth (i.e. handles more data) and communicates at higher speeds (i.e. 100 Mbits/s compared to 2 Mbits/s maximum) than Modbus Plus communications. Parsons will further investigate the existing network during Design Development Phase.

A new Closed-Circuit Television (CCTV) camera will also be provided in the TTDF. The camera, control receiver, and Ethernet encoder will match the existing CCTV equipment. The new camera will be tied into the plant's existing CCTV equipment.

For the proposed TTDF, Parsons will specify field instruments after consultation with the RWRF plant personnel and/or will match existing instruments to achieve instrument standardization throughout the plant. This criterion is intended to minimize spare parts inventory and improve operator familiarity with similar equipment. Instrument data sheets will be prepared to specify the same brand and model numbers already in use at the RWRF, as much as possible.

SECTION 14 – SUMMARY OF WORKSHOP NO.2 AND NEW PROJECT DIRECTION

14.1 BACKGROUND

A second Workshop (Workshop No.2) was conducted with the City on February 3, 2011 to present and discuss the comparison of Plan A with Plan C, as detailed under Section 11. The discussions included pros and cons of MBR system compared to conventional filtration system. This Section summarizes the discussion carried out at the Workshop and highlights the important decisions made for subsequent work.

14.2 DISCUSSION AND KEY DECISIONS

During the Workshop No.2, very crucial plant operating and maintenance issues were discussed in detail with the City's operations staff and the following key considerations were identified:

1. Train A facilities, reportedly, are old, of obsolete design and are difficult to operate and maintain. Further, nitrogen removal cannot be achieved reliably with the current configuration of the aeration basins in Train A. Discussions with the City's operations staff indicated that the ceramic disc diffusers installed in the aerations basins need replacement/cleaning and it may not be possible to restore them to their original state due to their age. The aeration pipe grids that connect the diffusers are old and unique to the type of diffusers currently installed. Further, the secondary clarifiers in Train A are in need of central column and scraper mechanism replacement. Based on the above described extensive repair/replacement needs related to Train A infrastructure coupled with the long age of the equipment, it appears that replacement of Train A facilities in the near future would be a prudent measure, If the intention is to continue to use Train A for the long term.

2. North Fresno Wastewater Reclamation Facility, operated by the City, was issued a WDR/NPDES permit on December 10, 2009 by the Central Valley Regional Water Quality Control Board (RWQCB) with a Total Nitrogen (TN) limit of 10 mg/L for the recycled water used for golf course irrigation. It is expected that the proposed TTDF at the RWRF will also have a similar TN limit for irrigation water. This means that it will be short sighted to design the TTDF with no consideration for nitrogen removal.

3. In this report, all the options involving conventional filtration systems are designed to produce Title 22 recycled water without nitrogen removal. However, as discussed above, if nitrogen removal becomes a requirement per the anticipated WDR/NPDES permit for the TTDF, additional aeration basins and secondary clarifiers will be required to provide enough Solids Retention Time (SRT) in the system for consistent and reliable nitrogen removal. On the other hand, the MBR alternative will not only produce effluent exceeding Title 22 criteria, but will achieve nitrogen removal without additional basins.

Based on the above discussion, it is evident that the MBR system alternative for TTDF has a clear advantage over the conventional filtration system alternatives. By converting Train A facilities into MBR (See Plan A), not only will the system be capable of producing effluent meeting all permit limitations, but also will avoid the future replacement and upgrading cost of Train A for nitrogen removal. This means that constructing an MBR system will, in effect, be an equivalent capacity replacement for Train A. Therefore, MBR will be more cost effective compared to conventional filtration systems, when considering both its ability to produce high quality effluent with nitrogen removal and the avoided cost of future upgrades/replacement of Train A facilities for nitrogen removal.

Moving forward, both Parsons and the City collectively decided to pursue MBR as the technology of choice for TTDF. In addition to the option of converting Train A facilities into MBR, the City expressed their interest to explore the option of having MBR designed and built as a separate stand-alone system with all new structures.

14.2 NEW PROJECT DIRECTION – POST WORKSHOP NO.1 AND WORKSHOP NO.2

The City asked Parsons to develop and compare the following two MBR alternatives for their review and final selection.

1. Converting Train A into MBR – (5 mgd constant flow; no peaking factor) – This is similar to Plan A as discussed in Section 9 of this report, except that the capacity will be 5 mgd constant flow instead of 12 mgd with peaking factor.

2. Constructing a separate standalone MBR system with all new tanks – (5 mgd constant flow; no peaking factor)

A new final section (Section No. 15) is added to this report to discuss and compare the two selected MBR system alternatives.

POST-WORKSHOP NO.2 ANALYSIS (SECTION 15 - SECTION 16)

SECTION 15 – SELECTED MBR ALTERNATIVES ANALYSIS

15.1 BACKGROUND

Workshop No. 2 was held on February 3, 2011 and was attended by the City's and Parsons' staff. Tertiary filters, MBR, and electrical feed alternatives were discussed and several key decisions were made with respect to the tertiary treatment systems as summarized below:

- MBR alternative offers several advantages over the conventional filtration alternatives, which include higher quality recycled water and nitrogen removal. Also, as Train A is reportedly approaching the end of its useful life (see Section 14), implementation of an MBR system could be tied with Train A phase out. This would avoid substantial costs associated with replacing and/or upgrading of Train A facilities in the near future, if tertiary filters were used. Therefore, MBR will be more cost effective compared to conventional filtration systems, when considering both its ability to produce high quality effluent with nitrogen removal and the avoided cost of future upgrades/replacement of Train A facilities for nitrogen removal. Based on the discussions, it was decided to pursue the MBR alternative as the system of choice for filtration, nitrogen removal and future capacity replacement for Train A.

- The MBR system should be designed to handle 5 mgd of constant flow. The influent pipeline should be capable of conveying 15 mgd of flow, with a parallel pipeline added in the future when the demand for recycled water increases beyond 15 mgd.

- The location of the MBR system should be evaluated considering a completely new structure for the system versus retrofitting the existing Train A structure for this purpose. In the case of using a new structure, the MBR system would be located north of Canal B. In the case of using existing Train A facilities, an existing secondary clarifier would be retrofitted into aeration basins and a new tank(s) would be constructed to house the membranes.

This Section develops and compares the two MBR system alternatives mentioned above.

15.2 DESIGN DEVELOPMENT

This subsection describes the design of MBR system for two different alternatives; 1) retrofitting existing Train A facilities, 2) using completely new structures.

15.2.1 Layout – 5 mgd Constant Flow – Retrofitting Train A Facilities into MBR

In this alternative, secondary clarifier No. 4 (Train A) would be modified and converted into the pre-aeration bioreactors of MBR system (Figure 15-1). Primary effluent would be taken from the existing stub at Train C and delivered by gravity to bioreactors. The gravity pipeline would be routed underneath Canal B as an inverted siphon. Fine screens would be located at the upstream side of this gravity line (near Train C) to minimize solids accumulation within the pipe. Following the pre-aeration bioreactors, the flow would be conveyed to the membrane tanks

located west of secondary clarifier No. 5. The MBR blower building would be located west of membrane tanks. Space is allowed for expansion to 30 mgd. The existing 24 inch diameter air line serving aeration basin No. 3 (Train A) would be used and extended to deliver process air to bioreactors. In-pipe UV system will be used to disinfect the MBR permeate to achieve Title 22 recycled water quality. Aeration basin No. 3 would be used for storage of the recycled water. The power for the MBR system would be supplied from the 12 kV electrical building, located east of Train A secondary clarifiers, through new conduits. See Subsection 15.5 for electrical details.

15.2.2 Layout – 5 mgd Constant Flow – MBR with All New Construction

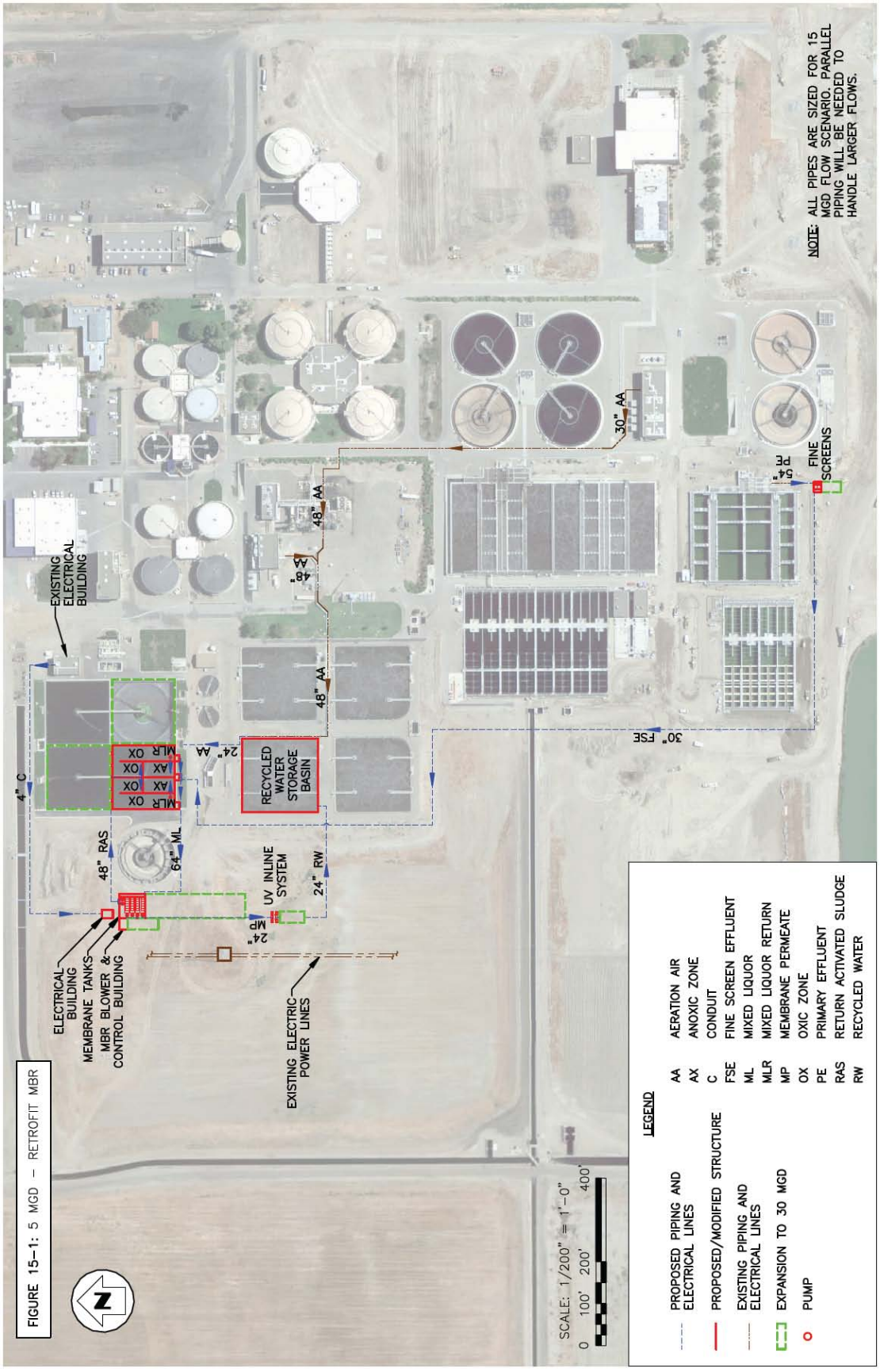
The structures for MBR system would be located north of Canal B as shown in Figure 15-2. Primary effluent would be taken from the existing stub at Train C and delivered by gravity to pre-aeration Bioreactors. The gravity pipeline will be routed underneath Canal B as an inverted siphon. Fine screens would be located at the upstream side of this gravity line (near Train C) to minimize solids accumulation within the pipe. Bioreactors, membrane tanks, and blower building would have common walls to minimize the concrete and piping costs. Space is allowed for expansion to 30 mgd. The existing 24 inch diameter air line serving aeration basin No. 4 (Train A) would be used and extended to deliver process air to bioreactors. In-pipe UV system will be used to disinfect the MBR permeate to achieve Title 22 recycled water quality. Aeration basin No. 4 would be used for storage of the recycled water. The power for the MBR system would be supplied from the 12 kV electrical building, located east of Train A secondary clarifiers, through existing and new conduits. See Subsection 15.5 for electrical details.

15.2.3 Capacity Analysis

Process analysis was performed to determine the volume of aeration basins required to handle 5 mgd of flow and to achieve NDN. The basins would be compartmentalized to incorporate several anoxic and oxic zones. The design criteria in Table 15-1 were developed as the basis for capacity analysis.

Table 15-1: Design Criteria for Capacity Analysis of MBR Aeration Basin to Achieve NDN

Item	Units	Design Value	Remarks
Flow Peaking Factor	-	1	Peak:Average ratio
Primary Effluent	-	-	Max month values
BOD	mg/L	224	70% of raw wastewater
TSS	mg/L	120	40% of raw wastewater
TKN	mg/L	30	65% of raw wastewater
MLSS	mg/L	10,000	
SRT (Minimum)	days	6	Oxic zone
Anoxic:Oxic Zone Ratio (Minimum)	-	0.3	
Maximum Oxygen Uptake Rate	mg/L-hr	128	


NOTE: ALL PIPES ARE SIZED FOR 15 MGD FLOW SCENARIO. PARALLEL PIPING WILL BE NEEDED TO HANDLE LARGER FLOWS.
FINE SCREENS
54" PE
30" AA
48" AA
48" AA
48" AA
30" FSE
RECYCLED WATER STORAGE BASIN
24" AA
4" C
EXISTING ELECTRICAL BUILDING
MLR OX
AX OX
AX OX
MLR OX
48" RAS
64" ML
UV INLINE SYSTEM
24" RW
24" MP
ELECTRICAL BUILDING
MEMBRANE TANKS
MBR BLOWER & CONTROL BUILDING
EXISTING ELECTRIC POWER LINES
SCALE: 1/200" = 1'-0"
0 100' 200' 400'
LEGEND
PROPOSED PIPING AND ELECTRICAL LINES
PROPOSED/MODIFIED STRUCTURE
EXISTING PIPING AND ELECTRICAL LINES
EXPANSION TO 30 MGD
PUMP
AA AERATION AIR
AX ANOXIC ZONE
C CONDUIT
FSE FINE SCREEN EFFLUENT
ML MIXED LIQUOR
MLR MIXED LIQUOR RETURN
MP MEMBRANE PERMEATE
OX OXIC ZONE
PE PRIMARY EFFLUENT
RAS RETURN ACTIVATED SLUDGE
RW RECYCLED WATER
FIGURE 15-1: 5 MGD – RETROFIT MBR

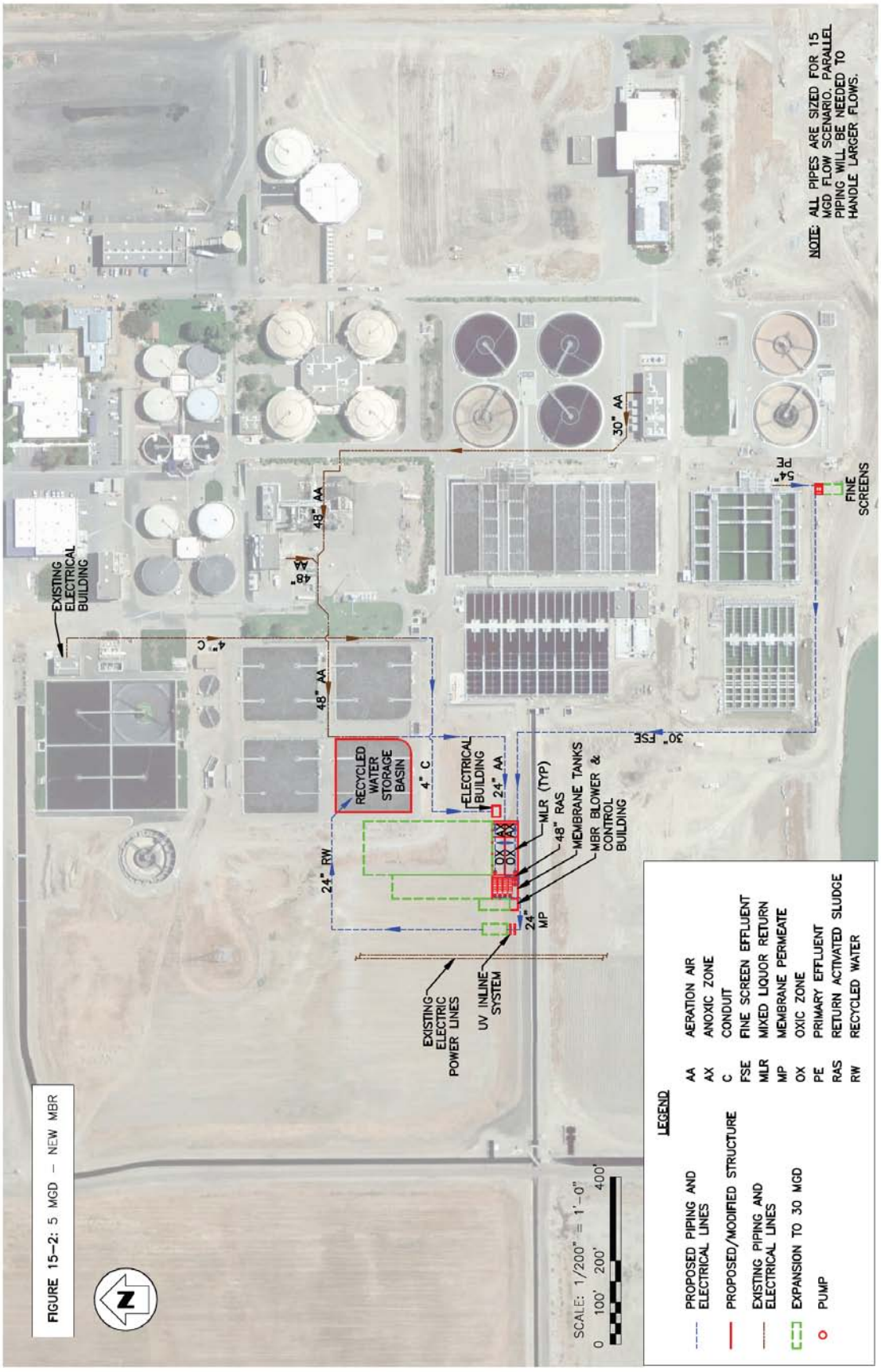


FIGURE 15-2: 5 MGD – NEW MBR

15.2.4 Fine Screens

The flow (i.e. primary effluent) would be conveyed by gravity to fine screens located southeast of aeration basins of Train C (Figures 15-1 and 15-2). Two fine screens would be installed with one of the units as standby. Each screen would be capable of handling 5 mgd of flow to provide prudent redundancy. The units would be installed in concrete channels equipped with isolation gates to allow for maintenance without interfering with the plant's operation. Each fine screen would be equipped with an integrated washer/compactor for cleaning and concentrating the screenings prior to disposal off site.

The design characteristics for the fine screens and washer/compactors are shown in Table 15-2.

Table 15-2: Design Characteristics of Fine Screens and Washer/Compactors

Item	Units	Design Value	Remarks
Screens			
Type	-	-	In-channel perforated-plate drum
Number	-	2 (1+1)	
Capacity, Each	mgd	5	
Effective Opening Size	mm	2	
Channel Width	ft	5.3	Width at screen
Screenings Handling			
Type	-	-	Washer, dewatering, compactor unit
Number	-	2 (1+1)	Integrated with screens
Motor Power, Each	hp	2	Also powers screen basket

15.2.5 Bioreactors and Associated Equipment

This subsection describes the structures and equipment located downstream of fine screens and upstream of membrane tanks.

Bioreactor (Pre-Aeration Basin):

Depending on the MBR alternative considered, the bioreactors (pre- aeration basins) would be provided by retrofitting the secondary clarifier No. 4 or by using a new structure. To provide redundancy, two bioreactors would be designed, each divided into several anoxic and oxic zones, with the first quarter of each bioreactor dedicated to the anoxic zone. Baffles would be placed in the bioreactors to separate the anoxic and oxic zones to minimize back-mixing as the flow passes through in a plug flow regime. Additional baffling would be used to divide each anoxic and oxic zone into 3 compartments, again to minimize back-mixing. The plug flow conditions increase the efficiency of biological treatment, optimizing carbonaceous matter removal, nitrification and denitrification. Submersible mixers would be used to provide mixing in the anoxic zones. Table 15-3 provides the design characteristics of the bioreactors. As can be seen in the Table, volume of bioreactors is larger for the first alternative (Retrofit MBR). This is

due to the fact that an existing structure (secondary clarifier No. 4) is being used and the volume available in this structure is more than what is actually needed to handle 5 mgd of flow.

Table 15-3: Bioreactors Design Characteristics

Item	Units	Design Value		Remarks
		Retrofit MBR	New MBR	
Bioreactors				
Number (In Parallel)	-	2	2	
Volume, Each	MG	1.0	0.42	
Anoxic Zone				
Number per Bioreactor	-	1	1	
Dimensions of Zone (L x W x SWD), Each	ft x ft x ft	75 x 37.5 x 12	27.5 x 30 x 17	
Number of Compartments per Zone	-	3	3	Equal volume (in series)
Oxic Zone				
Number per Basin	-	1	1	
Dimensions of Zone (L x W x SWD), Each	ft x ft x ft	225 x 37.5 x 12	82.5 x 30 x 17	
Number of Compartments per Zone	-	3	3	Equal volume (in series)
Anoxic Zone Mixers				
Type				Submersible
Number per Compartment	-	1	1	
Total Number	-	7 (6+1)	7 (6+1)	One shelf spare
Horsepower, Each	hp	4	4	

Aeration System:

The air would be transferred to the oxic zones in the bioreactors through fine bubble diffusers. Either EPDM Membrane disks or more efficient aerator strips (e.g. AEROSTRIP™), would be used to provide aeration. The aeration would be tapered so that approximately 70% of the oxygen is provided in the first half of the oxic zone to satisfy the high oxygen demand as the substrate enters the oxic zone.

The required air would be supplied to the oxic zones by the existing blowers. These blowers are of single-stage centrifugal type and have enough capacity to serve the biological needs of the MBR process as well as the remaining plant. The existing 24 inch diameter air pipeline of aeration basin No. 3 (Retrofit MBR Alternative) or aeration basin No. 4 (New MBR Alternative) would be used and extended to supply the air to the bioreactors. Aeration basin No. 3 (Retrofit-MBR Alternative) or aeration basin No. 4 (New-MBR Alternative) would no longer be in service and would be used as recycled water storage in the future.

The design characteristics for the aeration system are presented in Table 15-4.

Table 15-4: Aeration System Design Characteristics

Item	Units	Design Value	Remarks
Diffusers			
Type			Fine bubble, membrane (EPDM) disk or strip type
Aeration Pattern			Tapered along bioreactor length
Process Air Blowers			
Type			Single-stage centrifugal
Number	-	6 (5+1)	Existing blowers
Capacity, Each	scfm	27,000	
Discharge Pressure	psig	7.8 or 8.5	4 units at 7.8 and 2 units at 8.5
Horsepower, Each	hp	1,500	

Mixed Liquor Return and Sludge Recirculation Pumps:

Two recirculation lines will be provided in the MBR system: mixed liquor return and sludge recirculation. The mixed liquor return system transfers mixed liquor from the tail end of the oxic zone back to the head of the anoxic zone at a rate up to four times (adjustable) the average flow. This system transfers nitrates resulting from nitrification back to the anoxic zone for denitrification as the oxygen molecules associated with nitrates are used by the biomass.

The sludge recirculation system transfers sludge from the membrane tanks to the head of the oxic zone at a rate also up to four times (adjustable) the average flow. The recirculation system prevents the solids concentration in the membrane tanks from increasing excessively and thus plugging the membranes, as permeate is removed from the mixed liquor. This sludge is highly oxygenated and provides a portion of the process oxygen needed for BOD removal and nitrification. Sludge would be wasted from the MBR system from the sludge recirculation line. New pumps would be installed for this purpose.

The design characteristics for the recirculation and WAS pumps are presented in Table 15-5.

Table 15-5: Sludge Pumping Systems Design Characteristics

Item	Units	Design Value	Remarks
Mixed Liquor Return Pumps			Returning flow from oxic zone to anoxic zone
Type			Axial propeller
Number	-	3 (2+1)	One shelf spare
Capacity, Each	gpm	7,000	
TDH	ft	3	
Horsepower	hp	15	

Item	Units	Design Value	Remarks
Drive			Variable speed
Sludge Recirculation Pumps			Returning flow from membrane tanks to oxic zone
Type			Vertical propeller
Number	-	2 (1+1)	
Capacity, Each	gpm	14,000	
TDH	ft	20	
Horsepower	hp	125	
Drive			Variable speed
WAS Pumps			
Type			Centrifugal
Number	-	2 (1+1)	
Capacity, Each	gpm	450	
TDH	ft	20	
Horsepower	hp	5	
Drive			Variable speed

15.2.6 Membranes

The membranes would be installed in 4 new independent tanks. For the purpose of this Section, hollow-fiber membranes were considered. The following design criteria were developed as the basis for sizing the membranes:

- Minimum wastewater temperature of 16°C.
- Maximum flux rate of 12 gfd (all membrane tanks in service).
- Maximum flux rate of 16 gfd (one membrane tank out of service).

Four membrane tanks, each housing 6 membrane cassettes plus space for a future cassette, would have enough capacity to handle 5 mgd of flow. The tankage would be configured to allow isolation of a tank for maintenance and cleaning.

Permeate pumps would draw the MBR effluent through the membranes, directing it to the disinfection system. A building would house new air scouring blowers and membrane control and electrical system. The building would be located adjacent to the membrane structure.

Table 15-6 summarizes the design characteristics of the MBR membrane system.

Table 15-6: MBR Membrane System Design Characteristics

Item	Units	Design Value	Remarks
Tanks			
Number	-	4	
Cassettes per Tank			
Number Installed	-	6	
Space for Future	-	1	
Total Membrane Surface Area	ft2	417,360	
Air Scouring Blowers			
Type			High-speed turbo
Number	-	3 (2+1)	
Capacity, Each	scfm	3,950	
Discharge Pressure	psi	5	
Horsepower, Each	hp	125	
Drive			Variable speed
Permeate Pumps			
Type			Horizontal end suction
Number	-	5 (4+1)	One shelf spare
Capacity, Each	gpm	1,350	
TDH	ft	25	
Horsepower, Each	hp	20	
Drive			Variable speed
Backpulse Pumps			
Type			Horizontal end suction
Number	-	2 (1+1)	
Capacity, Each	gpm	1,480	
TDH	ft	25	
Horsepower, Each	hp	30	
Drive			Variable speed
Instrument Air Compressors			If Plant air not available
Number	-	2 (1+1)	
Horsepower, Each	hp	15	
Chemical Cleaning			
Sodium Hypochlorite			12.5% Solution
Frequency			
Recovery	Yearly	2	Per tank
Maintenance	Weekly	1	Per tank
Annual Consumption	gal	4,000	
Citric Acid			50% Solution
Frequency	Yearly	1-2	Part of Recovery Clean
Annual Consumption	gal	750	

15.3 DISINFECTION

During Workshop No.1, the City chose in-pipe UV disinfection as opposed to an open channel UV system. One of the major drivers was the positive feedback received from the staff at neighboring Clovis Water Reuse Facility in operating and maintaining their in-pipe UV system. Therefore, for the purpose of this TM, 1-mgd capacity in-pipe UV reactors were considered. The 1 MGD rating for each reactor is based upon high quality membrane permeate feed such as from the MBR system. Four reactor trains (3 operating + one standby) will be required to disinfect 5 mgd of flow and each train will accommodate two reactors. Table 15-7 and Figure 15-3 show the design criteria and preliminary layout for the in-pipe UV disinfection system, respectively. There are several larger in-pipe reactors currently available from other manufacturers that may be more economical for the present project and will be evaluated during detailed design.

Table 15-7: In-pipe UV Disinfection Design Characteristics

Parameter	Criteria
Design Flow, mgd	5
Type of UV System	In-pipe, Low Pressure, High Intensity
Number of Reactors	8 (3 trains + 1 standby) each train has 2 reactors
Flow Capacity per Reactor, mgd	1.0
Length of Reactor (ft)	8
Number of Lamps per Reactor	40
Total Number of Lamps Provided	320

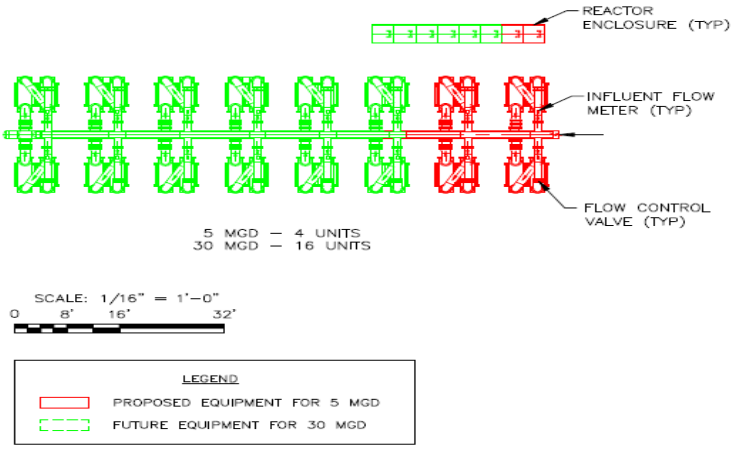


Figure 15-3: In-pipe UV Disinfection System Preliminary Layout

15.4 PRELIMINARY COSTS

Preliminary costs were developed for two alternatives: retrofitting the existing facilities in Train A for aeration basins of MBR system or using a completely new structure for this purpose. The costs estimated are according to Class 4 level per AACE (Association for the Advancement of Cost Engineering) guidelines. At this point in the design process, these costs are preliminary and should be used only for comparative purposes.

The costs were estimated using several resources. Quotes from the manufacturers, information available from similar projects performed by Parsons, including construction in the Central Valley, were used to determine these costs.

The capital costs for the two alternatives are shown in Table 15-8. For both alternatives, the credit for conventional NDN is negligible. This is the investment the City would need to make on a secondary treatment system, if the plant had to be upgraded to an NDN process using conventional tertiary filters rather than MBR. As the existing secondary systems for both Train B and Train C are designed and constructed with future NDN in mind, the aerations basins provide required SRT to achieve NDN and only require installation of new mixed liquor recycle pumps, the cost of which is deemed insignificant for comparison purposes. As indicated in Table 15-8, there is little cost difference between the two alternatives. Retrofitting the existing structure would result in less concrete cost but in higher piping cost.

15.4.1 Avoided Cost of Future Upgrades/Replacement of Train A

As discussed earlier, a credit could be given to compensate for the cost of replacing and upgrading Train A in the near future, which would occur under conventional filtration alternatives but not under MBR alternatives. To estimate this credit, $3-$4 per gal of wastewater treated was used as cost basis, which would translate into $15-$20 million of avoided future capital investment for a 5 mgd system. For the purposes of cost comparison in this Section, $18 million is considered as avoided capital replacement cost. Note that the estimated avoided cost is based on constructing new basins to remove nitrogen but without new aeration blowers.

Table 15-8: MBR Alternatives Capital Cost (5 mgd) [a]

Parameter	Capital Cost ($ Million)	
	Retrofit MBR	New MBR
MBR Equipment and Structures Cost	8.4	8.7
MBR Total Capital Cost [b]	24.5	24.4
Credit for Conventional NDN [b,c]	(0)	(0)
MBR Total Capital Cost Including NDN Credit	24.5	24.4
UV Disinfection Total Capital Cost [b]	5.3	5.3
Storage (Aeration Basin No.3 or 4) Total Capital Cost [b]	3.1	3.1
Total Capital Cost	**32.9**	**32.8**
Train A Capacity Replacement (Avoided Cost) [d]	(18)	(18)
Net Effective Capital Cost	**14.9**	**14.8**

[a] For detailed cost analysis see Appendix A.
[b] Including installation, civil, mechanical, electrical and instrumentation, contractor overhead and profit, contingency (20%) and escalation to midpoint of construction (2012-2013)
[c] NDN credit is insignificant (only involves installation of minor new equipment such as mixed liquor recycle pumps). NDN credit is based on the premise that if the City were to choose conventional filters instead of MBR and were required to achieve NDN in the conventional secondary treatment process.
[d] Near future replacement cost of Train A facilities equivalent to 5 mgd capacity

An evaluation of the operation and maintenance (O&M) costs was also performed (Table 15-9). The O&M cost difference between the two alternatives is insignificant and hence assumed to be the same. Credit is given to MBR system for avoided cost of operation and maintenance of a secondary treatment system to achieve NDN.

Table 15-9: MBR Alternatives O&M Cost (5 mgd) [a]

Parameter	O&M Cost ($)
MBR Total Annual O&M Cost [b,c]	833,000
Credit for Conventional NDN [b,c,d]	(280,000)
MBR Total Annual O&M Cost Including NDN Credit	553,000
UV Disinfection Total Annual O&M Cost [c,d]	150,000
Recycled Water Storage and Distribution Pumping Annual O&M Cost [d]	283,000
Total Annual O&M Cost	986,000

[a] For detailed cost analysis see Appendix A.
[b] Including power and chemicals consumption, membrane/diffusers replacement, general maintenance, and labor.
[c] Assuming power usage rate of 14¢ per kWh.
[d] Proportioned using 12 mgd costs developed in previous Sections.

Using the estimated capital and O&M costs, a 20-year life cycle cost analysis was performed. The results are shown in Table 15-10.

Table 15-10: MBR Alternatives Life-Cycle Cost (5 mgd)

Alternative	Parameter	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
RETROFIT TRAIN A INTO MBR	MBR System	24.5	553[1]	34.5
	Disinfection (In-pipe UV)	5.3	150	8.0
	Storage (Aeration Basin No.3) and Distribution Pumping	3.1	283	8.2[2]
	TOTAL	**32.9**	**986**	**50.7**
	Train A Capacity Replacement Cost	**(18)**		
	Net Effective Capital Cost	**14.9**		
NEW MBR	MBR System	24.4[1]	553[1]	34.4
	Disinfection (In-pipe UV)	5.3	150	8.0
	Storage (Aeration Basin No.4) and Distribution Pumping	3.1	283	8.2[2]
	TOTAL	**32.8**	**986**	**50.6**
	Train A Capacity Replacement Cost	**(18)**		
	Net Effective Capital Cost	**14.8**		

[1]Includes credit for conventional NDN
[2]Although the life of the storage structure is 50 years, a 20 year life cycle cost is presented for consistency.

15.5 REVISIONS TO POWER SOURCE OPTIONS

The power source options for TTDF for both conventional filtration and MBR alternative are described under Section 12 of this report. Single line diagram illustrating the proposed electrical system along with proposed electrical duct bank and cable routing plans are developed and enclosed as part of Section 12. The following revisions are made to the electrical strategy due to the new location for MBR.

A. 5 mgd Constant Flow – MBR with All New construction

For this option, feed will be drawn from existing Sub Service Switchgear "12KV-MS2" building. Two (2) existing circuit breakers 60-BKR-104 and 60-BKR-204 will be utilized to provide a double ended feed to the new indoor type 12 KV switchgear. This new switchgear will be provided with two (2) main circuit breakers, a normally open (NO) tie circuit breaker, two (2) feeder circuit breakers and extra space for two (2) additional circuit breakers for future expansion. All the 480 V Motor Control Centers are also indoor type. The new 12 KV switchgear and all the 480V Motor Control Centers will be housed in a building close to the MBR structure. The step-down transformers, however, are all outdoor type and will be located on an open concrete pad close to the new electrical building. Refer to Sketch No. 7 for a single line diagram showing the proposed system. Two (2) existing – 4"C conduits on the north-south electrical duct bank will be utilized up to Manhole EMH-6. From Manhole EMH-6, two (2) new -4"C conduits will be installed down to the new 12 KV switchgear Electrical Building. Refer to revised drawing E-1 (Rev.1) for electrical conduits and cable routes for this option.

B. 5 mgd Constant Flow – Retrofitting Train A Facilities into MBR

The proposed power source for this option is already discussed in detail in Section 12. The arrangement and type of equipment used will be similar to the option described above. The conduits and cable routes will utilize the two (2)-4"C spare conduits at Manhole EMH-2 on the north side of the Sub Service Switchgear "12KV-MS2" building. These conduits will be extended west and then south to the proposed location of the new electrical building. Refer to revised drawing E-1 (Rev.1) for electrical conduits and cable routes for this option.

15.6 DISCUSSION

It is evident from the data presented in Table 15-10 above, that the two MBR alternatives compared are very close to each other from a cost standpoint. The capital cost difference between the two alternatives is insignificant and is within the margin of error of our estimates. The concrete savings realized by retrofitting existing structures are balanced by less extensive piping required by using new structures.

However, using all new structures offers a more flexible and compact design. By properly planning the new facilities, they can be built in a monolithic construction with common walls, which would make it easier to build and more efficient to operate. The future expansion of tertiary facilities would follow the same compact pattern. Also, the design would not need to be tailored based on the constraints of existing facilities, but based on the best design

practices. For example, deeper new aeration basins compared to the retrofitted basins would allow for a more efficient aeration system.

Further, a separate standalone MBR system will be easier to construct and will also provide some redundant treatment facilities associated with that particular train in the interim and for several years until the City decides to totally decommission that train due to its obsolescence.

15.7 CONCLUSION

Based on the above discussion, Parsons recommends using all new structures for constructing the MBR system, as it would be a more prudent and reliable approach to achieve filtration, nitrogen removal and future capacity replacement for Train A.

SECTION 16 – RECOMMENDED PROJECT DESCRIPTION

This Section provides a brief description of the recommended project for TTDF at RWRF. The location and selection of technology for TTDF was thoroughly evaluated considering a variety of factors as presented in this TM and summarized in Section 15. A simplified schematic of the project is presented in Figure 16-1 below.

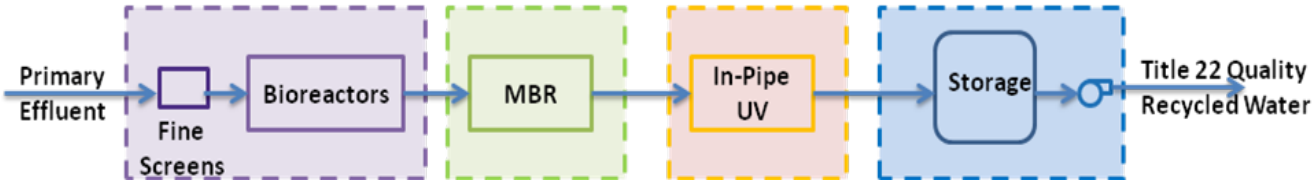


Figure 16-1: Simplified Schematic of Recommended Project for TTDF

16.1 Summary of Recommended Project

The TTDF will have a design capacity of 5 mgd (constant flow) and the facilities would be located on a "green field" site north of Canal B as shown in Figure 16-2. Primary effluent would be taken from the existing stub at Train C and delivered by gravity to pre-aeration bioreactors. The gravity pipeline will be routed underneath Canal B as an inverted siphon. Fine screens would be located at the upstream side of this gravity line (near Train C) to minimize solids accumulation within the pipeline. Bioreactors, membranes tanks, and blower building would have common walls to minimize the concrete and piping costs. In-pipe UV system will be used to disinfect the MBR permeate to achieve Title 22 recycled water quality. Aeration basin No. 4 would be used for storage of the recycled water. The facility will be laid out for ultimate design capacity of 30 mgd. The existing 24 inch diameter air line serving aeration basin No. 4 (Train A) would be used and extended to deliver process air to bioreactors. The power for this project would be supplied from the 12 kV electrical building, located east of Train A secondary clarifiers, through existing and new (extended) conduits.

16.2 Design Criteria

The design criteria in Table 16-1 were developed as the basis for the recommended project for TTDF.

Table 16-1: Design Criteria for TTDF

Item	Units	Design Value	Remarks
Design Flow Rate	mgd	5	
Flow Peaking Factor	-	1	Peak:Average ratio
Primary Effluent	-	-	Max month values
BOD	mg/L	224	70% of raw wastewater
TSS	mg/L	120	40% of raw wastewater
TKN	mg/L	30	65% of raw wastewater
MLSS	mg/L	10,000	
SRT (Minimum)	days	6	Oxic zone
Anoxic:Oxic Zone Ratio (Minimum)	-	0.3	
Maximum Oxygen Uptake Rate	mg/L-hr	128	

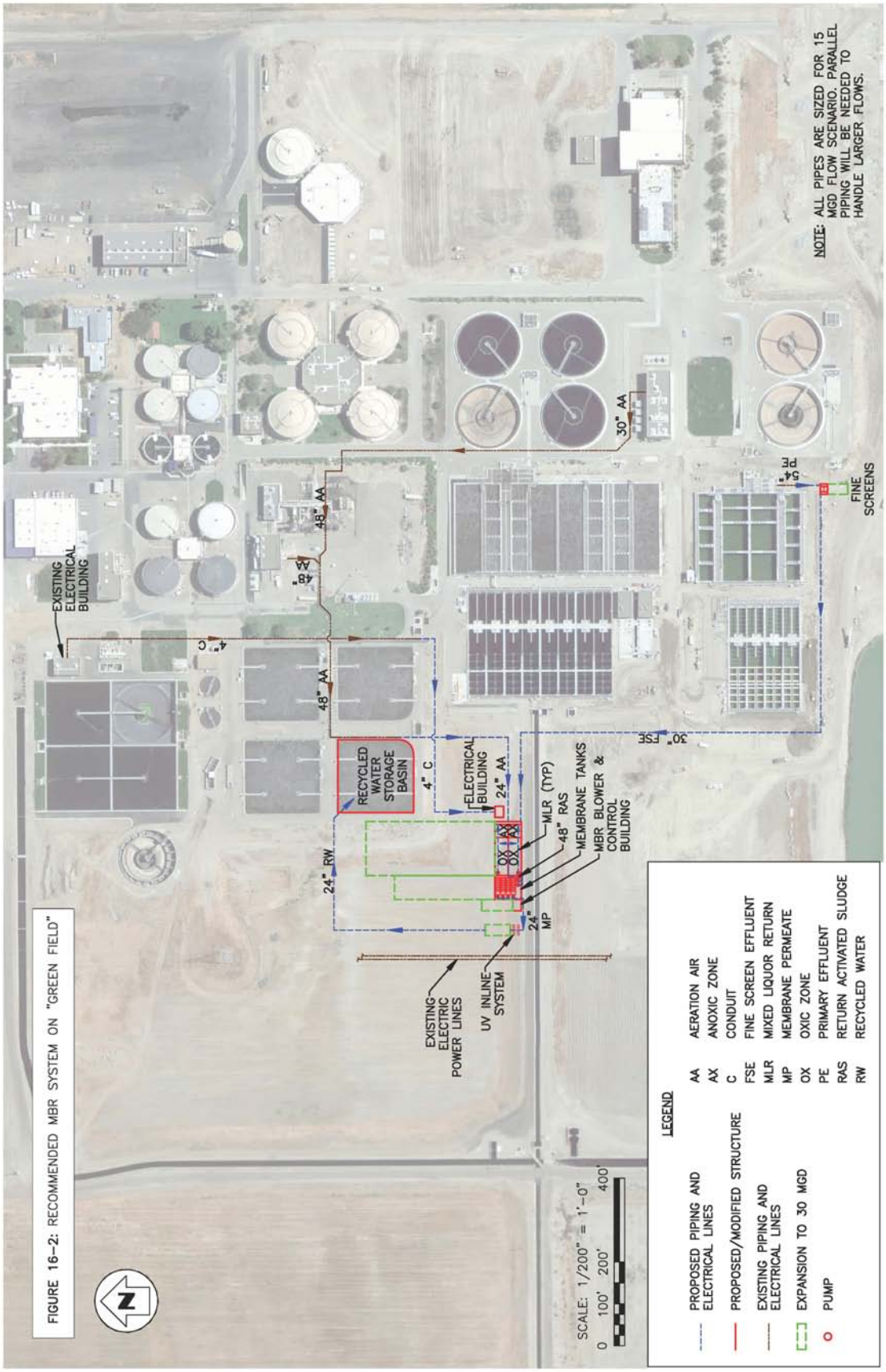


FIGURE 16–2: RECOMMENDED MBR SYSTEM ON "GREEN FIELD"

16.3 Process Equipment List

A list of major processes and equipment is presented in Table 16-2 below. An appropriate level of redundancy is incorporated into the process design and equipment sizing for reliable operation and maintenance of the TTDF.

Table 16-2: List of Major Process Equipment

Item	Units	Design Value	Remarks
Screens			
Type	-	-	In-channel perforated-plate drum
Number	-	2 (1+1)	One duty, one standby
Capacity, Each	mgd	5	
Bioreactors			
Number (In Parallel)		2	Anoxic and oxic zones in each
Volume, Each	MG	0.42	
Diffusers			
Type			Fine bubble, membrane (EPDM) disk or strip type
Aeration Pattern			Tapered along bioreactor length
Process Air Blowers			
Type			Single-stage centrifugal
Number	-	6 (5+1)	Existing blowers
Capacity, Each	scfm	27,000	
Discharge Pressure	psig	7.8 or 8.5	4 units at 7.8 and 2 units at 8.5
Horsepower, Each	hp	1,500	
Mixed Liquor Return Pumps			Returning flow from oxic zone to anoxic zone
Type			Axial propeller
Number	-	3 (2+1)	Two duty, one shelf spare
Capacity, Each	gpm	7,000	
TDH	ft	3	
Horsepower	hp	15	
Drive			Variable speed
Sludge Recirculation Pumps			Returning flow from membrane tanks to oxic zone
Type			Vertical propeller
Number	-	2 (1+1)	One duty, one standby
Capacity, Each	gpm	14,000	
TDH	ft	20	
Horsepower	hp	125	
Drive			Variable speed
WAS Pumps			
Type			Centrifugal

Item	Units	Design Value	Remarks
Number	-	2 (1+1)	One duty, one standby
Capacity, Each	gpm	450	
TDH	ft	20	
Horsepower	hp	5	
Drive			Variable speed
Membrane Tanks			
Number	-	4	
Cassettes per Tank			
Number Installed	-	6	
Space for Future	-	1	
Total Membrane Surface Area	ft2	417,360	
Air Scouring Blowers			
Type			High-speed turbo
Number	-	3 (2+1)	Two duty, one standby
Capacity, Each	scfm	3,950	
Discharge Pressure	psi	5	
Horsepower, Each	hp	125	
Drive			Variable speed
Permeate Pumps			
Type			Horizontal end suction
Number	-	5 (4+1)	Four duty, one shelf spare
Capacity, Each	gpm	1,350	
TDH	ft	25	
Horsepower, Each	hp	20	
Drive			Variable speed
Backpulse Pumps			
Type			Horizontal end suction
Number	-	2 (1+1)	One duty, one standby
Capacity, Each	gpm	1,480	
TDH	ft	25	
Horsepower, Each	hp	30	
Drive			Variable speed
Instrument Air Compressors			If Plant air not available
Number	-	2 (1+1)	One duty, one standby
Horsepower, Each	hp	15	
Chemical Cleaning			
Sodium Hypochlorite			12.5% Solution
Frequency			
Recovery	Yearly	2	Per tank
Maintenance	Weekly	1	Per tank

Item	Units	Design Value	Remarks
Annual Consumption	gal	4,000	
Citric Acid			50% Solution
Frequency	Yearly	1-2	Part of Recovery Clean
Annual Consumption	gal	750	
UV System			
Design Flow	mgd	5	
Type of UV System			In-pipe, Low Pressure, High Intensity
Number of Trains		4 (3+1)	Three duty, one standby
Number of Reactors		8 (6+2)	Six duty, two standby
Flow Capacity per Reactor	mgd	1.0	
Length of Reactor	ft	8	
Number of Lamps per Reactor		40	
Total Number of Lamps Provided		320	

16.4 Preliminary Costs

Preliminary costs were developed according to Class 4 level per AACE (Association for the Advancement of Cost Engineering) guidelines. Using the estimated capital and O&M costs, a 20-year life cycle cost analysis was performed. The results are shown in Table 16-3.

Table 16-3: MBR System Life-Cycle Cost (5 mgd)

Parameter	Capital Cost ($ Millions)	O&M Cost ($ Thousands)	20-Year Life Cycle Cost ($ Millions)
MBR System	24.4	553	34.4
Disinfection (In-pipe UV)	5.3	150	8.0
Storage (Aeration Basin No.4) and Distribution Pumping	3.1	283	8.2
TOTAL	**32.8**	**986**	**50.6**
Train A Capacity Replacement Cost	**(18)**		
Net Effective Capital Cost	**14.8**		

16.5 Power Source

For the proposed TTDF on a "green field" site, power feed will be drawn from existing Sub Service Switchgear "12KV-MS2" building. Two (2) existing circuit breakers 60-BKR-104 and 60-BKR-204 will be utilized to provide a double ended feed to the new indoor type 12 KV switchgear. This new switchgear will be provided with two (2) main circuit breakers, a normally open (NO) tie circuit breaker, two (2) feeder circuit breakers and extra space for two (2) additional circuit breakers for future expansion. All new 480 V Motor Control Centers are also indoor type. The new 12 KV switchgear and all the 480V Motor Control Centers will be housed

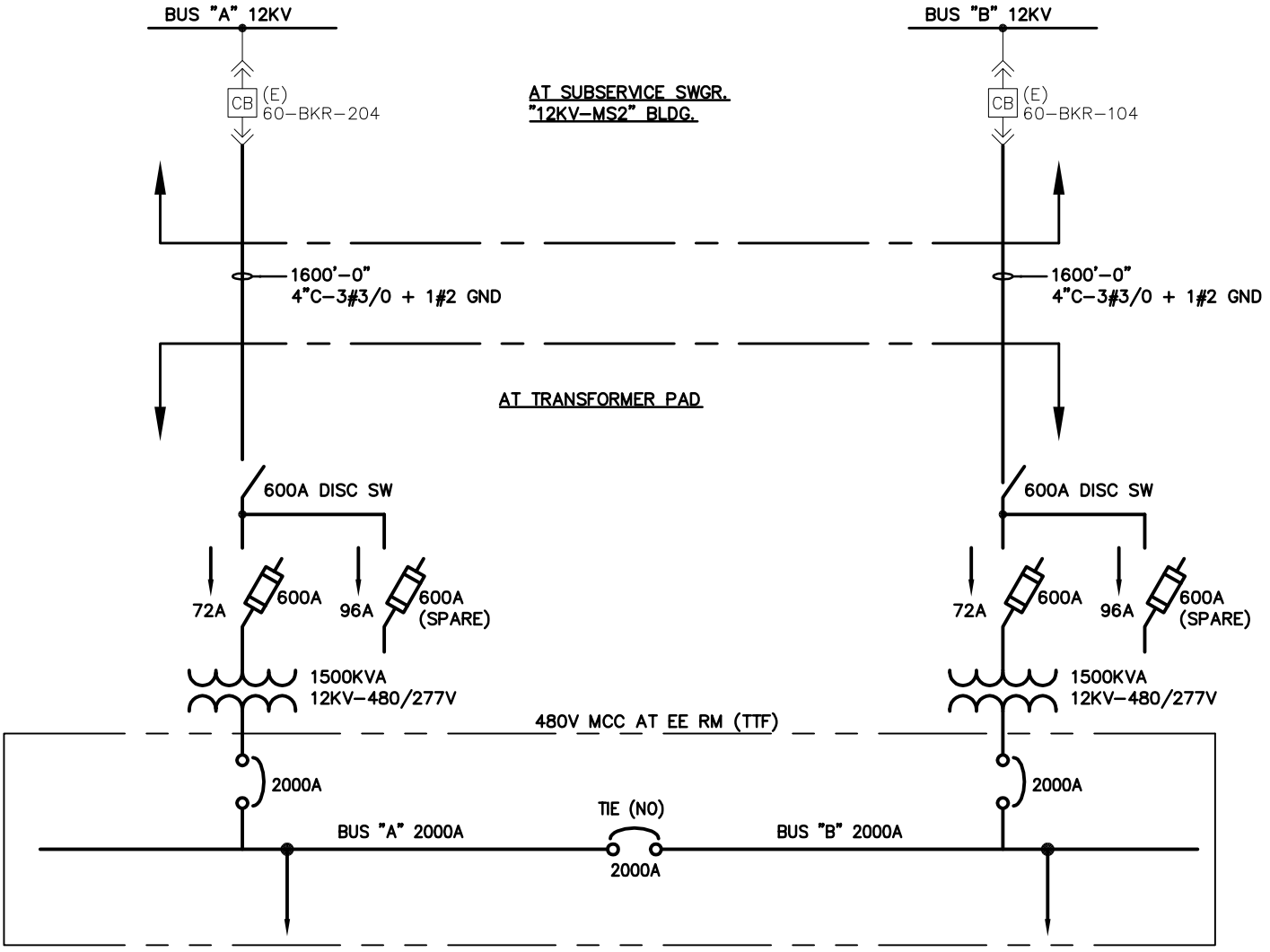
in a building close to the MBR structure. The step-down transformers, however, are all outdoor type and will be located on an open concrete pad close to the new electrical building. Two (2) existing – 4"C conduits on the north-south electrical duct bank will be utilized up to Manhole EMH-6. From Manhole EMH-6, two (2) new -4"C conduits will be installed down to the new 12 KV switchgear Electrical Building.

APPENDIX A

PRELIMINARY CONSTRUCTION AND O&M COST ESTIMATES

APPENDIX B

REFERENCE DRAWINGS

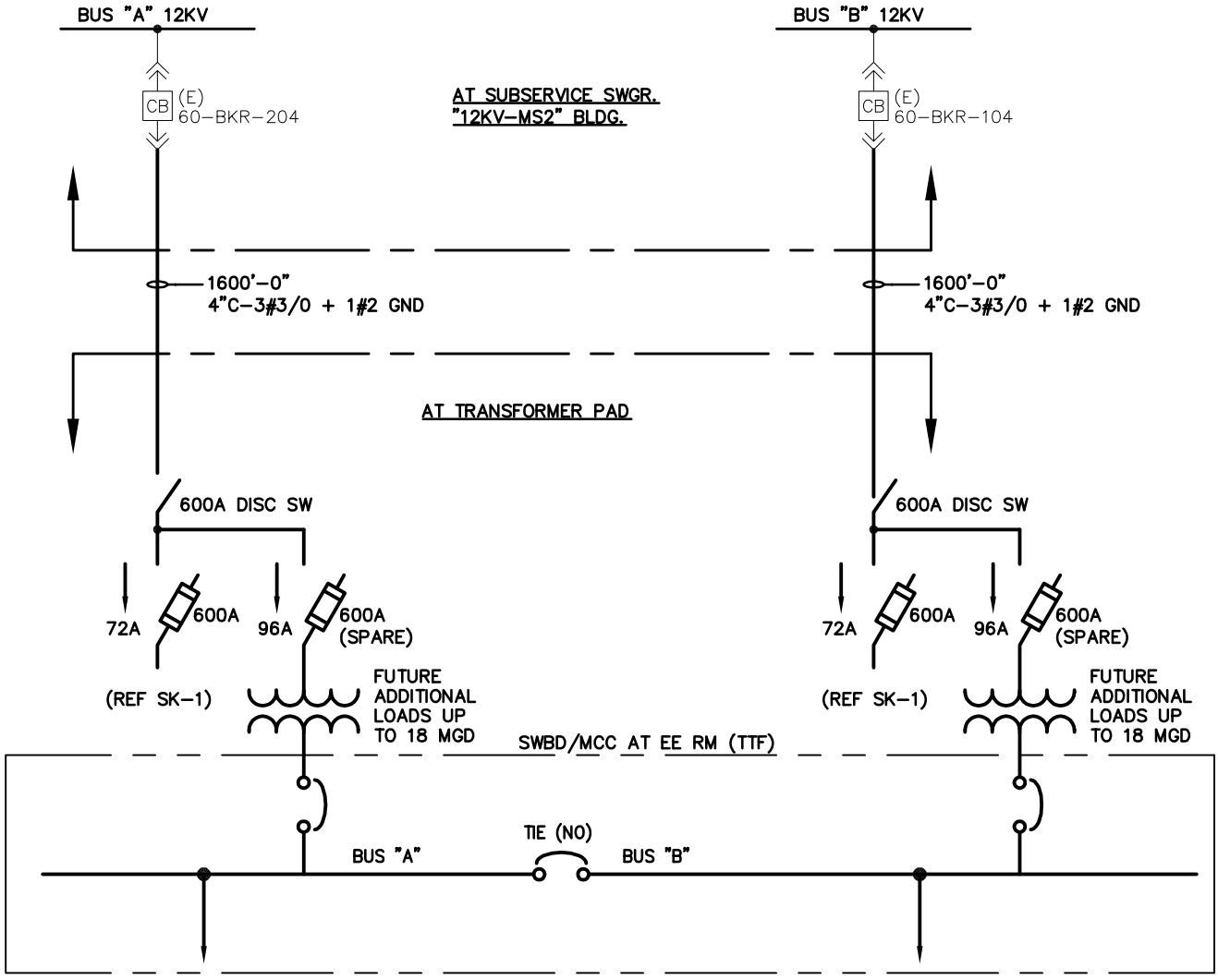


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - 12 MGD CONVENTIONAL FILTRATION SYSTEM

SK-1

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/01/2011

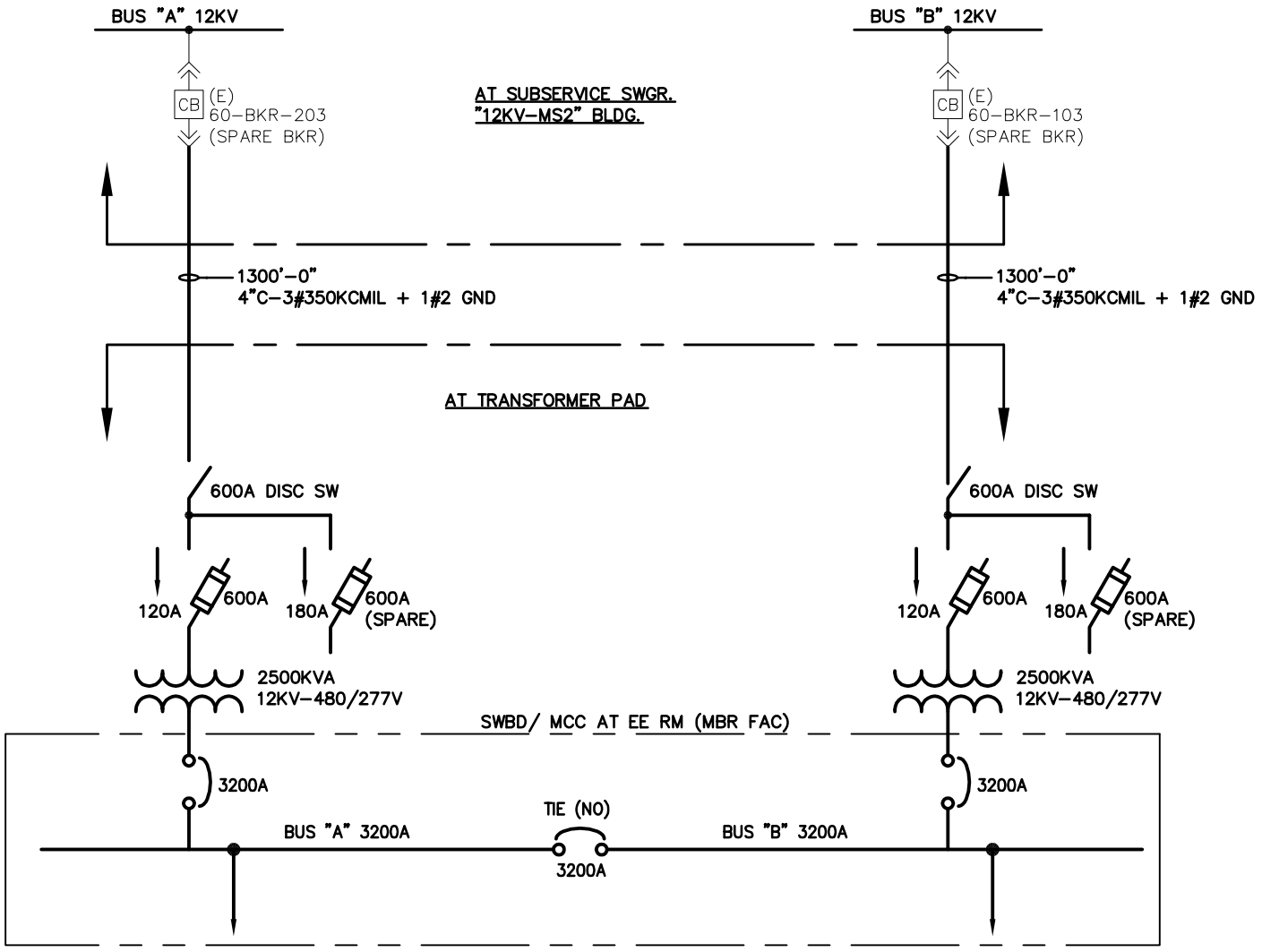


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - UP TO 30 MGD CONVENTIONAL FILTRATION SYSTEM

SK-2

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/01/2011

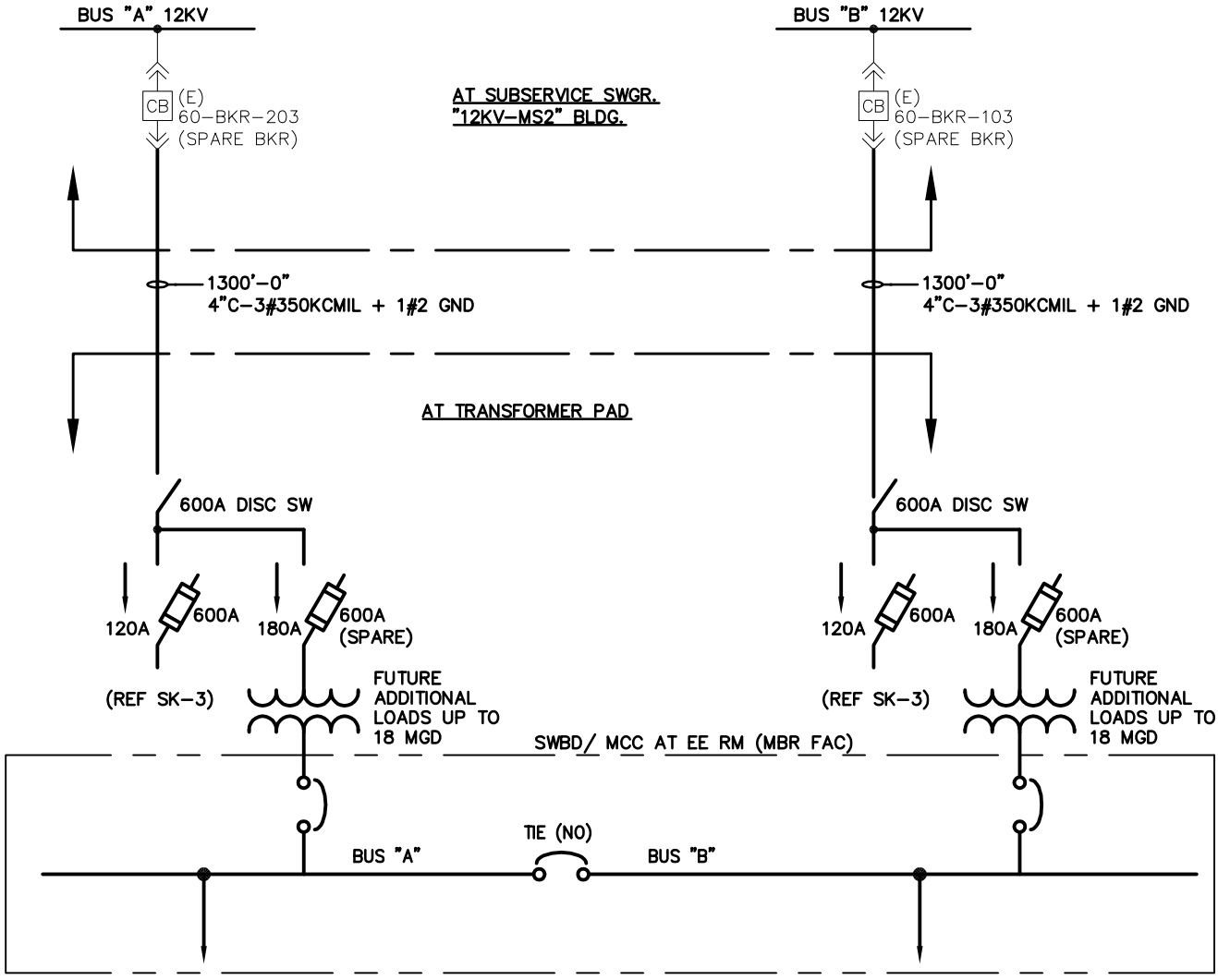


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - 12 MGD MBR SYSTEM
OPTION 1 (SPARE BREAKERS - NEW 4" CONDUITS)

SK-3

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/01/2011

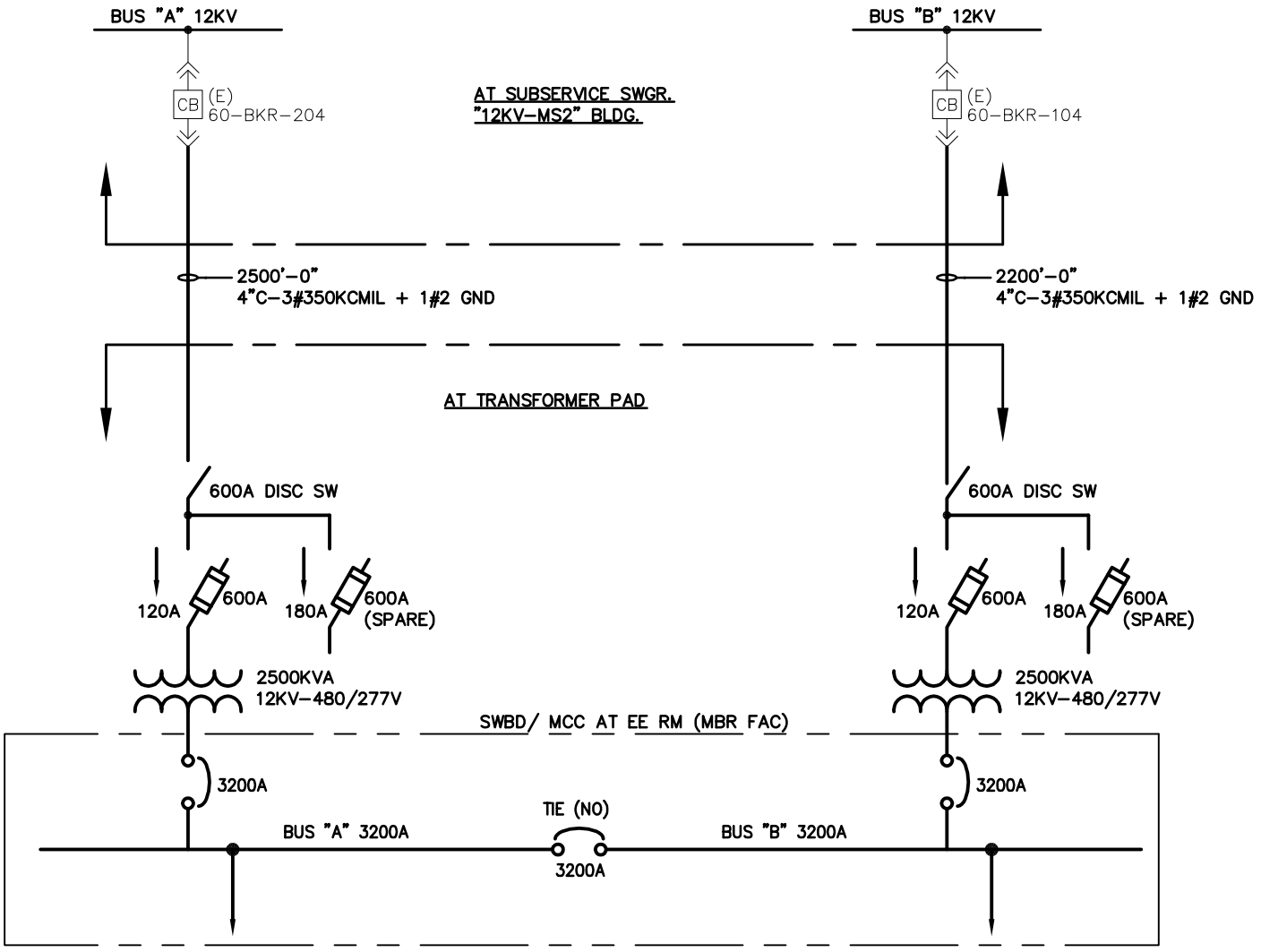


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - UP TO 30 MGD MBR SYSTEM
OPTION 1 (SPARE BREAKERS - NEW 4" CONDUITS)

SK-4

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/01/2011

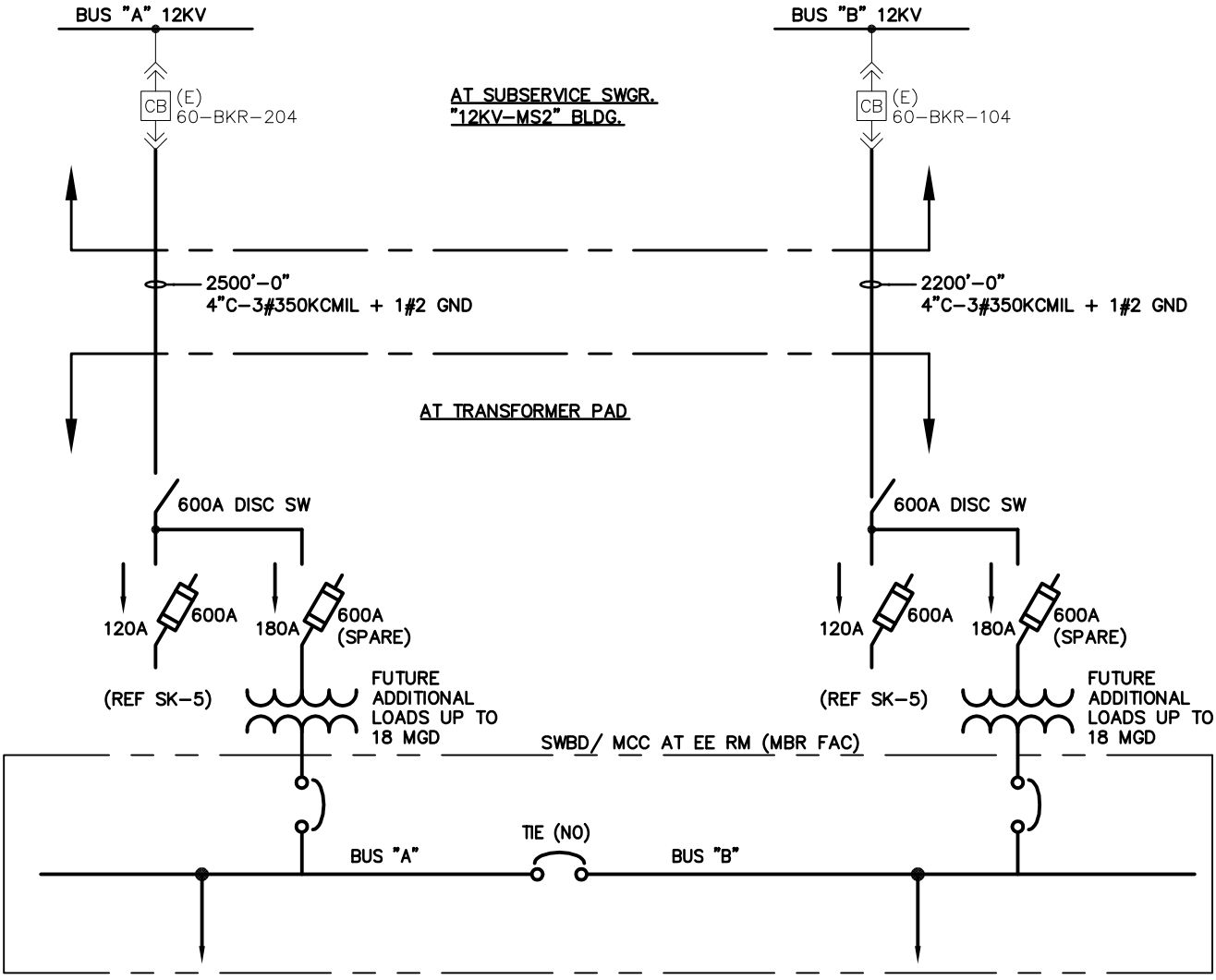


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - 12 MGD MBR SYSTEM
OPTION 2 (EXIST. BREAKERS - EXIST./ NEW 4" CONDUITS)

SK-5

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/01/2011

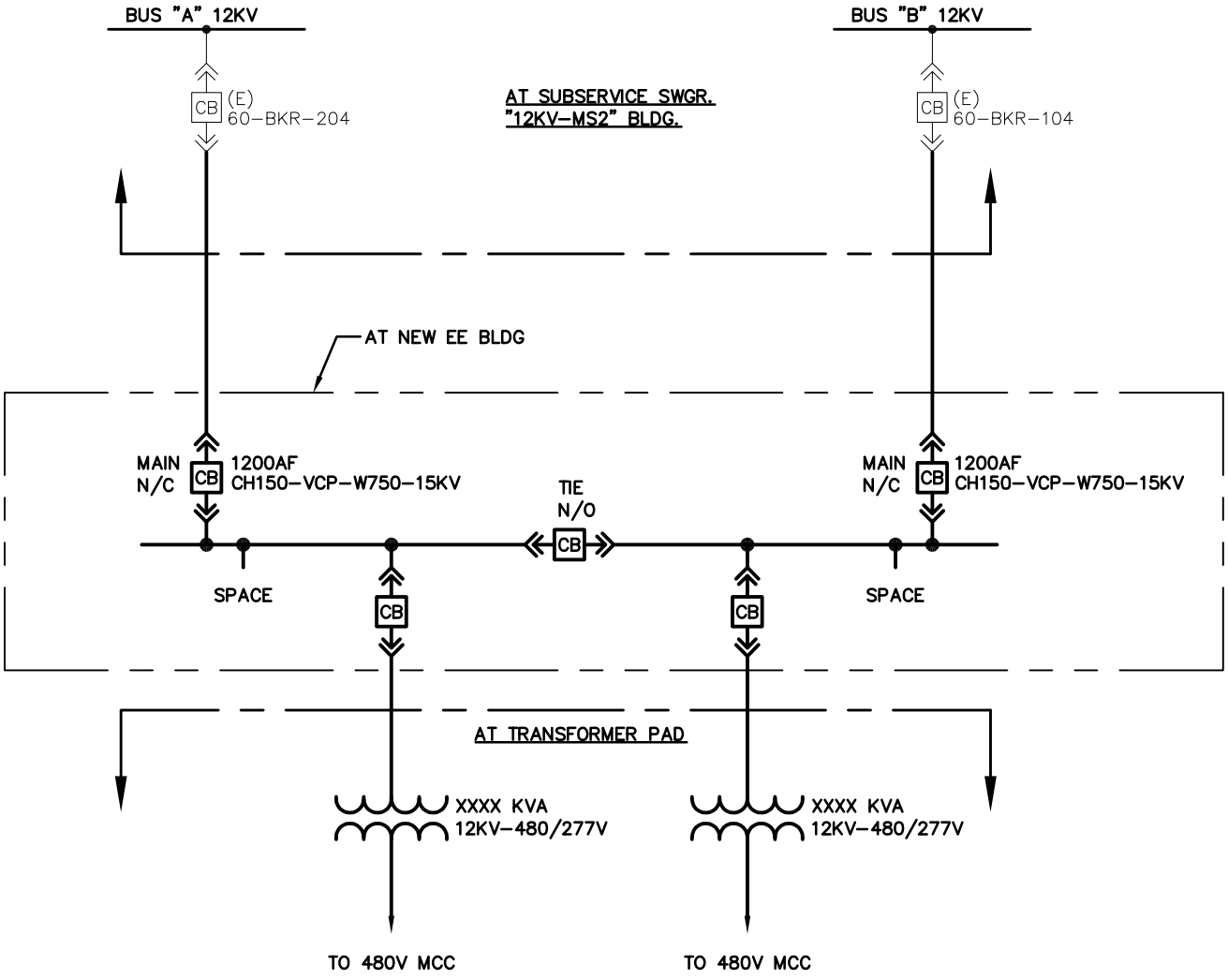


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - UP TO 30 MGD MBR SYSTEM
OPTION 2 (EXIST. BREAKERS - EXIST./ NEW 4" CONDUITS)

SK-6

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/01/2011

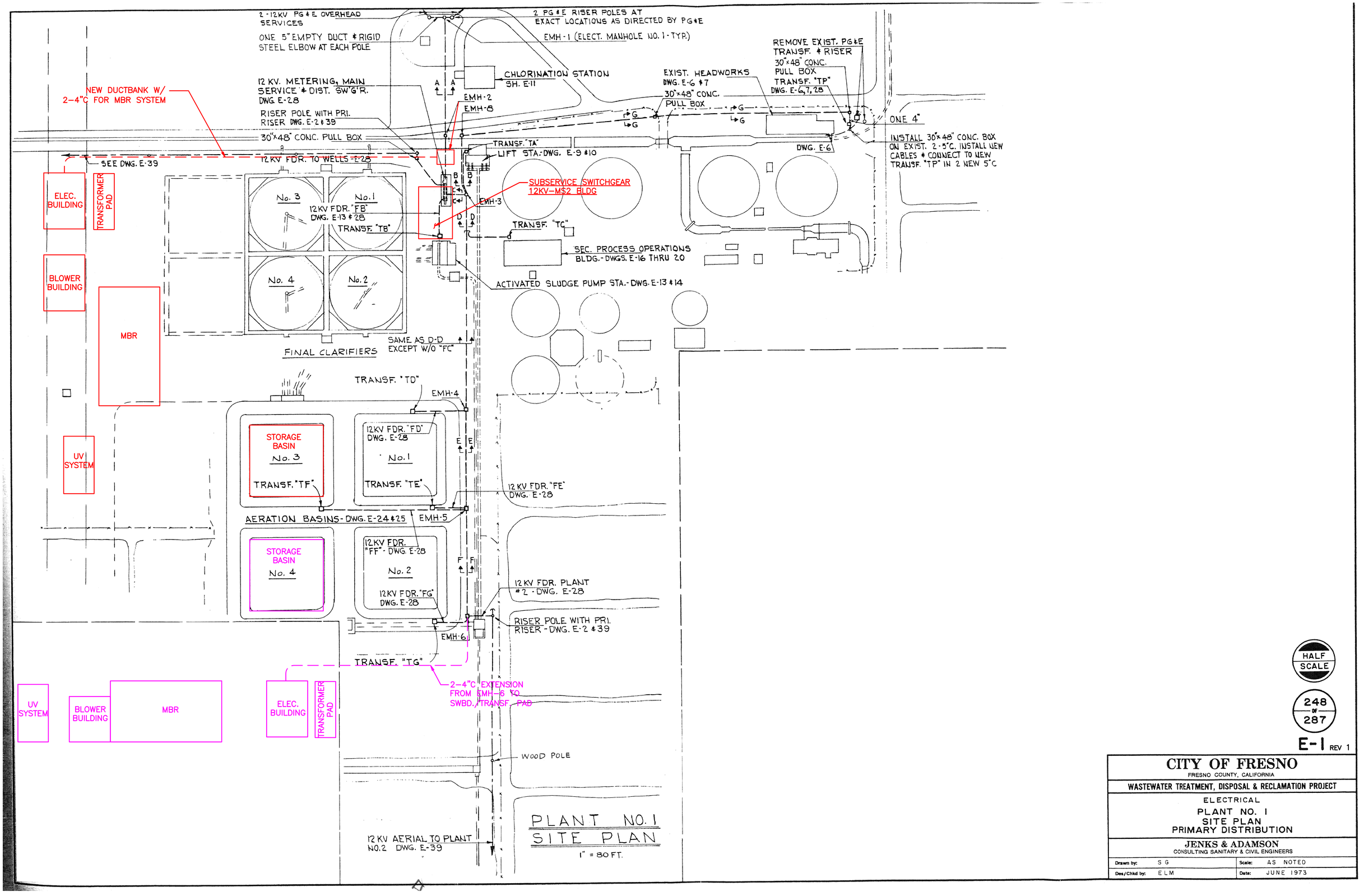


CITY OF FRESNO - TERTIARY TREATMENT AND DISINFECTION FACILITY

SINGLE LINE DIAGRAM
TTDF - 5 MGD MBR SYSTEM
PREFERRED ELECTRICAL EQUIPMENT ARRANGEMENT

SK-7

DESIGN BY: E. GATDULA
SCALE: NONE | DATE: 02/25/2011



HALF SCALE

248 OF 287

E-1 REV 1

CITY OF FRESNO

FRESNO COUNTY, CALIFORNIA

WASTEWATER TREATMENT, DISPOSAL & RECLAMATION PROJECT

ELECTRICAL

PLANT NO. 1
SITE PLAN
PRIMARY DISTRIBUTION

JENKS & ADAMSON
CONSULTING SANITARY & CIVIL ENGINEERS

Drawn by:	S G	Scale:	AS NOTED
Des/Chkd by:	E L M	Date:	JUNE 1973

APPENDIX C

REFERENCE DOCUMENTS

WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-254

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. R5-2002-0254-A01
AMENDING WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-254
FOR
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

WHEREAS, the California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) adopted Waste Discharge Requirements Order No. 5-01-254 for the Cities of Fresno and Clovis at its regularly scheduled public meeting on 19 October 2001; and

WHEREAS, Order No. 5-01-254 references the Cities of Fresno and Clovis as Discharger and the City of Fresno as Operator; and

WHEREAS, Order No. 5-01-254 requires that the Discharger comply with all pretreatment requirements contained in Title 40, Code of Federal Regulations (CFR), Part 403, including implementing the necessary legal authorities; and

WHEREAS, when Order No. 5-01-254 was adopted, legal adequacy review of the Operator's pretreatment program was still pending; and

WHEREAS, the legal adequacy review was completed and a 21 November 2001 letter from Board staff to the Operator identifies revisions that are necessary for the ordinance and the interjurisdictional agreements contained in the Operator's pretreatment program to comply with the federal pretreatment regulations set forth in 40 CFR Part 403; and

WHEREAS, although the Discharger has been made aware of the required revisions, the process of effecting the revisions will take some time; and

WHEREAS, the action to amend Waste Discharge Requirements Order No. 5-01-254 for this existing facility is exempt from the provisions of the California Environmental Quality Act in accordance with Title 14, California Code of Regulations, Section 15301; and

WHEREAS, the Board has notified the Discharger, interested agencies, and persons of its intent to amend waste discharge requirements for the Discharger and has provided them with an opportunity for public hearing and an opportunity to submit their views and recommendations; and

WHEREAS, the Board, in a public meeting, heard and considered all comments pertaining to this action; therefore be it

RESOLVED, that the Board hereby amends Waste Discharge Requirements Order No. 5-01-254 as follows:

RESOLUTION NO. R5-2002-0254-A01
AMENDING WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-245
FOR CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

REVISED FINDING

1. On Page 5, in Finding No. 20, delete last sentence and replace with "Pretreatment program review identified certain revisions to the City of Fresno's Municipal Code and interjurisdictional agreements that are necessary for the pretreatment program to contain the legal authorities required for compliance with the federal pretreatment regulations set forth in 40 CFR 403. The required revisions are set forth in a 21 November 2001 letter from Board staff to the Operator, and it is reasonable that a schedule be established (Provision H.35) for completion of the required revisions. The Operator's current pretreatment program, with revisions and updates submitted by the Operator on 5 April 2001, shall remain in effect and is approved conditional upon completion of the required revisions to the program in accordance with the time schedule set forth herein."

NEW PROVISION

2. On Page 35, add a new Provision H.35 that states: "The Operator shall, no later than **15 January 2003**, submit sufficient documentation to demonstrate that its ordinance and interjurisdictional agreements contained in its pretreatment program contain adequate legal authorities to implement and enforce the pretreatment requirements in compliance with 40 CFR 403."

I, GARY M. CARLTON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 1 March 2002.

_____
GARY M. CARLTON, Executive Officer

BLH:fmc

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 5-01-254

WASTE DISCHARGE REQUIREMENTS
FOR
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The Fresno-Clovis Metropolitan Regional Wastewater Reclamation Facility is a wastewater treatment facility (WWTF) that serves the cities of Fresno and Clovis; the Pinedale Water District and Pinedale Utilities District, both of which are within the city limits of Fresno; and some areas within Fresno County not within the city limits of Fresno or Clovis. The City of Clovis owns 9.5 percent of the WWTF's treatment capacity, while the City of Fresno owns the rest. The cities of Fresno and Clovis are referred to as Discharger. The City of Fresno is responsible for day-to-day WWTF operations, and is referred to as Operator. The WWTF is on property owned by the City of Fresno and covers 3,290 acres in Sections 20, 21, 22, 27, and 33, of T14S, R19E, MDB&M, as shown in Attachment A, which is part of this Order.

2. The WWTF features two separate wastewater treatment plants. Plant 1 is an activated sludge treatment plant that includes headworks, primary and secondary clarifiers, aeration basins, and anaerobic digesters (see Attachment B). The Discharger recently expanded Plant 1 to increase its nominal treatment capacity from 68 million gallons per day (mgd) to 88 mgd. Plant 2 is a 6-mgd-capacity trickling filter treatment plant that includes primary and secondary clarifiers (see Attachment C). Plant 2 is remotely located from Plant 1 and is currently not utilized. Also included within the 3,290-acre WWTF property are 1,660 acres of effluent disposal ponds; a 145-acre winery stillage disposal site (Stillage Site), portions of which have been in service since 1974; and about 600 acres of farmland on which WWTF effluent is recycled by local growers under lease agreements with the Operator.

3. Waste Discharge Requirements (WDRs) Order No. 96-054, adopted by the Board 23 February 1996, prescribes requirements for an average dry weather flow discharge of 68 mgd from Plant 1 and of 6 mgd from Plant 2 (when in operation). Order No. 96-054 also regulates the 145-acre Stillage Site generally in accordance with guidelines for land disposal of stillage waste from wineries (Stillage Guidelines) adopted by the Board in 1983. Prior to 1996, WDRs Order No. 74-10 regulated the discharge of stillage to a 95-acre portion of the Stillage Site.

4. Cease and Desist (C&D) Order No. 96-055, adopted by the Board 23 February 1996, directed the Discharger to achieve compliance with its WDRs by implementing specific short-term and long-term tasks and measures. Tasks included a study regarding the expansion of WWTF treatment and disposal pond capacity and the possibility of reclaiming substantially all wastewater. Measures included salinity control and compliance with an effluent salinity limitation. The Operator has

implemented salinity source control, upgraded the WWTF to accommodate current and projected wastewater flow through 2008, increased disposal capacity, and submitted a study describing the feasibility of expanded water recycling operations. On 19 October 2001, the Board adopted Order No. 5-01-241 rescinding C&D Order No. 96-055.

5. The Operator submitted a Report of Waste Discharge, dated 31 December 1996, in support of a 20-mgd increase in Plant 1 treatment and disposal capacity (i.e., to 88 mgd) and a 30 percent increase over current permitted flow of 72 mgd (i.e., to 94 mgd). The Discharger projects the added capacity should be sufficient until 2008.

6. Currently, average and maximum daily discharge flows are 68 mgd (on an annual basis) and 72 mgd (on a maximum monthly average basis), respectively. Discharger monitoring reports from 2000 characterize the WWTF effluent and municipal source water as follows:

Constituent	Units	Average	Minimum	Maximum
Effluent 5-day biochemical oxygen demand (BOD_5)	mg/L	26	8	53
Total dissolved solids (TDS)	mg/L			
Source water		240	220	250
Effluent		440	340	500
Conductivity at 25°C (EC)	µmhos/cm			
Source water		350	--	--
Effluent		780	690	870
Effluent Chloride	mg/L	72	60	107
Effluent Sodium	mg/L	81	74	100
Effluent bicarbonate alkalinity (as $CaCO_3$)	mg/L	208	164	255

7. The Discharger frequently adds ferric chloride to the influent prior to primary clarification. While this enhances pretreatment for organic and solids removal and control of hydrogen sulfide, it does increase the discharge's chloride and EC concentration. From 1 January 1999 through 4 April 2001, the discharge's monthly average chloride concentration ranged from 59 to 87 mg/L, averaged 70 mg/L, and had a 95% confidence level of 82 mg/L. Similarly, for this same period, the discharge's monthly EC concentration ranged from 594 to 924 µmhos/cm, averaged 757 µmhos/cm, and had a 95% confidence level of 842 µmhos/cm.

EFFLUENT DISPOSAL AND REUSE

8. At the current average daily discharge flow of 68 mgd, the WWTF discharges about 76,000 acre-feet per year (af/yr). Of this amount, about 4,000 af/yr of effluent is recycled directly, an amount that represents about only five percent of the WWTF's current annual discharge flow. Dedicated pumps and piping carry the effluent to reclamation areas for irrigation of crops such as alfalfa, cotton, silage corn, and wine grapes. Current and proposed on-site water recycling is by local farmers (hereafter Users) under lease agreements on 766 acres within the WWTF property (hereafter reclamation area). Off-site water recycling is by growers under separate water

reclamation requirements. Of the 72,000 af/yr discharged to the 1,660 acres of disposal ponds, about 63,400 af/yr (88 percent) percolates to groundwater and 8,600 af/yr (12 percent) is lost through evaporation.

9. The Discharger's practice of disposing of most discharge flow by percolation has, over the years, created an extensive groundwater mound under the WWTF disposal ponds (hereafter effluent mound). The effluent mound appears to be about 10-feet high, ranges in depth from 25 to 60 feet below ground surface (bgs), extends well beyond the perimeter of the WWTF property, and affects groundwater contours throughout a 25-square-mile area.

10. The Fresno Irrigation District (FID) covers 245,000 acres in central Fresno County, extends from Pine Flat Dam along the Kings River to the Kerman area, and includes the Fresno-Clovis metropolitan area.

11. In 1974, the City of Fresno entered into an agreement with FID to establish a groundwater reclamation system consisting of onsite extraction wells and piping that delivers groundwater to FID's Dry Creek and Houghton Canals during the growing season for agricultural use on the western side of FID. Both canals can each convey up to about 200 cubic feet per second. The 1974 agreement between FID and the Operator currently stipulates, in part, that the Operator may discharge a maximum of 30,000 af/yr of extracted groundwater to FID canals. To date, there are no restrictions on the use of extracted groundwater discharged to FID canals.

12. In 1975, the Operator installed 21 reclamation wells within the WWTF property. The amount of water extracted ranges between 10,000 af/yr (minimum) to 30,000 af/yr (maximum), an amount equivalent to 12 to 37 percent of the WWTF's current annual discharge flow. As of 30 April 2001, all 21 reclamation wells were operational. The estimated delivery capacity is in excess of 30,000 af/yr. With the exception of several newly-installed "Flowpath™" reclamation wells, the Operator's reclamation wells extract groundwater from depths exceeding 200 feet bgs, which is 140 to 175 feet below the top of the effluent mound. The Operator pumps from these depths rather than those associated with the effluent mound reportedly due to shallow zone's low specific yields. The Flowpath ™ wells, installed in the fall of 2000, extract from depths ranging from 80 to 240 feet bgs. The Operator periodically monitors the quality of groundwater extracted from the reclamation wells for TDS, EC, sodium, chloride, nitrogen compounds, and general minerals. The chloride concentration in extracted groundwater is comparable to WWTF effluent and not to groundwater extracted from the WWTF's background monitoring wells. Consequently, the reclamation well network, while drawing from depths below the top elevation of the effluent mound, is effectively extracting percolated effluent and not regional groundwater. Water quality data from October 2000 for groundwater extracted from three Flowpath ™ reclamation wells indicate the following average concentrations in mg/L: chloride (79), dissolved iron (0.19), dissolved manganese (1.24), total nitrogen (< 2), sodium (76), TDS (490), and total organic carbon (5).

13. The Operator normally delivers between 15,000 and 20,000 af/yr to FID canals with its current reclamation well network. For the Operator to deliver in excess of 30,000 af/yr to FID canals, the Operator would have to add more reclamation wells. Any increase in the discharge of extracted groundwater beyond that specified in the 1974 agreement is subject to FID approval.

14. The Discharger submitted a technical report, *Fresno-Clovis Regional Wastewater Reclamation Facilities Master Plan Summary Report* (Master Plan), dated November 1996, pursuant, in part, to C&D Order No. 96-055. The Master Plan describes several near- and long-term options for off-site effluent reuse/disposal to meet the Discharger's disposal needs through 2020. The Master Plan further describes the institutional and structural elements of each option, including its financial analysis and multi-year implementation schedule.

15. The Master Plan recommends the following effluent disposal and reuse projects: (a) adding about 270 acres of on-site disposal ponds, (b) maximizing the discharge to FID canals from of its existing reclamation well network, and (c) implementing a reuse project that would recycle an amount equivalent of the annual WWTF discharge flow. At the full capacity of 80 mgd, the annual discharge flow is about 90,000 af/yr, which far exceeds the discharge of any municipal sewage treatment facility in the San Joaquin Valley. The Discharger has increased its on-site disposal pond acreage and has continued to explore opportunities for the direct reuse of effluent. The City currently is constructing pipelines that will provide effluent for the irrigation of an additional 630 acres of reclamation area. The City also has a project under way to increase the capacity of the existing reclamation well network.

16. Calpine Corporation (hereafter Calpine) is planning to construct a new gas-fired turbine in Fresno County (Central Valley Energy Center, hereafter referred to as CVEC). Calpine proposes to pump approximately 7,000 af/yr from the Operator's reclamation wells to provide cooling tower and industrial process water for the CVEC. Once extracted, the recycled water will be dosed with sodium hypochlorite prior to introduction into a 20.5 mile, 30-inch diameter pipeline, which will terminate into two 1.5 million gallon storage tanks at the CVEC site.

17. In addition to its Kings River entitlement, FID and the Operator have signed contracts to purchase up to 135,000 af/yr of surface water from the Friant Division of the Central Valley Project, operated by the U.S. Bureau of Reclamation (Bureau). The contract between FID, the Operator, and the Bureau is up for renewal, which may change the terms and conditions of the 1974 agreement between FID and the Operator. Until the contract renewal is consummated, the economic value of WWTF effluent as a source of agricultural supply is uncertain. This economic uncertainty influences the Discharger's scheduling for implementing a large-scale effluent reuse project.

PRETREATMENT

18. Fifty-six significant industrial users discharge waste into the WWTF collection system, including 14 users from the metal finishing categories, according to data submitted by the Operator in February 2001. Other industrial users discharging into the WWTF include soft drink bottlers, meat packers, food processors (fruit, vegetable, grain, nuts, and seeds), dairy and poultry products processors, plastic manufacturers, wineries, and several linen and industrial laundries.

19. Pretreatment effluent standards established pursuant to section 307 of the Federal Clean Water Act (CWA) and amendments thereto are applicable to the discharge.

20. The Discharger originally developed a pretreatment program in conformance with 40 CFR 403. The Board approved the program on 17 June 1984. The Operator has subsequently submitted a revised pretreatment program (dated 6 June 1996), also in conformance with 40 CFR 403, which updates its original submission to bring it in line with current practices. The Operator updated its pretreatment program in 2001, in part, to reflect its latest municipal code and enforcement response plan, incorporate WWTF upgrades, and describe modifications in sampling procedures. The Board is reviewing the revised pretreatment program for completeness and adequacy.

21. A pretreatment compliance inspection conducted in June 1999 indicated that all elements of the Discharger's pretreatment program comply with the federal pretreatment regulations in 40 CFR 403.

SLUDGE MANAGEMENT AND BIOSOLIDS DISPOSAL

22. Pursuant to section 13274 of the California Water Code, the State Water Resources Control Board adopted on 17 August 2000 Water Quality Order No. 2000-10-DWQ, *General Waste Discharge Requirements for the Discharge of Biosolids to Land for use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities* (hereafter General Biosolids Order).

23. The WWTF produced 12,800 dry tons of sludge in 1999, or an average of 35 tons/day. Dissolved air flotation and gravity belt units thicken sludge, anaerobic digesters stabilize it, and belt filter presses dewater it.

24. Prior to 1993, the Operator pumped digested sludge to 62 acres of sludge drying beds consisting of unlined open earthen basins. The Operator has since constructed additional treatment facilities on the majority of the 62-acre site of the old sludge beds, with a small portion converted into effluent disposal ponds.

25. The Operator previously stockpiled over 75,000 cubic yards of biosolids that had been originally classified as "hazardous" waste due to its concentrations of lead and cadmium. In September 1994, the Discharger submitted a technical report, *Work Plan To Collect and Analyze Sludge Samples*. In July 1997, the California Department of Toxic Substances re-evaluated the biosolids and re-classified it as nonhazardous. During the fall of 1998, the Operator transported the stockpiled biosolids to the Fresno Sanitary Landfill as part of the landfill's final closure project. From September 1998 through January 1999, the Operator diverted 25 percent of the biosolids previously produced at the WWTF to the Fresno Sanitary Landfill as part of its final closure project.

26. In August 1997, the Discharger entered into a contract with McCarthy Farms (MFF) to haul nonhazardous WWTF biosolids to MFF's land application site near Corcoran or to MFF's composting site in Lost Hills operated by San Joaquin Composting, Inc. These sites are regulated by waste discharge requirements adopted by the Board. In April 1999, the Operator certified that WWTF biosolids met the requirements for Class B biosolids and implemented a direct land application program in conjunction with MFF in Corcoran.

HYDROLOGY, SOILS AND GROUNDWATER

27. The WWTF lies within the Fresno Hydrologic Area (No. 551.30), which is within the Kings River Basin, as depicted on interagency hydrologic maps prepared by the California Department of Water Resources (DWR) in August 1986. The WWTF is not within a 100-year floodplain, and all storm water runoff is reportedly contained on-site. Incidental on-site runoff (e.g., runoff along the canal banks) drains into Dry Creek Canal, which flows through the WWTF property.

28. Dry Creek Canal originates in the City of Fresno and flows seasonally downstream of the WWTF. Houghton Canal flows seasonally downstream of the WWTF and originates at a junction with Dry Creek Canal in the City of Fresno. Dry Creek Canal has an undetermined terminus southwest of the WWTF. Houghton Canal has an undetermined terminus west of the WWTF.

29. Areal soils consist of unconsolidated alluvial deposits of interbedded layers of sand, gravel, silt, sandy clay, clay and localized cobble zones. Soils in the upper five feet of the Stillage Site are described as well-sorted sands with good permeability (i.e., 0.7 to 1.0 in/hr) and therefore suitable for rapid infiltration of stillage waste.

30. The WWTF is in a semiarid region. Average annual precipitation and evapotranspiration are about 11 inches and 62 inches, according to information published by DWR.

31. Areal groundwater comprises the north portion of an essentially closed groundwater basin (Tulare Lake Basin) and flows southwesterly under unconfined conditions from the foothills east of Fresno westward to a northwest-trending line through Kerman and Raisin City. West of that line, groundwater occurs under both unconfined and semiconfined conditions. Extensive groundwater pumpage near the cities of Fresno and Raisin City have caused local changes in groundwater flow direction.

32. Groundwater in the WWTF vicinity occurs in an unconfined aquifer at depths ranging from 30 to 60 feet below ground surface (bgs). The Operator has delineated two zones of groundwater quality within the unconfined aquifer: a shallow zone consisting of the upper 50 feet of the aquifer and a lower zone, the top of which is about 200 feet below the water table.

33. The Operator monitors area groundwater via a groundwater monitoring well network currently comprised of 22 wells in the WWTF vicinity. In August 1996, the Operator proposed constructing additional groundwater monitoring wells along the WWTF perimeter to further characterize groundwater quality further and to assess potential groundwater impacts pursuant to Monitoring and Reporting Program No. 96-054. The Operator has not constructed the additional proposed groundwater monitoring wells.

34. Background or upgradient groundwater quality is highly variable due to the presence of dairies and other land uses that impact water quality. The Discharger currently monitors upgradient water quality in three wells, two monitoring wells (MW-10A and MW-10B) approximately 10,000 feet north of the WWTF property's north boundary and one domestic well (I) approximately 9,000 feet east of the WWTF's property's northeast corner. Of the two monitoring wells, MW-10A monitors the shallow zone and MW-10B, the deeper zone.

35. Upgradient or background groundwater is of high quality and meets all primary and secondary maximum contaminant levels for drinking water, according to the Operator's report, *Technical Memorandum No. 1-Update of Groundwater Quality Conditions* (April 1999). High quality groundwater conditions are generally associated with areas characterized by the absence of dairies or other localized sources of waste discharges.

36. Compared to background groundwater quality, groundwater passing under the WWTF contains elevated concentrations of TDS, EC, sodium, chloride, total phosphorus, and bicarbonate alkalinity. WWTF operations that have degraded groundwater for those constituents include stillage disposal and effluent disposal operations and the past use of sludge-drying beds. Groundwater within and surrounding the WWTF property has been degraded by other activities (e.g., past and existing dairy operations, a closed landfill), which over the years have created localized areas of groundwater degradation (hereafter referred to as "hot spots"). The Discharger's current groundwater monitoring well network is not adequate to distinguish groundwater impacts that are exclusively attributable to WWTF operations or to waste constituents originating from identified hot spots.

37. As indicated in Finding No. 8, evaporative losses account for about 12 percent of the current discharge flow to the disposal ponds. Evaporative losses will decrease to about 10 percent of the proposed increased discharge flow of 80 mgd, and result in an increase in the concentrations of waste constituents in effluent percolating to groundwater by about 10 percent. Therefore, groundwater underlying disposal ponds in areas unaffected by other waste discharges can be expected to contain salt constituents (e.g., chloride, EC, and TDS) in concentrations about 10 percent greater than that in WWTF effluent. A similar concentration increase can be expected for sodium provided there is no attenuation of sodium in the soil profile. The concentrating effect of evaporation appears to diminish as percolating effluent blends with regional groundwater, as indicated by the lower concentrations of chloride, TDS, and sodium in groundwater extracted in the recently-installed Flowpath ™ reclamation wells (as described in Finding No. 12).

38. As indicated in Finding No. 12, recent monitoring of groundwater extracted from the newly-installed Flowpath ™ reclamation wells has revealed very low concentrations of nitrogen and elevated concentrations of dissolved manganese (almost 25 times the drinking water standard of 0.05 mg/L). In contrast, monitoring of shallow groundwater has revealed nitrate-nitrogen concentrations approaching and even exceeding the drinking water standard of 10 mg/L and very low dissolved manganese concentrations.

STILLAGE SITE

39. The Operator's 145-acre stillage disposal site, or Stillage Site, consists of a 95-acre site (SS-1), 95 acres of which have been in service since 1974, and a 50-acre site (SS-2) in service since December 1998 (see Attachment A). Stillage waste is generated from the distillation of wine in continuous stills and pot stills (infrequently used) for the production of distilled spirits. Stillage waste is conveyed year-round to the Stillage Site by a dedicated pipeline.

40. Prior to 1974, four wineries discharged a maximum of 1.1 mgd of stillage waste to the Operator's sanitary sewer system. This practice resulted in nuisance conditions and other problems at the domestic wastewater treatment plant's infiltration beds. In 1974, the Operator began discharging up to 1.07 mgd of stillage via dedicated pipelines to the 95-acre SS-1 under the terms and conditions of WDRs Order No. 74-10. The Stillage Site has been operated generally in accordance with the minimum requirements of Board-adopted Stillage Guidelines. The Operator has not, however, adjusted its stillage disposal operation to ensure that it is protective of groundwater quality, even when groundwater monitoring data revealed that it had degraded and continues to degrade groundwater quality (discussed below).

41. The Stillage Site is divided into long narrow checks, approximately 500 feet long by 100 feet wide, most of which are equipped with concrete inlet structures to prevent erosion. Stillage is discharged to individual checks until it reaches depths ranging from 2.5 to about 4 inches, depending on the time of year. Once applied, the stillage is allowed to dry from six days to several weeks until all that remains is a thin, dry layer (called leathers). Checks are ripped and disked to a depth of 18 to 24 inches prior to reapplication of stillage. Prior to 1996, leathers were disked into disposal area soils. In 1996, the Operator began removing leathers from checks to help reduce the nutrient build-up in disposal area soils. Scraped leathers are stockpiled on site and reportedly used as soil amendment on landscaped areas within the WWTF property.

42. Recent monitoring data characterizes the BOD_5 and nitrogen concentrations in stillage as averaging about 12,000 mg/L and 400 mg/L, respectively. About 90 percent of the BOD_5 is in the soluble form; nitrogen occurs predominantly in the organic form, expressed as total Kjeldahl nitrogen (TKN). Typically, the peak discharge season is from August through November, during which discharge flows average about 0.215 mgd. Off-season discharge flow averages about 0.15 mgd.

43. The Operator discharged a total of about 79 million gallons of stillage in 2000. Peak daily flows occurred in mid-June, and ranged from 1.1 to 1.27 mgd. At an average TKN concentration of 400 mg/L, this discharge to the entire 145 acres of the Stillage Site equates to a nitrogen load in excess of 1,800 lbs/acre/year.

44. The Operator began growing crops in the Stillage Site in 1996 to reduce residual nitrogen, as recommended by the Stillage Guidelines. Soil monitoring data collected by the Operator in 1992 indicate that the Operator's long-term stillage disposal operation has resulted in a massive accumulation of nitrogen in the upper two feet of disposal area soils (i.e., 21,300 lbs TKN/acre).

45. Order No. 96-054, Stillage Discharge Specification B.8, requires the Discharger to grow crops in the Stillage Site to assist in the removal of residual nitrogen from the soil. The Discharger is exempt from this requirement if it can demonstrate that its stillage disposal operation has been and can be accomplished without nitrogen control and without violating Groundwater Limitations. The Discharger was required to submit a report on measures to be implemented to provide for nutrient uptake in the Stillage Site, or justification why such measures are unnecessary, pursuant to Order No. 96-054, Provision G.7. The Operator submitted a report that describes (a) alternatives to current disposal practices (i.e., implementing pretreatment by anaerobic digestion or discharging

to a different site) and (b) plans to plant crops on portions of the Stillage Site and to monitor soils before and after cropping.

46. In 1996, the Operator conducted a field experiment in which it planted Sudan grass on 35 acres of SS-1, allowed the crop to mature, and harvested it twice. Before and after cropping, the Operator analyzed soil samples for various constituents, including TKN, ammonia, phosphorus, and calcium. After harvesting, the Operator found that while reductions of these constituents occurred as a result of the planting, the concentrations were still quite elevated compared to background levels. The Operator has yet to initiate systematic cropping and harvesting of portions of the SS.

47. Excessive application of stillage waste to land can overload the shallow soil profile, cause anaerobic soil conditions, retard the degradation, stabilization, transformation, and immobilization of waste constituents, and create objectionable odors that lead to public nuisance. Degradation of waste constituents within the soil profile increases the concentration of alkalinity in soil pore water. Anaerobic soil conditions can lead to the dissolution of soil minerals such as calcium and magnesium. Hydraulic overloading flushes waste constituents, their decomposition by-products, and dissolved minerals into the soil profile. If attenuation is inadequate, these compounds may be released at concentrations in excess of applicable water quality objectives or could reasonably be expected to affect beneficial uses underlying groundwater.

48. The Operator's decades-long stillage disposal operation has degraded groundwater beneath SS-1 to the degree that its beneficial uses as a domestic and agricultural supply are impaired. Data from a monitoring well in this area (MW-2) shows that the EC of groundwater passing under SS-1 consistently exceeds the recommended secondary maximum contaminant levels for drinking water of 900 µmhos/cm. Additional monitoring data shows groundwater degradation for TDS, total alkalinity, calcium, magnesium, and manganese.

49. Currently, the Stillage Site receives stillage waste year round from only one winery, Cribari Winery, which is owned and operated by Canandaigua Wine Company, a New York corporation. Canandaigua Wine Company intends to cease discharge of stillage waste to the Stillage Site by the end of fall 2003.

50. The Operator reports that Plant 1 lacks the treatment capacity to handle all of the stillage waste currently generated by the Cribari Winery.

BASIN PLAN AND REGULATORY CONSIDERATIONS

51. The *Water Quality Control Plan for the Tulare Lake Basin, 2nd Edition,* (hereafter Basin Plan) designates beneficial uses, establishes water quality objectives, contains implementation plans and policies for protecting all waters of the Basin, and incorporates by reference plans and policies of the State Water Resources Control Board. These requirements implement the Basin Plan.

52. The Dry Creek and Houghton Canals carry irrigation deliveries from the Kings River and Friant Kern Canal, both waters of the United States. They also carry urban storm water runoff and surface waters from upgradient ephemeral streams. The Dry Creek and Houghton Canals are

valley floor waters. The designated beneficial uses of valley floor waters, according to the Basin Plan, are municipal and domestic, agricultural, industrial service, and industrial process supply; water contact and noncontact water recreation; warm freshwater, wildlife, and rare, threatened, or endangered species habitat; and groundwater recharge.

53. Historically, groundwater has been the sole source of municipal and domestic supply for the Fresno-Clovis metropolitan area, and for thousands of residents in surrounding rural areas. The Basin Plan designates the beneficial uses of groundwater in the vicinity of the WWTF and its discharges to land as municipal, agricultural, industrial service, and industrial process supply and water contact and noncontact water recreation.

54. In 1977, the United States Environmental Protection Agency (EPA) determined that the groundwater aquifer serving the Fresno-Clovis metropolitan area is a sole source of drinking water pursuant to section 1424 of the Safe Drinking Water Act.

55. Water in the Tulare Lake Basin is in short supply, requiring importation of surface waters from other parts of the State. The Basin Plan encourages reclamation on irrigated crops wherever feasible and indicates that evaporation of reclaimable wastewater is not an acceptable permanent disposal method where the opportunity exists to replace an existing use or proposed use of fresh water with recycled water. The Basin Plan further requires plans for new or expanded wastewater treatment facilities to include wastewater reclamation, or reasons why this is not possible.

56. Section 13050(h) of the California Water Code defines water quality objectives as ". . . the limits or levels of water quality constituents or characteristics which are established for the reasonable protection of beneficial uses of water or the prevention on nuisance within a specific area."

57. The Basin Plan establishes numerical and narrative water quality objectives for surface and groundwaters within the basin, and recognizes that water quality objectives are achieved primarily through the Board's adoption of waste discharge requirements and enforcement orders. Where numerical water quality objectives are listed, these are the limits necessary for the reasonable protection of beneficial uses of the water. Where compliance with narrative water quality objectives is required, the Board will, on a case-by-case basis, adopt numerical limitations in orders which will implement the narrative objectives to maintain existing and anticipated beneficial uses of waters in the subject area.

58. The Basin Plan identifies numerical water quality objectives for waters designated as municipal supply. These are the maximum contaminant levels (MCLs) specified in the following provisions of Title 22, California Code of Regulations: Tables 64431-A (Inorganic Chemicals) and 64431-B (Fluoride) of section 64431, Table 64444-A (Organic Chemicals) of section 64444, and Table 64449-A (Secondary Maximum Contaminant Levels-Consumer Acceptance Limits) and 64449-B (Secondary Maximum Contaminant Levels-Ranges) of section 64449. The Basin Plan's incorporation of these provisions by reference is prospective, and includes future changes to the incorporated provisions as the changes take effect. The Basin Plan requires the application of objectives more stringent than MCLs as necessary to ensure that waters do not contain chemical constituents in concentrations that adversely affect beneficial uses, whether the use is domestic drinking water supply, agricultural supply, or some other use.

59. The Basin Plan contains narrative water quality objectives for chemical constituents in and toxicity of groundwater that address constituents in the discharge that are potentially harmful to beneficial uses. The toxicity objective requires that groundwater be maintained free of toxic substances in concentrations that produce detrimental physiological responses in plants or animals. The chemical constituent objective states groundwater shall not contain chemical constituents in concentrations that adversely affect beneficial uses. Guidelines for identifying the quality of irrigation water necessary to sustain various crops were compiled by Ayers and Westcot in 1985 *(Food and Agriculture Organization of the United Nations – Irrigation Drainage Paper No. 29).* The Basin Plan recognizes these Guidelines for providing relevant numerical criteria to evaluate compliance with the previously described narrative water quality objectives. The Guidelines are intended for use in estimating the potential hazards to crop production associated with long term use of the particular water being evaluated. The Guidelines divide water quality characteristics as having "No Problem – Increasing Problems – Severe Problems" based on large numbers of field studies and observations, and carefully controlled greenhouse and small plot research. In general, crops sensitive to sodium or chloride are most sensitive to foliar absorption from sprinkler applied water. Bicarbonate has been a problem when fruit crops or nursery crops are sprinkler irrigated during periods of very low humidity and high evaporation. The following table contains numerical criteria adapted from the Guidelines for protection of a range of crops under various circumstances, but the most stringent is not necessarily the concentration that assures no adverse affect on any nonagricultural beneficial use:

Problem and Related Constituent	No Problem	Increasing Problem
Salinity of irrigation water (EC, µmhos/cm)	< 750	750 – 3,000
Salinity of irrigation water (TDS, mg/L)*	< 450	450 – 1,800
Specific Ion Toxicity		
from ROOT absorption		
Sodium (mg/L)	< 69	69 – 207
Chloride (mg/L)	< 142	142 – 355
Boron (mg/L)	< 0.5	0.5 – 2.0
from FOLIAR absorption		
Sodium (mg/L)	< 69	> 69
Chloride (mg/L)	< 106	> 106
Miscellaneous		
NH_4-N (mg/L) (for sensitive crops)	< 5	5 – 30
NO_3-N(mg/L) (for sensitive crops)	< 5	5 – 30
HCO_3 (mg/L) (only with overhead sprinklers)	< 90	90 - 520
pH	normal range = 6.5 – 8.4	

* Assumes an EC:TDS ratio of 0.6:1

60. The existing and anticipated beneficial uses of area groundwater for agricultural supply include irrigation of crops sensitive to salt and boron. According to the 1994 DWR land use map, irrigated crops within five miles of the WWTF consist of alfalfa, almonds, beans, corn, cotton, grain and hay, melons, peaches, plums, tomatoes, and vineyards. Based on climate, soil type, and water

quality, other crops sensitive to salt and boron might be capable of being grown in the area, and changing market conditions could drive a change in cropping patterns, but neither is expected to necessitate greater protection than crops already identified.

61. The Guidelines presents the maximum EC of irrigation water for various crops with respect to percent crop reductions (i.e., 0, 10, 25, and 50). The table below extracts irrigation water EC data (in µmhos/cm) for crops cultivated in the WWTF vicinity (as described in Finding No. 60). As indicated below, zero crop yield reductions are not evident when irrigating all but one crop (bean) with water having an EC of less than 1,000 µmhos/cm.

Crop	0% Reduction	10% Reduction
Beans	700	1,000
Almonds	1,000	1,400
Plums	1,000	1,400
Vineyards	1,000	1,700
Corn (Sweet)	1,100	1,700
Peaches	1,100	1,400
Corn (Forage)	1,200	2,100
Alfalfa	1,300	2,200
Melon (Cantaloupe)	1,500	2,400
Tomatoes	1,700	2,300
Hay (Barley)	4,000	4,900
Cotton	5,100	6,400

62. The Guidelines indicate that boron sensitive crops such as stone fruit and grapes may show injury when irrigated with water with boron ranging from 0.5 to 1.0 mg/L and reduced yield and vigor when irrigated with water with boron ranging from 1.0 to 2.0 mg/L. Bicarbonate has been a problem when fruit crops or nursery crops are sprinkler irrigated during periods of very low humidity and high evaporation.

63. To maintain the beneficial uses of flood irrigation of stone fruit, and sprinkler irrigation of vegetables and fruit, it is necessary that area groundwater have EC values of 1,000 µmhos/cm or less, and low concentrations of chloride, sodium, boron, and bicarbonate.

64. The average EC of WWTF effluent in 2000 was about 430 µmhos/cm above source water EC and the average bicarbonate of WWTF effluent in 2000 was 208 mg/L as $CaCO_3$ (as indicated in Finding No. 6). Despite the Discharger's implementation of an effective salinity source control program, however, the average sodium concentration of WWTF effluent (81 mg/L in 2000) exceeds the 69 mg/L recommended by the Guidelines for sodium sensitive crops (for either root or foliar absorption). Unless other means of sodium control are possible, irrigating at night is one method to mitigate potential adverse effects of sprinkler irrigation of sodium-sensitive crops with water containing elevated levels of sodium and of bicarbonate. Because the groundwater degradation from sodium can be mitigated by reasonable changes in irrigation management practices and because the Discharger has implemented best practicable source control for sodium and bicarbonate alkalinity (a matter that will require further documentation by means of studies

required herein), the consequent degradation from sodium and bicarbonate alkalinity for the time can be found at the present time to be consistent with Resolution No. 68-16.

65. As explained in the attached Information Sheet, this Order implements water quality objectives established as necessary to maintain the existing and anticipated beneficial uses of area groundwater for the production of stone fruit, grape, and other crops that are sensitive to salt (i.e., sodium and chloride), boron, or both. The numerical values reflect the highest tolerable level of quality necessary to sustain sprinkler application, as these are more restrictive than for flood irrigation. These objectives include EC (990 µmhos/cm), and the following expressed as mg/L: chloride (106), sodium (103), boron (0.7), and TDS (560). The Order's nitrogen limit of 10 mg/L is for total nitrogen because all forms of nitrogen can convert to nitrate in groundwater and the nitrate standard is 10 mg/L as nitrogen in drinking water. It is reasonable to conclude that a total nitrogen limit of 10 mg/L is adequately protective of existing and anticipated agricultural land uses. This Order implements a narrative groundwater limitation for taste and odor by prescribing a groundwater limitation of 0.5 mg/L for ammonia. This concentration is based on a European Union drinking water standard. Discharger monitoring data indicate that effluent ammonia concentrations typically exceed 5 mg/L. As such, there is reasonable potential for the discharge to cause violations of the narrative water quality limitation for taste. There are numerous domestic wells in the area encompassed by the groundwater mound created by percolating effluent. The groundwater ammonia limitation is protective of the beneficial uses of area groundwater for domestic supply.

66. California Department of Water Resources standards for the construction and destruction of groundwater wells (hereafter DWR Well Standards), as described in *California Well Standards Bulletin 74-90* (June 1991) and *Water Well Standards: State of California Bulletin 94-81* (December 1981), and any more stringent standards adopted by the Discharger or county pursuant to CWC section 13801, apply to all monitoring wells.

67. The discharge authorized herein and the treatment and storage facilities associated with the discharge of treated municipal wastewater, except for discharges of residual sludge and solid waste, are exempt from the requirements of Title 27, California Code of Regulations (CCR), section 20380 et seq. (hereafter Title 27). The exemption, pursuant to Title 27 CCR section 20090(a), is based on the following:

    a. The waste consists primarily of domestic sewage and treated effluent;

    b. The waste discharge requirements are consistent with water quality objectives; and

    c. The treatment and storage facilities described herein are associated with a municipal wastewater treatment plant.

68. The discharge of stillage waste authorized herein is exempt from the requirements of Title 27. The exemption, pursuant to section 20090(b), is based on the following:

    a. The Board is issuing these waste discharge requirements,

b. These waste discharge requirements implement the Basin Plan and allow discharge only in accordance with the Basin Plan, and

c. The wastewater is not hazardous waste and need not be managed according to Title 22, CCR, Division 4.5, Chapter 11, as a hazardous waste.

69. In the process of crop irrigation, evaporation and crop transpiration remove water from and result in accumulation of residual salts in the soil root zone. These salts would retard or inhibit plant growth except for a fraction of irrigation water applied to leach the harmful salt from the root zone. The leached salts eventually enter groundwater and concentrate above the uppermost layer of the uppermost aquifer. As this is the general condition throughout the agricultural Tulare Lake Basin, water supply wells for all beneficial uses typically are constructed to extract groundwater from below this level.

70. Infiltration from wastewater treatment and wastewater disposal ponds results in wastewater intersecting and accumulating on and in the uppermost layer of the uppermost groundwater until dispersed horizontally and vertically into the main mass of the aquifer. Compliance with the various water quality objectives necessary to protect present and future beneficial uses within the aquifer should be determined by water representative of the uppermost zones. Site-specific studies to determine the appropriate zones and geographical locations should be conducted by the Discharger subject to Executive Officer approval.

TITLE 22

71. Domestic wastewater contains pathogens harmful to humans that are typically measured by means of total and fecal coliform, as indicator organisms. The California Department of Health Services (DHS) has primary statewide responsibility for protecting public health. In 1977, DHS established statewide criteria in Title 22, California Code of Regulations (CCR), section 60301 et seq., (hereafter Title 22) for the use of recycled water and has developed guidelines for specific uses. Revisions of the water recycling criteria in Title 22 became effective on 2 December 2000. The revised Title 22 expands the range of allowable uses of recycled water, establishes criteria for these uses, and clarifies some of the ambiguity contained in the previous regulations.

72. The 1988 Memorandum of Agreement (MOA) between DHS and the State Water Resources Control Board on the use of recycled water establishes basic principles relative to the agencies and the regional boards. Under terms of the MOA, the Board implements Title 22 and DHS recommendations for the protection of public health. In addition, the MOA allocates primary areas of responsibility and authority between these agencies, and provides for methods and mechanisms necessary to assure ongoing, continuous future coordination of activities relative to the use of recycled water in California.

73. Title 22 requires recyclers of treated municipal wastewater to submit an engineering report detailing the use of recycled water, contingency plans, and safeguards. The Discharger submitted an engineering report to DHS pursuant to Title 22 for on-site water reclamation operations on

1 February 2001. The DHS commented on the Discharger's Title 22 Engineering Report by letter dated 22 March 2001. The Discharger is in the process of responding to these comments.

74. By letter dated 10 May 2001, DHS recommended that the Discharger expedite efforts to expand recycling and curtail discharge to groundwater. The DHS recommends that the Board require the Discharger to (a) assess the current status of all private and domestic wells that exist within the 25-square-mile area described in Finding No. 9, (b) monitor domestic supply wells within this area for contaminants to assure they are producing safe water for domestic use, and (c) conduct a comprehensive study to assess the fate and effects of the discharge on groundwater.

75. By letter dated 24 August 2001, DHS further recommended that the Board require the Discharger, in collaboration with FID, to (a) identify the types of crops grown in the area served by FID canals that receive groundwater extracted by the Operator's reclamation wells and (b) provide information on the dilution of the extracted groundwater with fresh water prior to irrigation application. If food crops are found to be grown in the subject area, DHS recommends the Discharger be required to evaluate the degree of filtration and virus removal provided. The DHS also recommended the Discharger provide continuous turbidity monitoring of representative reclamation wells for at least one year.

DEGRADATION

76. State Water Resources Control Board (SWRCB) Resolution No. 68-16 (hereafter Resolution 68-16 or the "Antidegradation" Policy) requires the Board in regulating the discharge of waste to maintain high quality waters of the state until it is demonstrated that any change in quality will be consistent with maximum benefit to the people of the State, will not unreasonably affect beneficial uses, and will not result in water quality less than that described in the Board's policies (e.g., quality that exceeds water quality objectives).

77. The Basin Plan identifies the greatest long-term problem facing the entire Tulare Lake Basin as the increase in salinity in groundwater, which has accelerated due to the intensive use of soil and water resources by irrigated agriculture. The Basin Plan recognizes that degradation is unavoidable until a valley wide drain is constructed to carry salts out of the basin. Until the drain is available, the Basin Plan describes numerous salt management recommendations and requirements. The later includes the requirement that discharges to land from wastewater treatment facilities not have an EC greater than source water plus 500 μmhos/cm. Accordingly, the Basin Plan allows for salinity degradation and focuses on controlling the rate of increase.

78. The Board finds that some degradation of groundwater beneath the WWTF and reclamation and disposal areas is consistent with Resolution 68-16 provided that:

- the degradation is confined to a specified area
- the Discharger minimizes the degradation by fully implementing, regularly maintaining, and optimally operating best practicable treatment and control (BPTC) measures

- the degradation is limited to waste constituents typically encountered in municipal wastewater as specified in the groundwater limitations in this Order
- the degradation does not result in water quality less than that prescribed in the Basin Plan

79. Some degradation of groundwater by some of the typical waste constituents released with discharge from a municipal wastewater utility after effective source control, treatment, and control is consistent with maximum benefit to the people of California. The technology, energy, water recycling, and waste management advantages of municipal utility service for the Cities of Fresno and Clovis far exceed any benefits derived from a metropolitan area otherwise reliant on numerous concentrated individual wastewater systems, and the impact on water quality will be substantially less. When allowed, the degree of degradation allowed depends upon many factors (i.e., background water quality, the waste constituent, the beneficial uses and most stringent water quality objective, source control measures, waste constituent treatability).

80. The WWTF described in Finding No. 2 provides treatment and control of the discharge that incorporates:

- technology for secondary treatment of municipal wastewater
- biosolids handling and treatment for reuse
- constituent attenuation within the vadose zone
- concrete treatment structures
- recycling of wastewater on cropped properties
- a pretreatment program that includes effective salinity source control
- an active inflow and infiltration (I/I) rehabilitation program
- a capital recovery fund
- an operation and maintenance (O&M) manual
- staffing to assure proper operation and maintenance

81. Discharger practices that may not constitute BPTC as used in Resolution 68-16 include the reliance of effluent disposal by evaporation and percolation. The impact to area groundwater caused by this practice is mitigated to some degree by the Operator's discharge to FID canals of about 15,000 af/yr of groundwater extracted from a network of reclamation wells situated throughout the disposal pond area. However, as indicated in Finding No. 12, the concentrations of dissolved manganese in groundwater extracted from several reclamation wells exceed the water quality objective of 0.05 mg/L (as referenced in Finding No. 58). Neither WWTF effluent nor groundwater sampled from shallow monitoring wells exhibit such high dissolved manganese concentrations. Further, the Discharger's stillage disposal operation appears to have degraded and polluted groundwater underlying SS-1 (Finding No. 48). The existing impacts on groundwater and the appropriate level of degradation that complies with Resolution 68-16 has not been evaluated.

82. This Order, therefore, establishes schedules of tasks to evaluate BPTC for each treatment, storage, and disposal component of the WWTF and to characterize groundwater for all waste constituents.

83. This Order establishes groundwater limitations that will not unreasonably threaten present and anticipated beneficial uses or result in groundwater quality that exceeds water quality objectives set forth in the Basin Plan. This means that where the stringency of the limitations for the same waste constituent differs according to beneficial use, the most stringent applies as the governing limitation for that waste constituent. This Order contains tasks for assuring that BPTC and the highest water quality consistent with the maximum benefit to the people of the State will be achieved. Accordingly, the discharge is consistent with the antidegradation provisions of Resolution 68-16. Based on the results of the scheduled tasks, the Board may reopen this Order to reconsider groundwater limitations and other requirements to comply with Resolution 68-16.

CEQA FINDINGS

84. The City of Fresno certified a final environmental impact report (EIR) dated 31 October 1995 for an expansion in WWTF treatment and disposal capacity in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq.) and the State CEQA Guidelines. The expansion project includes (a) increasing Plant 1 treatment capacity to 80 mgd to accommodate urban growth in the Discharger's service area, (b) discontinuing use of Plant 2 to improve the WWTF's overall air emissions, reliability, and operations, and (c) constructing an additional 600 acres of infiltration basins (i.e., effluent disposal ponds) to provide disposal capacity for the increased flows and to comply with Board-prescribed pond freeboard requirements. The EIR estimates that, at full build out, the project would discharge an additional 11,200 af/yr of effluent to area groundwater. While the EIR states that the infiltration of effluent over the years has caused concentrations in groundwater of TDS, EC, and sodium to increase, the EIR states that the project would not affect public or private water supplies. The EIR identifies the project's impact on groundwater as temporary, as the City "shall commit to developing a plan for the reclamation of water infiltrated at the plant by 1997." The EIR further states that the City of Fresno "shall continue to develop and implement a reuse program for its treated wastewater to reduce the need for future infiltration basins. The EIR indicates the City "is also developing a reuse program for its treated wastewater to alleviate groundwater conditions under the treatment plant…[to]…mitigate the cumulative effects to water resources to a level of less than significant." The City's proposed mitigation measure must result in implementation of additional projects that recycle a total of at least 11,200 af/yr, but these projects have yet to be realized.

85. The project certified by the City of Fresno as described in the EIR differs from the project characterized in the Discharger's 31 December 1996 Report of Waste of Discharge (RWD). The RWD describes a project in which the City would increase Plant 1's treatment capacity to 88 mgd, continue use of Plant 2, and construct an additional 600 acres of disposal ponds. The increase in amount of effluent percolating from the project described in the RWD is nearly 25,000 af/yr, not the 11,200 af/yr identified in the EIR. Since submitting the RWD, the Discharger indicates that (a) it plans, as necessary, to treat some industrial flows in Plant 2 prior to full treatment in Plant 1; (b) the 80 mgd specified in the EIR represents the annual monthly average daily discharge flow; and (c) the EIR did not accurately reflect that Plant 1 would be designed, constructed, and operated

to treat a maximum monthly average daily discharge flow of 88 mgd. The additional 8 mgd short-term treatment capacity accommodates seasonal peaks from food-processing industries that generally occur in September.

86. As described in Finding No. 16, Calpine proposes to recycle up to 7,000 af/yr of effluent extracted by reclamation wells. If Calpine completes its project utilizing extracted effluent, the Discharger will still need to implement reuse projects for an additional 4,200 af/yr to accomplish its goal of reusing the 11,200 af/yr discharge flow to groundwater resulting from the WWTF expansion project.

87. The Board, as a responsible agency under CEQA, has reviewed the City's EIR for the project relative to impacts to groundwater quality and concurs that the increased percolation will have a significant effect on water quality by contributing to increases in salts and increasing the already dominant groundwater mound and affected geographic area. Further, the Board concurs that the City's mitigation measure of implementing reuse projects to offset the project's increase in flow (i.e., 11,200 af/yr) will mitigate the project's potential incremental impact, but observes that the measure has yet to be implemented. Given that the full increase will be reached in 2008, the stated commitment of the City to mitigate, and applicable reclamation policies, full mitigation by 2004 is not unreasonable. Regardless, the scale of the reuse program is not sufficient to mitigate the same adverse water quality impacts occurring from the pre-project discharge, which must be evaluated by the Board in accordance with Resolution No. 68-16. The following provisions mitigate or avoid the adverse impact of the project on water quality: (a) annual monthly average daily discharge flow is limited to 80 mgd and maximum monthly average daily discharge flow is limited to 88 mgd (WWTF Discharge Specification B.1); reuse projects must recycle 11,200 af/yr by 2004 (Provision H.15); (c) water quality of private domestic and agricultural wells within the influence of the discharge must be evaluated (Provision H.18); and treatment and control practices must be evaluated along with consequent degradation of groundwater for consistency with Resolution No. 68-16 (Provisions H.12, H13, and H14).

88. On 25 March 1998, the City of Fresno adopted a negative declaration (Environmental Assessment 98-03), in accordance with CEQA and State CEQA Guidelines for the discharge of stillage to the 50-acre stillage disposal site (SS-2) adjacent to the existing 95-acre stillage disposal site (SS-1). Mitigation measures 3 – 15 are identical to Stillage Discharge Specifications C.1 – C.13 from WDRs Order No. 96-054. The negative declaration does not adequately mitigate the potentially significant effect on groundwater from accumulation of nitrogen in stillage disposal area soils, nor adequately monitor the fate of waste constituents that percolate through the soil profile. The following provisions mitigate or avoid the adverse impact of the project on water quality: (a) planting and harvesting of crops will reduce the nitrogen content in soils (Stillage Disposal Specification D.1) and (b) vadose zone monitoring for waste constituents and their decomposition by-products will provide adequate monitoring (Monitoring and Reporting Program).

GENERAL FINDINGS

89. Section 13263 of the CWC authorizes the Board to prescribe discharge requirements that implement the Basin Plan and other applicable plans and take into consideration other factors,

including the factors in CWC section 13241, which includes economic considerations. The State Water Resources Control Board, however, has held that a regional board need not specifically address section 13241 factors when implementing existing water quality objectives in waste discharge requirements because the factors were already considered in adopting water quality objectives. These waste discharge requirements implement adopted water quality objectives. Therefore, no additional analysis of the section 13241 factors is required.

90. Pursuant to CWC section 13263(g), discharge is a privilege, not a right, and adoption of this Order does not create a vested right to continue the discharge.

91. California Water Code (CWC) section 13267 authorizes the Board to require anyone who discharges waste that could affect the quality of water, as the Discharger does, to furnish, under penalty of perjury, technical and monitoring program reports.

92. The Board considered all the above and the supplemental information and details in the attached Information Sheet, which is incorporated by reference herein, in establishing the following conditions of discharge.

93. The Board has notified the Discharger and interested agencies and persons of its intent to prescribe waste discharge requirements for this discharge and has provided them with an opportunity for a public hearing and an opportunity to submit their written views and recommendations.

94. The Board, in a public meeting, heard and considered all comments pertaining to the discharge.

IT IS HEREBY ORDERED that Order No. 96-054 is rescinded and that, pursuant to CWC sections 13263 and 13267, the Cities of Fresno and Clovis, their agents, successors, and assigns, in order to meet the provisions contained in the Clean Water Act and Division 7 of the California Water Code and regulations adopted there under, shall comply with the following:

A. Discharge Prohibitions

1. Discharge of wastes from the WWTF and of stillage from the Stillage Site to surface waters or surface water drainage courses is prohibited.

2. Discharge of waste classified as “hazardous” as defined in section 2521(a) of Title 23, CCR, section 2510 et seq., or “designated” as defined in section 13173 of the California Water Code, is prohibited.

3. Bypass or overflow of untreated or partially treated waste from the WWTF to disposal ponds, to reclamation areas, or to the Stillage Site, is prohibited.

4. By **31 December 2003** discharge of stillage to SS-1 is prohibited.

5. Discharge of stillage to areas within or beyond the WWTF property other than to the Stillage Site (as defined in Finding No. 39) without Board-adopted waste discharge requirements or waiver from said requirements is prohibited.
6. Discharge of effluent to areas outside of the WWTF property boundary without Board-adopted water reclamation requirements or waiver from said requirements is prohibited.

7. Grazing of animals producing milk for human consumption within areas irrigated with effluent is prohibited.

B. WWTF Discharge Specifications

1. The discharge flow from WWTF (i.e., the combined flow from Plant 1 and Plant 2 when in service and discharging directly to disposal ponds) shall not exceed:

   a. an annual monthly average daily discharge flow of 80 mgd; and

   b. a maximum monthly average daily discharge flow of 88 mgd.

2. The discharge from Plant 1 (including that from Plant 2 when in service and discharging directly to disposal ponds) shall not exceed the following limits:

Constituent	Units	Monthly Average[1]	Daily Maximum
BOD_5[2]	mg/L	40	80
Total Suspended Solids (TSS)	mg/L	40	80
Settleable Solids	mL/L	0.2	0.5

[1] Arithmetic mean of measurements made during the month
[2] Five-day, 20° Celsius biochemical oxygen demand

3. The arithmetic mean of BOD_5 and of total suspended solids in effluent samples collected over a monthly period shall not exceed 20 percent of the arithmetic mean of the values for influent samples collected at approximately the same times during the same period (80 percent removal).

4. The monthly average EC of the discharge, shall not exceed the flow-weighted average EC of the source water plus 500 µmhos/cm, or a maximum of 900 µmhos/cm, whichever is less. The flow-weighted average for the source water shall be a moving average for the most recent twelve months.

5. The discharge shall not have a pH less than 6.0 or greater than 9.0.

6. Objectionable odors shall not be perceivable beyond the limits of the WWTF property at an intensity that creates or threatens to create nuisance conditions.

7. Notwithstanding WWTF Discharge Specifications B.1 through B.6, no waste constituent shall be released or discharged, or placed where it will be released or discharged, in a concentration or in a mass that causes violation of Groundwater Limitations.

C. Disposal Pond Specifications

1. The dissolved oxygen content in the upper zone (1 foot) of effluent in disposal ponds shall not be less than 1.0 mg/L.

2. Disposal ponds shall be managed to prevent breeding of mosquitoes. In particular:

   a. An erosion control program should assure that small coves and irregularities are not created around the perimeter of the water surface.

   b. Weeds shall be minimized through control of water depth, harvesting, or herbicides.

   c. Dead algae, vegetation, and debris shall not accumulate on the water surface.

   d. Vegetation management operations in areas in which nesting birds have been observed shall be carried out either before or after, but not during, the **1 April to 30 June** bird nesting season.

3. Public contact with effluent shall be precluded through such means as fences, signs, or acceptable alternatives. Signs shall be as shown in Attachment D, a part of this Order.

4. Disposal ponds shall have sufficient capacity to accommodate allowable discharge flow and design seasonal precipitation and ancillary inflow and infiltration, excluding effluent discharged as authorized by valid requirements to reclamation areas and to off-site effluent storage and disposal areas. Design seasonal precipitation shall be based on total annual precipitation using a return period of 100 years, distributed monthly in accordance with historical rainfall patterns. Freeboard shall never be less than two feet (measured vertically) or a lesser freeboard if certified in writing by a registered civil engineer as adequate to prevent overtopping, overflows, or levee failures.

5. On or about **15 November** of each year, available disposal pond storage capacity shall at least equal the volume necessary to comply with Disposal Pond Specification C.4.

D. Stillage Discharge Specifications

1. **Effective immediately,** the Discharger shall commence regularly planting and harvesting crops in the Stillage Site to reduce the nitrogen content in stillage disposal area soils.

2. Objectionable odors originating from stillage disposal areas shall not be perceivable beyond the limits of the WWTF property boundary.

3. The maximum daily stillage discharge shall not exceed the following limits:

Period of Year	Maximum Discharge (mgd)
1 May to 30 Sep	1.36
1 Oct to 30 Nov	0.77
1 Dec to Apr 30	0.46

4. Stillage shall be discharged to land in long narrow checks or basins. The check or basin surface should be leveled within 0.1 foot per 100 feet and be free of potholes.

5. At the inlet of the checks, stillage shall be distributed using splash plates or other devices to prevent deep holes from forming.

6. The depth of applied stillage shall not exceed the following in any one application:

Period of Year	Maximum Depth (inches)
1 May to 30 Sep	3.7
1 Oct to 30 Nov	3.0
1 Dec to Apr 30	2.5

7. Standing stillage shall not be present 24 hours after application has ceased.

8. Checks receiving stillage applications shall be allowed to dry for at least the following period before re-application of waste:

Period of Year	Drying Time (days)
1 May to 30 Sep	6
1 Oct to 30 Nov	9
1 Dec to Apr 30	13

9. Land area used for disposal shall equal or exceed the following:

Period of Year	Land Area (acres per 100,000 gpd of stillage waste)
1 May to 30 Sep	6
1 Oct to 30 Nov	9
1 Dec to Apr 30	13

10. Once applied stillage has dried, the Discharger shall remove leathers prior to re-application. The Discharger shall store collected leathers in a manner that precludes infiltration of waste constituents into soils in a mass or concentration that will violate Groundwater Limitations. Further, the Discharger shall dispose of collected leathers not recycled as a soil amendment

in a manner that precludes infiltration of waste constituents into soils in a mass or concentration that will violate Groundwater Limitations.

11. The resulting effect of the stillage discharge on soil pH shall be such as not to exceed the buffering capacity of the soil profile.

12. Soil depth in the Stillage Site shall be 10 feet or greater above unbroken hardpan, groundwater, or impermeable soils. There shall be no unripped hardpan within the top 10 feet of the soil profile.

E. Sludge Specifications

Sludge in this document means the solid, semisolid, and liquid residues removed during primary, secondary, or advanced wastewater treatment processes. Solid waste refers to grit and screening material generated during preliminary treatment. Residual sludge means sludge that will not be subject to further treatment at the WWTF. Biosolids refers to sludge that has undergone sufficient treatment and testing to qualify for reuse pursuant to federal and state regulations as a soil amendment for agriculture, silviculture, horticulture, and land reclamation.

1. Sludge and solid waste shall be removed from screens, sumps, ponds, clarifiers, etc. as needed to ensure optimal plant operation.

2. Treatment and storage of sludge generated by the WWTF and solids from the Operator's stillage disposal operation (i.e., leathers) shall be confined to the WWTF property and conducted in a manner that precludes infiltration of waste constituents into soils in a mass or concentration that will violate Groundwater Limitations.

3. Any storage of residual sludge, solid waste (including stillage leathers), and biosolids on property of the WWTF shall be temporary and controlled and contained in a manner that minimizes leachate formation and precludes infiltration of waste constituents into soils in a mass or concentration that will violate Groundwater Limitations.

4. Residual sludge, biosolids, and solid waste shall be disposed of in a manner approved by the Executive Officer and consistent with Title 27. Removal for further treatment, disposal, or reuse at sites (i.e., landfill, WWTF, composting site, soil amendment sites) operated in accordance with valid waste discharge requirements issued by a regional water quality control board will satisfy this specification.

5. Use of biosolids as a soil amendment shall comply with General Biosolids Order (State Water Resources Control Board Water Quality Order No. 2000-10-DWQ, *General Waste Discharge Requirements for the Discharge of Biosolids to Land for Use as a Soil Amendment in Agricultural, Silvicultural, Horticultural, and Land Reclamation Activities*). The Discharger must obtain a "Notice of Applicability" of the General Biosolids Order from the Executive Officer prior to discharge of biosolids to any site. Alternatively, use of biosolids

as a soil amendment shall comply with valid waste discharge requirements issued by a regional water quality control board.

6. Use and disposal of biosolids should comply with the self-implementing federal regulations of 40 CFR 503, which are subject to enforcement by the U.S. Environmental Protection Agency (EPA), not the Board. If during the life of this Order the State accepts primacy for implementation of 40 CFR 503, the Board may also initiate enforcement where appropriate.

F. Reclamation Specifications

The following specifications apply to reclamation areas under the control of the Discharger within the WWTF property boundary. Other reclamation sites are covered by separate waste reclamation requirements.

1. Recycled water (i.e., effluent) shall remain within the Discharger's on-site reclamation areas. Recycled water provided off-site shall only be provided to users that hold Board-adopted water reclamation requirements, or users who have obtained a waiver of reclamation requirements from the Board.

2. Use of recycled water shall be limited to flood irrigation of fodder, fiber, seed crops, and of crops such as wine grapes that undergo extensive commercial, physical, or chemical processing before human consumption, and shall comply with the provisions of Title 22.

3. The Discharger shall maintain the following setback distances from areas irrigated with recycled water:

Setback Distance (feet)	To
25	Property Line
30	Public Roads
50	Drainage courses
100	Irrigation wells
150	Domestic wells

4. No physical connection shall exist between recycled water piping and any domestic water supply or domestic well, or between recycled water piping and any irrigation well that does not have an air gap or reduced pressure principle device.

5. The perimeter of reclamation areas shall be graded to prevent ponding along public roads or other public areas.
6. Areas irrigated with recycled water shall be managed to prevent breeding of mosquitoes. More specifically:

    a. All applied irrigation water must infiltrate completely within a 48-hour period.

b. Ditches not serving as wildlife habitat should be maintained free of emergent, marginal, and floating vegetation.

c. Low-pressure and unpressurized pipelines and ditches accessible to mosquitoes shall not be used to store recycled water.

7. Recycled water shall be managed to minimize runoff onto adjacent properties not owned or controlled by the Discharger.

8. Recycled water shall be managed to minimize contact with workers.

9. If recycled water is used for construction purposes, it shall comply with the most current edition of *Guidelines for Use of Reclaimed Water for Construction Purposes*. Other uses of recycled water not specifically authorized herein shall be subject to the approval of the Executive Officer and shall comply with Title 22.

10. Public contact with recycled water shall be precluded through such means as fences or acceptable alternatives. Signs with proper wording (shown below) of a size no less than four inches high by eight inches wide shall be placed at all areas of public access and around the perimeter of all areas used for effluent disposal or conveyance to alert the public of the use of recycled water. All signs shall display an international symbol similar to that shown in Attachment D, a part of this Order, and present the following wording:

"RECYCLED WATER—DO NOT DRINK"

"AGUA DE DESPERDICIO RECLAMADA—POR FAVOR NO TOME"

11. Reclamation of WWTF effluent shall be at reasonable agronomic rates considering the crop, soil, climate, and irrigation management plan. The annual nutrient loading of reclamation areas, including the nutritive value of organic and chemical fertilizers and of the recycled water, shall not exceed the crop demand.

G. Groundwater Limitations

Release of waste constituents from any storage, treatment, or disposal component associated with the WWTF shall not, in combination with other sources of the waste constituents, cause groundwater under and beyond the WWTF and discharge area(s) to exceed any of the following:

1. Constituent concentrations specified below or natural background concentration, whichever is greater:

a. Total coliform organisms of 2.2 MPN/100 mL.

b. Total nitrogen in excess of 10 mg/L.

c. For constituents identified in Title 22 (as described in Finding No. 58), the MCLs quantified therein.

2. Constituent concentrations listed below or natural background concentration, whichever is greater:

Constituent	Units	Limitation
Boron	mg/L	0.7
Chloride	mg/L	106
EC	µmhos/cm	990
Sodium	mg/L	103
Total Dissolved Solids[1]	mg/L	560

[1] A cumulative constituent comprised of dissolved matter consisting mainly of inorganic salts, small amounts of organic matter, and dissolved gases [e.g., ammonia, bicarbonate alkalinity, boron, calcium, chloride, copper, iron, magnesium, manganese, nitrate, phosphorus, potassium, sodium, silica, sulfate, total alkalinity]

3. Taste- or odor-producing substances in concentrations that cause nuisance or adversely affect beneficial uses, including but not limited to ammonia (as N) in excess of 0.5 mg/L, or natural background, whichever is greater.

4. Constituent concentrations identified as follows or natural background concentration, whichever is greater: toxic substances in concentrations that produce detrimental physiological responses in human, plant, or animal, or aquatic life; or chemical constituents and pesticides in concentrations that adversely affect beneficial uses.

H. Provisions

1. For purposes of day-to-day communication regarding compliance with terms of this Order, the Board will communicate directly with the City of Fresno. Correspondence and notifications between the Board and City of Fresno shall be as if to or from all parties identified in Finding No. 1 as "Discharger."

2. The Discharger shall comply with the *Standard Provisions and Reporting Requirements for Waste Discharge Requirements*, dated 1 March 1991, which are attached hereto and by reference a part of this Order. This attachment and its individual paragraphs are commonly referenced as Standard Provision(s).

3. The Discharger shall comply with Monitoring and Reporting Program No. 5-01-254 that is part of this Order, and any revisions thereto as ordered by the Executive Officer.

4. The Discharger shall submit to the Board on or before each report due date the specified document or, if an action is specified, a written report detailing evidence of compliance with the date and task. If noncompliance is being reported, the reasons for such noncompliance shall be stated, plus an estimate of the date when the Discharger will be in compliance. The Discharger shall notify the Board by letter when it returns to compliance with the time schedule.

5. **By 15 April 2002**, the Discharger shall submit a technical report describing a work plan for monitoring its stillage disposal operation. The technical report shall at a minimum describe:

   a. The methods the Discharger will employ for determining the daily quantity of stillage discharge and the amount of acreage covered by the discharge on a daily basis.

   b. Alternatives for disposal should the Discharger be in threatened violation of any conditions of this Order.

   c. The location, depths, and number of soil sampling points.

   d. Vadose zone monitoring procedures, specifically:

      i) The location, depths, and number of vadose zone liquid sampling points.

      ii) The method for collecting samples of liquid percolating through the soil.

   The technical report must be prepared by a qualified professional such as a California registered civil engineer, agricultural engineer, or a certified soil scientist experienced in land treatment of food processing wastewater. The Discharger shall implement the Stillage Site monitoring program within **30 days** following Executive Officer approval of the technical report.

6. **By 15 April 2002**, the Discharger shall submit a sludge management plan that satisfies the information requirements of Attachment E, "Information Needs For Sludge Management Plan." A California registered civil engineer experienced in sludge disposal must prepare and certify the sludge management plan. Following written approval of the sludge management plan from the Executive Officer, this Provision shall be considered satisfied.

7. **By 15 July 2002**, the Discharger shall complete a hydrogeologic investigation within the area affected and potentially affected by the WWTF and submit a technical report to the Executive Officer. The technical report, which shall be prepared and professionally certified by a geologist registered to practice in California, shall describe the underlying geology, existing wells (active and otherwise), local well construction practices and standards, well restrictions, and hydrogeology. The report shall recommend representative monitoring zones of the uppermost aquifer with consideration given to the Discharger's existing data and provide a detailed evaluation of the existing monitoring well network. The recommendations shall be reviewed and approved as appropriate by the Executive Officer.

8. Within 210 days following Executive Officer approval of representative monitoring zones in accordance with **Provision H.7**, the Discharger shall submit a technical report proposing a modified groundwater monitoring network. The technical report shall consist of a Monitoring Well Installation Work Plan for a network that satisfies Attachment F, "Standard Monitoring Well Provisions for Waste Discharge Requirements." The network shall include one or more background wells and sufficient number of wells to evaluate performance of BPTC measures and to determine compliance with this Order's Groundwater Limitations. These include monitoring wells immediately downgradient of components that do or may release waste constituents to groundwater (e.g., disposal ponds, Stillage Site, former sludge drying bed area, biosolids storage areas). Every monitoring well shall comply with applicable Well Standards. Monitoring of wells constructed to yield representative samples from approved monitoring zones within the uppermost aquifer in accordance with this Order's Monitoring and Reporting Program shall comprise the representative zone monitoring program. Implementation of the Monitoring Well Installation Work Plan shall be subject to the prior approval of the Executive Officer.

9. The Discharger shall comply with the following compliance schedule in implementing the groundwater monitoring network approved by the Executive Officer in Provision H.8:

Task	Compliance Date
a. Implement Monitoring Well Installation Work Plan	180 days following Work Plan approval by Executive Officer
b. Complete Monitoring Well Installation	120 days following Work Plan implementation
c. Commence Groundwater Monitoring	30 days following completion of task 9.b
d. Submit Monitoring Well Installation Report of Results	60 days following completion of task 9.b
e. Submit technical report that characterizes natural background water quality in approved representative monitoring zones for all monitored constituents	365 days following completion of task 9.d

Technical reports submitted pursuant to this Provision shall be prepared and certified by a California registered civil engineer or geologist, and are subject to Executive Officer approval.

10. Compliance with Groundwater Limitations will be evaluated based on the approved representative zone monitoring program following completion of Provision H.9, task e. Should the Discharger fail to comply with the schedule to characterize natural background groundwater quality at the approved monitoring zone(s) by the date specified in Provision H.9, task e, the Board shall not consider the lack of natural background characterization as sufficient defense to enforcement for violations of Groundwater Limitations G.1 through G.4.

11. **By 15 October 2002**, the Discharger shall submit a written work plan in the form of a technical report that sets forth a schedule for a systematic and comprehensive technical evaluation of each component of the WWTF's waste treatment and control to determine for each waste constituent best practicable treatment and control as used in Resolution 68-16. The technical report shall contain a preliminary evaluation of each component and propose a time schedule for completing the comprehensive technical evaluation. The technical report shall be prepared and certified by a California registered civil engineer. The schedule to complete all comprehensive technical evaluations shall be as short as practicable, and shall not exceed two years. Upon written determination of adequacy by the Executive Officer of the technical report, this Provision shall be considered satisfied.

12. **By two years from satisfaction of Provision H.11**, the written comprehensive technical evaluation shall be submitted with the Discharger's written recommendations for any WWTF modifications (e.g., component upgrade and retrofit) and/or operational modifications that are necessary to ensure BPTC. Comprehensive technical evaluations shall be prepared and certified by a California registered civil engineer. The proposed schedule for modifications shall be identified. The schedule shall be as short as practicable but in no case shall completion of the necessary improvement exceed four years past the Executive Officer's determination of the adequacy of the comprehensive technical evaluation submitted pursuant to this provision unless the schedule is reviewed and specifically approved by the Board. The adequacy of the component evaluation, recommended improvements, and schedule are subject to the Executive Officer's review and determination.

13. The groundwater limitations set forth in this Order are not final and not an entitlement. **By 15 June 2005**, the Discharger shall submit a technical report that proposes specific numeric groundwater limitations for each waste constituent that reflects full implementation of BPTC and compliance with the most stringent applicable water quality objectives for that waste constituent. The report shall describe how these were determined considering actual data from monitoring wells comprising the approved representative zone monitoring program, impact reductions through full implementation of BPTC, reasonable growth, the factors in Water Code section 13241, State Water Resources Control Board Resolution No. 68-16, the Basin Plan, etc. The most stringent applicable water quality objective shall be interpreted based on the Regional Board policy entitled Application of Water Quality Objectives on pages IV-21 through IV-23 of the Basin Plan. Where the stringency of a proposed water quality objective can vary according to land use, the Discharger must provide documentation from similar third party government authorities that there is no potential for the more sensitive land use to occur, and the reason, if it wishes the Board to consider a proposed water quality objective, that provides protection for only less sensitive uses. The Board will consider the documentation and recommendation for the governing water quality objective, and it is this accepted value that will establish the maximum permissible groundwater limitation the Board will consider in Phase 2 evaluation. The Discharger may, at its discretion, submit results of a validated groundwater model or other hydrogeologic information to support its proposal.

14. Upon completion of tasks set forth in Provisions H.12 and H.13, the Board shall consider the evidence provided and make a determination regarding (a) whether the Discharger has justified BPTC and (b) the appropriate final numeric groundwater limitations that comply with Resolution 68-16.

15. The Discharger shall expand its WWTF effluent reuse operation to recycle an additional 11,200 af/yr over that recycled currently (as described in Finding Nos. 8 and 12). This amount may include the 7,000 af/yr reuse project proposed by Calpine (described in Finding No. 16). The Discharger shall comply with the following time schedule in implementing additional reuse project(s):

Task	Compliance Date
a. Submit technical report and implementation schedule	**15 October 2002**
b. Submit Title 22 Engineering Report to DHS	**90 days** following Executive Officer approval of Task 15.a
c. Comply with CEQA	**270 days** following completion of Task 15.b
d. Submit Report of Water Reclamation for additional reuse project(s)	**60 days** following completion of Task 15.c
e. Implement additional reuse project(s)	**110 days** following completion of Task 15.d

Reports submitted pursuant to Tasks a, b, d of this Provision shall be prepared and certified by a California registered civil engineer.

16. **By 1 April 2002**, the Discharger, in collaboration with FID, shall submit a technical report that (a) identifies the types and acreages of crops in the FID service area that receives groundwater extracted from the Operator's reclamation wells and (b) provides information on the dilution of the extracted groundwater with fresh water prior to irrigation. The crop identification should provide information on fluctuations in cropping patters in the subject area. The dilution information should provide and interpret historic flow data of FID surface water deliveries to cropland receiving extracted groundwater for a range of water year types (e.g., drought, normal, and wet). The Discharger shall submit a copy of the technical report to DHS. Upon written approval of the Executive Officer of the technical report, this Provision shall be considered satisfied.

17. **By 15 February 2002,** the Discharger shall submit a technical report for Executive Officer approval that describes a work plan and implementation schedule for installing and operating continuous turbidity monitoring devices on representative reclamation wells for at least a one-year period. The Discharger shall submit a copy of the technical report to DHS. The Discharger shall implement continuous turbidity monitoring on approved representative

monitoring wells prior to the startup of reclamation well discharge in the spring 2002 irrigation season.

18. **By 15 July 2002**, the Discharger shall submit a technical report describing a work plan and implementation schedule for sampling a representative number of private domestic and agricultural wells in the 25-square-mile area surrounding and downgradient of the WWTF (as described in Finding No. 9). The technical report shall, at a minimum, include:

    a. A map depicting the location of all individual and agricultural wells in the subject area.

    b. A map depicting the land use within the subject area.

    c. A map and listing of individual and agricultural wells proposed for sampling, and a justification of why each well was selected for sampling.

    d. The driller's log for the selected wells.

    e. A proposed list of monitored constituents, including, at a minimum, the following: TDS, EC, general minerals (defined in the Monitoring and Reporting Program), nitrogen compounds (i.e., nitrate, nitrite, ammonia, organic nitrogen), total organic carbon, endocrine disrupting compounds, and pharmaceuticals.

    f. A thorough description of the sampling and testing protocol.

    A California registered civil engineer or geologist shall certify the technical report. The Discharger shall submit a copy of the technical report to DHS. Within **30 days** following Executive Officer written approval of the technical report, the Discharger shall commence sampling of approved domestic and agricultural wells and continue sampling in accordance with the approved work plan. Upon evaluation of submitted data, the Executive Officer may require the Discharger to sample additional wells.

19. **By 15 July 2002**, the Discharger shall submit a technical report describing a work plan and implementation schedule for an evaluation of the degree of soil treatment provided by the current recharge and extraction operation. The evaluation shall include, at a minimum, a determination of the level of filtration and virus removal treatment provided. A California registered civil engineer or geologist shall certify the technical report. The Discharger shall submit a copy of the technical report to DHS. Within **30 days** following Executive Officer written approval of the technical report, the Discharger shall implement the work plan. Within **120 days** following the work plan implementation, the Discharger shall submit a technical report describing the results of the evaluation. The Discharger shall submit a copy of the technical report to DHS. Following written acceptance of the technical report by the Executive Officer, this Provision will be considered satisfied.

20. **By 1 March 2002,** the Discharger shall submit a report for Executive Officer approval outlining EPA test methods and detection limits for priority pollutants listed in Title 40, Code of Federal Regulations, Part 131.

21. By **15 March 2002**, the Discharger shall submit a technical report that shows whether the disposal ponds have adequate capacity for the 100-year annual rainfall at design flow of 80 mgd. The technical report shall also include a nutrient balance that estimates the amount of nitrogen (tons and lbs/acre) that will percolate annually to groundwater underlying the disposal ponds at the design flow. A California registered civil engineer must oversee and certify the technical report. Following written approval of the technical report from the Executive Officer, this Provision shall be considered satisfied.

22. At least **90 days prior** to termination or expiration of any lease, contract, or agreement involving the Stillage Site, reclamation areas, or off-site reuse of effluent, used to justify the capacity authorized herein and assure compliance with this Order, the Discharger shall notify the Board in writing of the situation and of what measures have been taken or are being taken to assure full compliance with this Order.

23. The Discharger shall not allow pollutant-free wastewater to be discharged into the WWTF collection, treatment, and disposal systems in amounts that significantly diminish the system's capability to comply with this Order. Pollutant-free wastewater means stormwater (i.e., inflow), groundwater (i.e., infiltration), cooling waters, and condensates that are essentially free of pollutants.

24. The Discharger shall use best practicable treatment or control, including proper operation and maintenance, to comply with terms of this Order.

25. Each User of recycled water who is farming lands within the WWTF property should receive appropriate employee training to assure proper operation of recycling facilities, worker protection, and compliance with this Order. The Operator and Users shall each designate a Recycled Water Supervisor responsible for compliance with these waste discharge requirements. The Recycled Water Supervisor shall be responsible for the avoidance of cross-connections during the installation, operation and maintenance of the reclamation area's pipelines and equipment.

26. If the Board determines that waste constituents in the discharge have reasonable potential to cause or contribute to an exceedance of an objective for groundwater, this Order may be reopened for consideration of addition or revision of appropriate numerical effluent or groundwater limitations for the problem constituents.

27. The Discharger shall report to the Board any toxic chemical release data it reports to the State Emergency Response Commission within 15 days of reporting the data to the Commission pursuant to section 313 of the "Emergency Planning and Community Right to Know Act of 1986."

28. The Discharger shall comply with all pretreatment requirements contained in 40 CFR 403 and shall be subject to enforcement actions, penalties, fines, and other remedies by EPA or other appropriate parties, as provided in the CWA, as amended, and the CWA. The Discharger shall implement and enforce its approved Publicly-Owned Treatment Works (POTW) Pretreatment Program, which is hereby made an enforceable condition of these requirements. EPA may initiate enforcement action against an industrial user for noncompliance with applicable standards and requirements as provided in the CWA.

29. The Discharger shall enforce the requirements promulgated under Sections 307(b), (c), (d), and 402(b) of the CWA. The Discharger shall cause industrial users subject to federal categorical standards to achieve compliance no later than the date specified in those requirements or, in the case of a new industrial user, upon commencement of the discharge.

30. The Discharger shall perform the pretreatment functions required in 40 CFR 403, including, but not limited to:

    a. Implementing the necessary legal authorities as provided in 40 CFR 403.8(f)(1);

    b. Enforcing the pretreatment requirements under 40 CFR 403.5 and 403.6;

    c. Implementing the programmatic functions as provided in 40 CFR 403.8(f)(2);

    d. Providing the requisite funding and personnel to implement the pretreatment program as provided in 40 CFR 403.8(f)(3);

    e. Publishing a list of industrial users that were in significant noncompliance of applicable pretreatment requirements as required by 40 CFR 403.8(f)(2)(vii); and

    f. Conducting inspections in accordance with provisions of 40 CFR 403.8(f)(1)(v) and 403.8(f)(2)(v) and ensuring compliance with pretreatment standards and requirements by (1) assessing and collecting, when appropriate, civil penalties and civil administrative penalties in accordance with Government Code Sections 54740, 54740.5, and 54740.6, or (2) other equally effective means.

31. In the event of any change in control or ownership of land or waste discharge facilities described herein, the Discharger shall notify the succeeding owner or operator of the existence of this Order by letter, a copy of which shall be immediately forwarded to this office. To assume operation under this Order, the succeeding owner or operator must apply in writing to the Executive Officer requesting transfer of the Order. The request must contain the requesting entity's full legal name, the state of incorporation if a corporation, the name and address and telephone number of the persons responsible for contact with the Board, and a statement. The statement shall comply with the signatory paragraph of Standard Provision B.3 and state that the new owner or operator assumes full responsibility for compliance with this Order. Failure to submit the request shall be considered a discharge

without requirements, a violation of the California Water Code. Transfer shall be approved or disapproved by the Executive Officer.

32. The Discharger must comply with all conditions of this Order, including timely submittal of technical and monitoring reports as directed by the Executive Officer. Violations may result in enforcement action, including Board or court orders requiring corrective action or imposing civil monetary liability, or in revision or rescission of this Order.

33. A copy of this Order shall be kept at the discharge facility for reference by operating personnel. Key operating personnel shall be familiar with its contents.

34. The Board will review this Order periodically and will revise requirements when necessary.

I, GARY M. CARLTON, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 19 October 2001.

_____
GARY M. CARLTON, Executive Officer

Order Attachments:
Monitoring and Reporting Program No.
A: Vicinity Map
B: Plant 1 Diagrammatic Layout
C: Plant 2 Diagrammatic Layout
D: Symbol For Recycle Water Signs
E: Information Needs for Sludge Management Plan
F: Standard Monitoring Well Provisions for Waste Discharge Requirements
G: Recommended Recycled Water Monitoring Form
Information Sheet
Standard Provisions (1 March 1991 version) (separate attachment to Discharger only)

BLH:jlk:fmc 10/19/01 AMENDED

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 5-01-254

MONITORING AND REPORTING PROGRAM
FOR
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

This Monitoring and Reporting Program (MRP) is issued pursuant to Water Code Section 13267. The Discharger shall not implement any changes to this MRP unless and until a revised MRP is issued by the Executive Officer. Sample station locations are depicted on Attachments B and C. Changes to sample location shall be established with concurrence of Board's staff, and a description of the revised stations shall be submitted to the Board and attached to this Order. All samples should be representative of the volume and nature of the discharge or matrix of material sampled. The time, date, and location of each sample shall be recorded on the sample chain of custody form.

WWTF INFLUENT MONITORING

Samples shall be collected at the headworks and should be representative of the influent for the period sampled. Time and date of collection of samples shall be recorded. Influent monitoring shall include at least the following:

Constituent	Units	Type of Sample	Sampling Frequency
Maximum Daily Flow	mgd	Continuous	Daily
Average Daily Flow	mgd	Continuous	Daily
Monthly Average Flow	mgd	Computed	Monthly
Annual Monthly Average Daily Flow[1]	mgd	Computed	Monthly
Settleable Solids	mL/L	Grab	2/week[2]
pH	pH units	Continuous	Daily[4]
BOD_5[2]	mg/L	24-hr Composite	2/week[3]
Monthly Average BOD_5	mg/L	Calculated	Monthly
Total Suspended Solids	mg/L	24-hr Composite	2/week[3]
Monthly Average TSS	mg/L	Calculated	Monthly

1 Based on the previous twelve months
2 Five-day biochemical oxygen demand at 20ºC
3 Nonconsecutive days
4 Median value for 24-hour period

WWTF DISCHARGE MONITORING

Effluent samples shall be collected just prior to discharge to the disposal ponds and should be representative of the volume and nature of the discharge. Time of collection of composite and grab samples shall be recorded. Effluent monitoring from Plant 1 (and from Plant 2 when in operation and discharging directly to disposal ponds) shall include at least the following:

Constituent	Units	Type of Sample	Sampling Frequency[1]
pH	pH Units	Continuous	Daily[2]
Settleable Solids	mL/L	Grab	2/Week[3]
BOD_5			
Concentration	mg/L	24-hr Composite	2/Week[3]
Monthly Average	mg/L	Calculated	Monthly
Percent Removal	%	Calculated	Monthly
Total Suspended Solids			
Concentration	mg/L	24-hr Composite	2/Week[3]
Monthly Average	mg/L	Calculated	Monthly
Percent Removal	%	Calculated	Monthly
Total Dissolved Solids (TDS)[4]	mg/L	24-hr Composite	Weekly[5]
EC[6]	µmhos/cm	24-hr Composite	2/Weekly
Chloride	mg/L	24-hr Composite	2/Week[3,5]
Ammonia Nitrogen (as NH_3-N)	mg/L	24-hr Composite	Weekly
Nitrate Nitrogen (as NO_3-N)	mg/L	24-hr Composite	Weekly
Nitrite Nitrogen (as NO_2-N)	mg/L	24-hr Composite	Weekly
Total Kjeldahl Nitrogen (TKN)	mg/L	24-hr Composite	Weekly
Total Nitrogen	mg/L	Calculated[7]	Weekly
General Minerals[8]	mg/L	24-hr Composite	Quarterly[9]
Metals[10,11]	µg/L	24-hr Composite	Semiannually[12]
Priority Pollutants[13]	µg/L	Grab	Semiannually[12,14]

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1 If results of monitoring a pollutant appear to violate discharge specifications, but monitoring frequency is not sufficient to validate violation (e.g., the monthly mean for BOD_5), or indicate a violation and potential upset of the treatment process (e.g., less than minimum dissolved oxygen concentration), the frequency of sampling shall be increased to confirm the magnitude and duration of violation, if any, and aid in identification and resolution of the problem.

2 Median value for 24-hour period

3 Nonconsecutive days

4 TDS as referred to in this program shall be determined using EPA Method No. 160.1 for combined organic and inorganic TDS and EPA Method No. 160.4 for inorganic.

5 Concurrent with EC sampling (i.e., on the same day)

6 Conductivity at 25º

[7] Total Nitrogen as referred to in this program shall be calculated as : TKN + NO_2-N + NO_3-N
[8] General Minerals as referred to in this program shall include the constituents in the Analyte listed below.
[9] January, April, July, and October
[10] Metal analyses as referred to in this program shall include aluminum arsenic, barium, copper, cadmium, chromium, lead mercury, molybdenum, selenium, silver, zinc, and nickel.
[11] Samples shall pass through a 0.45 µm filter prior to analysis.
[12] April and October, coincident with general minerals analyses
[13] The Discharger must submit a report for approval by 1 March 2002 outlining EPA test methods and detection limits for priority pollutants listed in Title 40, Code of Federal Regulations, Part 131).
[14] Sampling to commence in April 2002

General Minerals Analyte List

Alkalinity (as $CaCO_3$), unfiltered		Phosphorus, total dissolved (P)
Boron	Hardness (as $CaCO_3$), calculated	Potassium
Bicarbonate (as $CaCO_3$), unfiltered	Iron	Sodium
Calcium	Magnesium	Sulfate
Carbonate (as $CaCO_3$), unfiltered	Manganese	

Sample Collection and Preservation: Any sample placed in an acid-preserved bottle must first be filtered through a 0.45 µm nominal pore size filter. If field filtering is not feasible, samples shall be collected in unpreserved containers and submitted to the laboratory within 24-hours with a request (on the chain-of-custody form) to filter immediately then preserve the sample.

DISPOSAL POND MONITORING

Disposal pond monitoring shall include at least the following:

Constituent/Parameter	Unit	Type of Sample	Sampling Frequency[1]
Dissolved Oxygen (DO)	mg/L	Grab[2]	As Required[3]
Temperature	°C	Grab	As Required[4]
Freeboard	feet[5]	Observation	
External Disposal Ponds			Daily
Internal Disposal Ponds			Weekly[6]

[1] If results of monitoring appear to violate Disposal Pond Specifications, but monitoring frequency is not sufficient to validate violation or indicate a violation and potential upset of the treatment process (e.g., less than minimum dissolved oxygen concentration), the frequency of sampling shall be increased to confirm the magnitude and duration of violation, if any, and aid in identification and resolution of the problem.
[2] Samples shall be collected at a depth of one foot from each pond in use, opposite the inlet, and analyzed for DO. Samples shall be collected between 0700 and 0900 hours.
[3] If offensive odor detected by or brought to the attention of WWTF personnel, monitor affected pond(s) daily until dissolved oxygen > 1.0 mg/L. If DO results for any pond in use indicate noncompliance with Disposal Pond Specification C.1, the Discharger shall implement corrective measures as specified in the O&M manual and monitor said pond daily until its DO stabilizes above 1.0 mg/L.
[4] Concurrent with DO monitoring

[5] For freeboard measurements greater than 2 feet, estimate to nearest half foot. For freeboard measurements less than 2 feet, estimate to nearest quarter foot.
[6] At least once every seventh calendar day on nonconsecutive days

Markers (e.g., staff gages) shall be placed in disposal ponds adjacent to public roads, private properties, and surface waters. The markers shall have calibrations indicating the water level at design capacity and available operational freeboard. The Discharger shall inspect all disposal ponds daily to determine compliance with Disposal Pond Specification D.4, which requires freeboard of all disposal ponds to never be less than two feet (measured vertically). In addition, the Discharger shall inspect the condition of the disposal ponds in use daily and write visual observations of developing potential problems in a bound logbook. Notations shall include observations of whether weeds are developing in the water or along the bank, and their location; whether dead algae, vegetation, scum, or debris are accumulating on the disposal pond surface and their location; whether burrowing animals or insects are present; and the general color of effluent in the disposal pond. A summary of entries made in the log during each month shall be submitted along with the monitoring report the following month. The Discharger shall certify in each November monitoring report that it is in compliance with Disposal Pond Specification C.5.

RECLAMATION OPERATION MONITORING

The type of crop(s) irrigated, amounts of water and/or reclaimed water applied to the crops(s) (in acre-feet) and amounts of sludge and chemical fertilizers (in pounds of nitrogen per acre) shall be measured and reported to the Board quarterly in accordance with the following schedule:

Monitoring Period	Reports Due
January – March	1 May
April – June	1 August
July – September	1 November
October – December	1 February

The Discharger shall utilize the form presented in Attachment G (or variation thereof subject to Board staff approval) for reporting the reclamation area monitoring data.

STILLAGE DISCHARGE MONITORING

The areas of land utilized for stillage disposal shall be reported monthly. Additionally, a sampling station shall be established where a representative sample of the stillage can be obtained. Stillage discharge monitoring shall include at least the following:

Constituent	Units	Type of Sample	Frequency
Flow	mgd	Measured	Daily
pH	pH units	Grab	Weekly
BOD_5, total	mg/L	Grab	Weekly
BOD_5, soluble	mg/L	Grab	Weekly

Constituent	Units	Type of Sample	Frequency
COD, total	mg/L	Grab	Weekly
COD, soluble	mg/L	Grab	Weekly
Total Suspended Solids	mg/L	Grab	Weekly
Volatile Suspended Solids	mg/L	Grab	Weekly
Total Kjeldahl Nitrogen (TKN)	mg/L	Grab	Weekly
Nitrate Nitrogen (as NO_3-N)	mg/L	Grab	Monthly[1]
Total Nitrogen	mg/L	Calculated	Monthly[1]
Total Phosphorus (P)	mg/L	Grab	Monthly[1]
Total Organic Carbon (TOC)	mg/L	Grab	Monthly[1]
Carbon/Nitrogen/Phosphorus ratio	---	Calculated	Monthly[1]
EC	µmhos/cm	Grab	Monthly[1]
TDS	mg/L	Grab	April, October

[1] Coincident with time of weekly sample

STILLAGE SITE APPLICATION MONITORING

Constituent	Units	Type of Sample	Frequency
Precipitation[1]	inches	Rain gauge	Daily
Flow	mgd	Measured	Daily
Area	acres	Measured	Daily
Drying Time[2]	days	Calculated	Per Application
BOD_5, maximum[3]	lbs/acre/day	Calculated	Monthly
BOD_5, average[4]	lbs/acre/ day	Calculated	Weekly
Total Kjeldahl Nitrogen (TKN)[5]	lbs/acre/day	Calculated	Monthly

[1] On-site rain gauge, National Weather Service, or California Irrigation Management Information System

[2] Report per active application area

[3] Maximum daily BOD_5 loading rate shall be calculated using the total volume of stillage applied on the day of application, estimated daily application area, and a running average of the three most recent results of BOD_5, which shall also be reported along with supporting calculations.

[4] Average BOD_5 loading rate shall be calculated using the total volume of stillage applied on the day of application, the total application period (i.e., day of application and drying time), estimated application area on day of application, and a running average of the three most recent results of BOD_5, which shall also be reported along with supporting calculations.

[5] Loading rate for nitrogen shall be calculated using the daily applied load and the estimated daily application area.

STILLAGE SITE SOILS MONITORING

The Discharger shall inspect and document the condition of the Stillage Site at least once a week. Notations should be made in a bound log book and include observations on whether ponding waste, soil clogging, odors, insects, or other potential nuisance conditions are present. The notations shall also document any corrective actions taken. A summary of entries made in the log during each month shall be submitted along with the monitoring report the following month.

The Discharger shall establish representative soil surface and soil profile monitoring locations within and outside the Stillage Site. There shall be at least one monitoring location per 20 acres. The samples shall be collected and analyzed for at least the following constituents:

Constituent	Units	Sample[1]	Frequency
Soil pH	pH Units	Grab	Semiannually[2]
Total Alkalinity (as $CaCO_3$)	mg/kg	Grab	Semiannually[2]
Cation Exchange Capacity	meq/100 grams	Grab	Semiannually[2]
Total Phosphorus (P)	mg/kg	Grab	Semiannually[2]
Nitrate Nitrogen (as NO_3-N)	mg/kg	Grab	Semiannually[2]
Total Kjeldahl Nitrogen (TKN)	mg/kg	Grab	Semiannually[2]
Total Nitrogen	mg/kg	Calculated	Semiannually[2]

[1] Samples shall be collected at 0.5, 1, 2, 3-foot depths.
[2] April and October

STILLAGE SITE VADOSE ZONE MONITORING

The Discharger shall establish representative vadose monitoring locations in the Stillage Site in accordance with the approved work plan required by Provision H.5. The samples shall be collected and analyzed for at least the following constituents:

Method	Constituent	Minimum Sample (mL)	Frequency
	pH	5	Twice/year[1]
	EC	10	Twice/year[1]
EPA 351.3 or 4500N-org	TKN	20	Twice/year[1]
EPA 300.0	Nitrate	20	Twice/year[1]
	Phosphorus		Twice/year[1]
	Sulfate		Twice/year[1]
	Chloride		Twice/year[1]
EPA 200.7	Calcium	5	Twice/year[1]
	Iron		Twice/year[1]
	Magnesium		Twice/year[1]
	Manganese		Twice/year[1]
	Potassium		Twice/year[1]

Method	Constituent	Minimum Sample (mL)	Frequency
	Total Alkalinity	20	Twice/year[1]
EPA 310.1			
EPA 415.1	TOC	150	Twice/year[1]

[1] In accordance with the vadose zone monitoring program described in the Discharger's approved work plan for monitoring its stillage disposal operation (Provision H.5).

GROUNDWATER MONITORING

Prior to collecting samples, the monitoring well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 volumes of the standing water within the well casing and screen, or additionally the filter pack pore volume.

At least quarterly and concurrently with groundwater quality sampling, the Discharger shall in each well measure groundwater level and report the data as groundwater depth (in feet and hundredths) and as groundwater surface elevation (in feet and hundredths above mean sea level). The horizontal geodetic location for each monitoring well shall be provided where the point of beginning shall be described by the California State Plane Coordinate System, 1983 datum.

Samples shall be collected from approved monitoring wells and analyzed for the following constituents at the following frequency:

Constituent	Units	Type of Sample	Frequency
Total Coliform Organisms	MPN/100 mL	Grab	Quarterly[1]
Total Organic Carbon (TOC)	mg/L	Grab	Quarterly[1]
Ammonia Nitrogen (as NH_3-N)	mg/L	Grab	Quarterly[1]
Nitrate Nitrogen (as NO_3-N)	mg/L	Grab	Quarterly[1]
Total Kjeldahl Nitrogen (TKN)	mg/L	Grab	Quarterly[1]
Total Organic Nitrogen (as N)	mg/L	Calculated	Quarterly[1]
EC	µmhos/cm	Grab	Quarterly[1]
Total dissolved solids (TDS)	mg/L	Grab	Quarterly[1]
General Minerals	mg/L	Grab	Quarterly[1]
Metals[2]	µg/L	Grab	Quarterly[1]
Dissolved Oxygen	mg/L	Grab	Quarterly[1]
Oxidation-Reduction Potential	mV	Grab	Quarterly[1]

[1] January, April, July and October

[2] Samples shall pass through a 0.45 µm filter prior to analysis.

In reporting the results of the first sampling event pursuant to this MRP, the Discharger shall include a

detailed description of the procedures and techniques for: (a) sample collection, including purging techniques, sampling equipment, and decontamination of sampling equipment; (b) sample preservation and shipment; (c) analytical procedures; and (d) chain of custody control.

EXTRACTED GROUNDWATER MONITORING

Prior to collecting samples, the reclamation well shall be adequately purged to remove water that has been standing within the well screen and casing that may not be chemically representative of formation water. Depending on the hydraulic conductivity of the geologic setting, the volume removed during purging is typically from 3 to 5 volumes of the standing water within the well casing and screen, or additionally the filter pack pore volume. Samples shall be collected from the reclamation wells and analyzed for the following constituents at the following frequency:

Constituent / Parameter	Units	Type of Sample	Frequency
Flow	million gallons	metered	Monthly
	acre-feet	Calculated	Monthly
Total Coliform Organisms	MPN / 100 mL	Grab	Quarterly[1]
Total Dissolved Solids (TDS)	mg/L	Grab	Quarterly[1]
pH	pH Units	Grab	Quarterly[1]
EC	µmhos/cm	Grab	Quarterly[1]
Total Kjeldahl Nitrogen (TKN)	mg/L	Grab	Quarterly[1]
Ammonia Nitrogen (as NH_3-N)	mg/L	Grab	Quarterly[1]
Nitrate Nitrogen (as NO_3-N)	mg/L	Grab	Quarterly[1]
Total Nitrogen	mg/L	Calculated	Quarterly[1]
Total Phosphorus (P)	mg/L	Grab	Quarterly[1]
Chloride	mg/L	Grab	Quarterly[1]
General Minerals	mg/L	Grab	Semiannually[2]
Total Organic Carbon (TOC)	mg/L	Grab	Semiannually[2]
Metals[3]	µg/L	Grab	Semiannually[2]

[1] January, April, July and October
[2] April and October, coincident with general minerals
[3] Samples shall pass through a 0.45 µm filter prior to preservation.

PRETREATMENT MONITORING

The Discharger shall submit an annual report to the Board, with copies to the U.S. Environmental Protection Agency (EPA) Regional Administrator and the State Water Resources Control Board, describing the Discharger's pretreatment activities over the previous 12 months. In the event that the Discharger is not in compliance with any conditions or requirements of this Order, the Discharger shall include the reasons for the noncompliance and state how and when the Discharger shall comply with such conditions and requirements. This annual report shall be submitted by **28 February** and shall contain, but not be limited to item E.7 of *Standard Provisions and Reporting Requirements for Waste*

Discharge Requirements, dated 1 March 1991 (Standard Provisions).

Signed copies of the reports shall also be submitted to the EPA Regional Administrator and the State Board at the following addresses, or as advised in writing subsequent to adoption of this Order:

Regional Administrator	Pretreatment Program Manager
U.S. EPA, Region 9	Division of Water Quality
Water Management Division (W-5-2)	State Water Resources Control Board
75 Hawthorne Street	P.O. Box 944213
San Francisco, CA 94105	Sacramento, CA 94244-2130

BIOSOLIDS MONITORING

To monitor whether discharges to the WWTF are interfering with the treatment process or lessening biosolids quality, the Discharger shall collect monthly composite samples of sludge in accordance with EPA's *POTW Sludge Sampling And Analysis Guidance Document, August 1989*, *Test Methods for Evaluating Solid Waste, Physical Chemical Methods (SW-846)*. Monthly the Discharger shall submit a certification statement for biosolids classification, how the pathogen reduction and the vector reduction were met. Supporting documentation and analytical results must be submitted with the certification. The certification statement and report shall be submitted to the Executive Officer.

Biosolids monitoring shall include the following:

Constituent[1]	Sampling Frequency[2]	Constituent[1]	Sampling Frequency[2]
pH	Monthly	Molybdenum	Monthly
Total Solids	Monthly	Nickel	Monthly
Total Nitrogen	Monthly	Selenium	Monthly
Nitrate Nitrogen (as NO_3-N)	Monthly	Silver	Monthly
Ammonia Nitrogen (as NH_3-N)	Monthly	Zinc	Monthly
Total Phosphorus (P)	Monthly	Fecal Coliform[3]	Monthly
Potassium	Monthly	Vector Reduction[3]	Monthly
Arsenic	Monthly	Salmonella[4]	Quarterly[5]
Cadmium	Monthly	Enteric Viruses[4]	Quarterly[5]
Chromium	Monthly	Helminth Ova[4]	Quarterly[5]
Cobalt	Monthly	Semi-Volatile Organics	Quarterly[5]
Copper	Monthly	Pesticides	Quarterly[5]
Lead	Monthly	PCBs	Quarterly[5]
Mercury	Monthly		

Constituent[1]	Sampling Frequency[2]	Constituent[1]	Sampling Frequency[2]

[1] In metal analyses, ICAP may not be used for arsenic, mercury, and selenium.
[2] The Discharger shall sample for these parameters at the specified frequency if biosolids are to be land-applied.
[3] If biosolids are classified as Class B and land applied and do not meet 40 CFR 503 Alternatives for Processes to Significantly Reduce Pathogens (PSRP) or Processes to Further Reduce Pathogens (PFRP). Vector reduction as defined in 40 CFR 503.33(b)(1) through 503.33(b)(8).
[4] If biosolids are classified as Class A.
[5] January, April, July, and October

WATER SUPPLY MONITORING

Discharger shall utilize its computerized database of the production from municipal wells supplying the cities of Fresno and Clovis. The chemical analysis shall be the most recent analysis in accordance with Title 22 requirements. The flow weighted average concentration shall be calculated and reported for each mineral listed in the following table. The electronic form of the data shall accompany the written calculations.

Constituent[1]	Units	Reporting Frequency[2]
Total Dissolved Solids	mg/L	Quarterly[3]
EC	µmhos/cm	Quarterly[3]

[1] Constituents shall be reported as a flow-weighted average of all wells during the quarter.
[2] Moving average shall include the most recent analysis for each well.
[3] January, April, July, October.

REPORTING

Monthly monitoring reports containing samples collected at frequencies of monthly or greater shall be submitted to the Board by the **1st day of the second month** following sampling. Quarterly reports shall be submitted to the Board by the **1st day of the second month** following the calendar quarter.
In reporting the monitoring data, the Discharger shall arrange the data in tabular form so that the date, the constituents, and the concentrations are readily discernible. The data shall be summarized in a manner that illustrates clearly whether the Discharger complies with waste discharge requirements, including calculation of all averages, etc. If any pollutant is monitored at the locations designated herein more frequently than is required by this Order, the results of such monitoring shall be included in the calculation and reporting of the values required in the discharge monitoring report form. Such increased frequency shall be indicated on the discharge monitoring report form. Monthly and quarterly monitoring reports shall discuss the compliance record for the reporting period. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with this Order.

The Discharger may also be requested to submit an annual report to the Board with tabular and graphical summaries of the monitoring data obtained during the previous year. Any such request shall be made in writing. The report shall discuss the corrective actions taken and planned to bring the discharge into full compliance with the waste discharge requirements.

By **1 February of each year**, the Discharger shall submit a written Annual Report to the Executive Officer containing the following:

1. The names, certificate grade and general responsibilities of persons operating and maintaining the wastewater treatment plant (Standard Provision E.1).

2. The names and telephone numbers of (a) persons to contact regarding plant emergency and routine situations and (b) persons designated as Recycled Water Supervisors.

3. A statement certifying when the flow meter and other monitoring instruments and devices were last calibrated, including identification of who performed the calibration (Standard Provision C.4).

4. A statement identifying whether the current operation and maintenance manual, and contingency plan, reflect the wastewater treatment plant as currently constructed and operated, and the dates when these documents were last reviewed for adequacy.

5. The results of an evaluation conducted pursuant to Standard Provision E.4 and a figure depicting monthly average discharge flow for the past five years.

6. A statement describing whether the disposal ponds have adequate capacity for a 100-year rainfall at a design flow of 80 mgd. The statement shall include a summary of disposal pond monitoring of percolation rates for the previous year. The summary shall describe the method(s) used to determine percolation rates and shall include for each disposal pond.

    a. Period during which percolation rate was determined (i.e., initial and final dates)

    b. Measured percolation rate and calculated percolation rate (adjusted for evaporation losses) in inches/day

7. The most recent Annual Water Supply Report for the City of Fresno.

8. A summary of onsite reclamation operations for the previous water year (i.e., from October through September). The summary shall discuss total monthly water application; total wastewater recycled annually; total nutrient loading annually from applied wastewater, biosolids, and chemical fertilizers; and total estimated amount of nutrients removed through crop harvest. In short, the summary shall present a mass balance relative to constituents of concern and hydraulic loading along with supporting data and calculations. The summary shall also include a tabulation and interpretation of analytical results of reclamation soil monitoring.

9. A summary of Stillage Site nitrogen control measures for the previous water year (i.e., from October through September). The summary shall discuss total monthly stillage application; total wastewater recycled annually (if applicable); total nutrient loading annually from applied stillage and wastewater (if applicable), and total estimated amount of nutrients removed through crop harvest. In short, the summary shall present a mass balance relative to constituents of concern and hydraulic and waste constituent loading along with supporting data and calculations. The summary shall include a tabulation and interpretation of analytical results of Stillage Site soil monitoring for the previous calendar year. The summary shall also present tabulated Stillage Site monitoring data for the previous calendar year on 3.5" computer diskettes (or submitted separately via e-mail), either in MS-DOS / ASCII format or in another file format acceptable to the Executive Officer (e.g., Microsoft Excel).

10. A summary of groundwater monitoring data for the previous calendar year. The summary shall include

    a. Hydrographs showing the groundwater elevation in each approved monitoring well for at least the previous five years. The hydrographs should show groundwater elevation with respect to the elevations of the top and bottom of the screened interval and be presented at a scale of values appropriate to show trends or variations in groundwater elevation.

    b. Graphs of the laboratory analytical data for all samples taken from each approved well (monitoring and reclamation) within at least the previous five calendar years (as data become available). Each such graph shall plot the concentration of one or more waste constituents over time for a given monitoring well, at a scale appropriate to show trends or variations in water quality. The graphs shall plot each datum, rather than plotting mean values. For any given evaluated constituent, the scale for the background plots shall be the same as that used to plot downgradient data. Separate graphs shall show hydrologic equipotential gradients and equal concentration gradients for evaluated constituents.

    c. All monitoring analytical data obtained during the previous four quarterly reporting periods, presented in tabular form, as well as 3.5" computer diskettes (or submitted separately via e-mail), either in MS-DOS / ASCII format or in another file format acceptable to the Executive Officer (e.g., Microsoft Excel).

    d. A comprehensive discussion of the compliance record, and the result of any corrective actions taken or planned that may be needed to bring the Discharger into full compliance with the waste discharge requirements.

11. A summary of groundwater extraction operations for the previous calendar year. This summary shall address the past year's groundwater extraction activities and extracted groundwater quality and shall contain all monitoring analytical data obtained during the previous four quarterly reporting periods, presented in tabular form, as well as 3.5" computer diskettes (or submitted separately via e-mail), either in MS-DOS / ASCII format or in another file format acceptable to the Executive Officer (e.g., Microsoft Excel).

12. A summary of biosolids monitoring, including

a. Annual sludge production in dry tons and percent solids.

b. A schematic diagram showing sludge handling facilities and solids flow diagram.

c. A description of disposal methods, including the following information related to the disposal methods used at the WWTF. If more than one method is used, include the percentage of annual sludge production disposed of by each method

i. For **landfill disposal**, include: (a) the Order numbers of WDRs that regulate the landfill(s) used, (b) the present classifications of the landfill(s) used, and (c) the names and locations of the facilities receiving sludge.

ii. For **land application**, include: (a) the locations of the site(s), (b) the Order numbers of any WDRs that regulate the site(s), (c) the application rate in lbs/acre/year (specify wet or dry), and (d) subsequent uses of the land.

iii. For **incineration**, include: (a) the names and location of the site(s) where sludge incineration occurs, (b) the Order numbers of WDRs that regulate the site(s), (c) the disposal method of ash, and (d) the names and locations of facilities receiving ash (if applicable).

iv. For **composting**, include: (a) the location of the site(s), and (b) the Order numbers of any WDRs that regulate the site(s).

The Annual Report shall discuss the compliance record for the reporting period. If violations have occurred, the report shall also discuss the corrective actions taken and planned to bring the discharge into full compliance with this Order. Reports submitted concerning WWTF performance must also be signed and certified by the chief plant operator. When reports contain laboratory analyses performed by the Discharger and the chief plant operator is not in the direct line of supervision of the laboratory, reports must also be signed and certified by the chief of the laboratory.

The Discharger shall implement this monitoring program on the first day of the month following adoption of this Order. All reports submitted in response to this Order shall comply with the signatory requirements in Standard Provision B.3.

Ordered by:_____
GARY M. CARLTON, Executive Officer

19 October 2001
(Date)

BLH:jlk:fmc:10/19/01 AMENDED

INFORMATION SHEET

ORDER NO. 5-01-254
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

The Fresno-Clovis Metropolitan Regional Wastewater Reclamation Facility is a wastewater treatment facility (WWTF) that serves the cities of Fresno and Clovis; the Pinedale Water District and Pinedale Utilities District, both of which are within the city limits of Fresno; and some areas within Fresno County not within the city limits of Fresno or Clovis. The cities of Fresno and Clovis are referred to as Discharger. The City of Fresno is responsible for day-to-day WWTF operations, and is referred to as Operator. The WWTF, on property owned by the Operator, originated in 1891 as a 40-acre "sewage farm" for raw sewage disposal. Beginning in 1924, the Operator began extracting groundwater from deep on-site irrigation wells to draw down the shallow water table caused by groundwater mounding under the WWTF disposal ponds[1].

The WWTF currently encompasses 3,290 acres and includes two separate treatment plants; 1,660 acres of disposal ponds; about 600 acres of reclamation area; 290 acres of wet-weather effluent disposal area: and a 145-acre wine stillage disposal area that currently serves Canandaigua Wine Company, a New York corporation. The Operator recently expanded the WWTF property by 480 acres and proposes to convert some of the newly acquired area to disposal ponds and to use the remainder for year-round water reclamation.

The Operator submitted a Report of Waste Discharge in 1996, to support a proposed increase in WWTF discharge flow from 74 to 94 million gallons per day (mgd). Plant 1 is now an 88-mgd-capacity activated sludge treatment plant that includes headworks and primary and secondary clarifiers. Plant 2, which is currently in stand-by mode, is a 6-mgd-capacity trickling filter plant that includes primary and secondary clarifiers. The WWTF currently treats about 68 mgd, or 24,800 million gallons annually (76,000 acre-feet).

The Operator's January 2001 Title 22 Engineering Report (hereafter Title 22 Report) describes the WWTF as follows:

> Influent is pumped from the collection system into the Headworks for screening, flow measurement, and grit removal. The flow from the Headworks is then divided equally among six primary clarifiers. The effluent from the clarifiers converges at the Primary Effluent Splitting Structure. The primary solids are pumped directly into anaerobic digesters. Currently nine are in service, two are being rehabilitated, and one is used as a feed storage structure for the Dewatering facility.
>
> The primary effluent is divided into two trains. The "B" side receives sixty-four percent of the flow and consists of four plug flow type aeration basins in parallel. Each basin consists of five influent cells followed by a large tank. The aeration effluent enters eight rectangular sedimentation basins, also in parallel, whose effluent flows to a network of percolation ponds via a canal system.

1 Loehr, R. C. et al. (1979). Land Application of Wastes. Volume I, Publisher, City.

"A" side receives thirty-six percent of the primary effluent and consists of four complete mix aeration basins. This aeration effluent enters five final clarifiers.

Solids from these secondary systems are thickened using a combination of five dissolved air floatation units and two gravity belt thickeners. The thickened secondary solids from each unit feed into a common header and the solids are distributed to the digesters.

The feed digester (Digester #1) receives digested biosolids from all digesters on line. This is pumped to the dewatering facility, which contains seven belt filter presses. The dewatered solids are stored in a silo and then shipped by truck to an application site.

The WWTF has an average power demand of 6.3 megawatts (MW). The WWTF is supplied by two sources of power. Feeder A (10 MW) is the primary source of power; Feeder B (5 MW) is a standby source of power. The Operator's Title 22 Report indicates that a new substation adjacent to the WWTF and owned by the City of Fresno will provide the WWTF's power supply by May 2001. A second 12 KW supply feeds directly into the WWTF's switchgear from a separate substation, thereby assuring reliable power. Further, the WWTF has three standby engine generators onsite with capacities of 25 KW (propane), 350 KW (diesel), and 1,600 KW (diesel). The overall onsite standby capacities allows the WWTF to continue to operate process components during a power outage, including the primary treatment units, plus one of the large aeration blowers. The Operator has implemented a computerized maintenance program to monitor equipment data, preventive maintenance, and repairs. Instrumentation, electrical, and mechanical equipment are on a preventive maintenance program that regularly schedules calibration and service of the equipment. Equipment repairs are scheduled on the computerized maintenance program, and the repair data is entered into the computer. The data from the preventive maintenance and repairs has established equipment history to help in the scheduling of repairs with a minimum of equipment downtime and improved equipment reliability.

The Operator reports that 56 significant industrial users discharge waste into the WWTF collection system, including 14 users from the metal finishing categories. Other industrial users discharging into the WWTF include soft drink bottlers, meat packers, food processors, dairy and poultry products processors, plastic manufacturers, wineries, and several linen and industrial laundries. The Discharger originally developed a pretreatment program in conformance with 40 CFR 403. The Board approved the program on 17 June 1984. The Operator has subsequently submitted a revised pretreatment program (dated 6 June 1996), also in conformance with 40 CFR 403, which updates its original submission to bring it in line with current practices. The Operator updated its pretreatment program in 2001, in part, to reflect its latest municipal code and enforcement response plan, incorporate WWTF upgrades, and describe modifications in sampling procedures. Board staff is reviewing the revised pretreatment program for completeness and adequacy. Once the program is deemed complete, staff will submit for Board consideration a proposed Order approving the revised pretreatment program.

Sludge from the WWTF is thickened by dissolved air flotation and gravity belts, anaerobically digested, and dewatered by seven belt filter presses, three of which went on line in July 1993. Prior to 1993, digested sludge was pumped to 62 acres of open earthen basins beds that are no longer in service and the Operator has since constructed additional treatment facilities on the majority of the 62 acre site. Plant Wells 1001 and 1002, which are in proximity to these former drying beds, have high concentrations of TDS and nitrates.

The Operator previously stockpiled 100,000 cubic yards of dried sludge at the WWTF. Over 75,000 cubic yards of the stockpiled sludge was classified as "hazardous" waste due to the lead and cadmium concentrations present in it. In July1997, the California State Department of Toxic Substances reclassified the sludge as nonhazardous. The stockpiled sludge was transported to the Fresno Sanitary Landfill in 1998 as part of the landfill's final closure project.

Effluent Disposal and Reclamation

At the current annual average discharge flow of 68 mgd, the WWTF's annual discharge flow is 24,820 million gallons (or about 76,000 af). Of this amount, about 4,000 af/yr of effluent is recycled directly, an amount that represents about only five percent of the WWTF's current annual discharge flow. On-site effluent recycling effluent currently occurs on 528 acres within the WWTF property, an amount that will reportedly increase to 766 acres (hereafter reclamation area). Area farmers recycle effluent on site under lease agreements with the Operator, as summarized below:

Field No.	Lessee	Acreage	Types of Crops	AF used in 1999
1	Quist Dairy	121	Alfalfa, Silage, Cotton, Wheat	175
6B	Dan Sousa	160	Wine Grapes, Silage, Alfalfa	462
7B	Quist Dairy	117	Cotton, Alfalfa, Silage, Wheat	51
7C	Quist Dairy	130	Cotton, Silage, Wheat	12
8*	Quist Dairy	238	Cotton, Silage, Alfalfa, Wheat	0
	Total	766	Total	700

*Field 8 currently does not have access to recycled water; however, the Operator anticipates that necessary improvements will be made to convey recycled water to the field by 2002.

Off-site effluent recycling currently occurs on 2,770 acres surrounding the WWTF property by growers under separate water reclamation requirements (WRRs), as summarized below:

Field No.	WRRs Order No.	Reclaimer	Acreage	Types of Crops	AF used in 1999
2	94-370	Al Coelho Jr.	560	Cotton, Wine Grapes, Alfalfa	502
3	94-369	Golden State Vintners	1,560	Wine Grapes	1,528
6A	94-372	Joe Souza	320	Alfalfa, Silage, Wheat	580
6C	94-367	Myrna Craviero (Dan Souza)	130	Alfalfa, Silage, Wheat	299
7A	94-371	Quist Dairy (Alvin J. Quist)	200	Cotton, Alfalfa, Silage, Wheat	135
		Total	2,770	Total	3,044

As indicated above, about 3,700 af of effluent was directly recycled in 1999, an amount equivalent to less than five percent of current WWTF's annual discharge flow. Of the 72,000 af/yr discharged to the disposal ponds, about 63,400 af/yr (88 percent) percolates to groundwater and 8,600 af/yr (12 percent) is lost through evaporation (i.e., 62 in/yr evaporation from 1,660 acres of disposal ponds). Over the years,

the Operator's reliance on effluent disposal by percolation has created an extensive groundwater mound (approximately 10-feet high) that persists year-round, ranges in depth from 25 to 61 feet below ground surface (bgs), and extends well beyond the perimeter of the WWTF property. The mounded effluent appears to affect groundwater contours throughout the surrounding township.

The Operator owns and operates a network of 21 groundwater extraction wells on the WWTF property (hereafter reclamation wells). The reclamation wells extract from 150 to 200 feet below ground surface (bgs), operate about 10 months of the year, and discharge about 10 to 40 mgd (or about 15,300 af/yr) to the Houghton Canal and the Dry Creek Canal under an agreement with FID. Order No. 96-054 did not establish numerical or narrative effluent limits for the discharge from the groundwater extraction wells, require any monitoring of the flow or quality of the extracted groundwater, or impose any restrictions on the use of extracted groundwater.

The 1974 agreement between the Operator and FID currently stipulates, in part, that (a) the Operator must discharge into FID canals a minimum of 100,000 af of extracted groundwater during any ten year period; (b) the Operator may discharge a maximum of 30,000 af/yr of extracted groundwater to FID canals; (c) for every acre-foot of extracted groundwater the Operator discharges to FID canals, FID may deliver to the Operator 0.45 af of surface water up to a maximum of 7,600 af/yr. The Operator uses this surface water throughout the City of Fresno for aquifer recharge (i.e., by discharging to groundwater recharge basins situated within the metropolitan area). Most of the surface water delivered to Fresno's groundwater recharge basins is from the Friant Division of the Central Valley Project (CVP), operated by the U.S. Bureau of Reclamation (Bureau). The Operator and FID have signed contracts to purchase up to 135,000 af/yr of CVP surface water from the Bureau.

The Operator normally delivers between 15,000 and 20,000 af/yr to FID canals, an amount that is equivalent to 19 to 25 percent of the current annual discharge flow. Any increase in the discharge of extracted groundwater beyond that stipulated in the 1974 agreement is subject to FID approval.

The Discharger submitted a technical report, *Fresno-Clovis Regional Wastewater Reclamation Facilities Master Plan Summary Report* (Master Plan), dated November 1996, pursuant, in part, to C&D Order No. 96-055. The Master Plan describes a planning structure to maximize effluent reuse through land-based alternatives, primarily effluent reuse for agriculture. It documents options for off-site effluent reuse/disposal to meet the Discharger's disposal needs through 2020. The Master Plan presents financial impact analyses and multi-year implementation schedules for each option. These options include
(a) adding about 270 acres of on-site disposal ponds; (b) increasing the amount of groundwater extracted and discharged to FID's canals to 28,000 to 33,000 af/yr, which is about equal to the capacity of the existing on-site extraction wells; and (c) reclaiming effluent on lands outside of FID's service area through the development of a partnership among the Operator, FID, Raisin City Water District, Mid-Valley Water District, James Irrigation District, and Tranquillity Irrigation District. According to the Master Plan, negotiations for the reuse project will take up to 18 months to finalize and construction of the reuse project's infrastructure (e.g., pipelines) will take up to 36 months to complete. The Master Plan further indicates that FID may seek mitigation for delivery of effluent outside of the FID service area. The Discharger has increased its on-site disposal pond acreage, but has yet to implement the Master Plan's effluent reuse options.

Calpine Corporation (hereafter Calpine) is planning to construct a new gas-fired turbine in Fresno County (Central Valley Energy Center, hereafter referred to as CVEC). Calpine proposes to pump approximately 7,000 af/yr from the Operator's reclamation wells to provide cooling tower and industrial process water for the CVEC. Once extracted, the recycled water will be dosed with sodium hypochlorite prior to introduction into a 20.5 mile, 30-inch diameter pipeline, which will terminate into two 1.5 million gallon storage tanks at the CVEC site.

The California Department of Health Services (DHS) commented on the tentative WDRs circulated for public comment on 10 April 2001. Among the concerns expressed by DHS was that the Discharger has discharged and will continue to discharge a significant amount of wastewater to groundwater with minimal treatment and inadequate monitoring.

On 23 April 2001, DHS released for public review the first draft of regulations governing projects designed to use recycled water for the purpose of recharging by infiltration or injection of recycled water in a groundwater basin designated in a Water Quality Control Plan, as defined in CWC section 13050(j), for use as a source of domestic water supply. The draft regulations do not specify the hydraulic loading rate that constitutes groundwater recharge. The draft regulations proposed higher levels of treatment (e.g., nutrient removal, filtration) than is typically provided for domestic wastewater disposed of through percolation. The draft regulations also propose to control total nitrogen, regulated contaminants (i.e., those for which Title 22 establishes maximum contaminant levels) and physical characteristics and control of nonregulated contaminants such as total organic carbon (TOC). The draft regulations propose that recycled water rechargers monitor mounded groundwater for TOC, total nitrogen, and pharmaceuticals (e.g., endocrine disrupting chemicals).

In its 10 April 2001 letter, DHS recommends that the Discharger expedite efforts to expand its recycling efforts and curtail discharge to groundwater. In its regulation of this ongoing discharge, DHS recommends that the Board require the Discharger to (a) assess the current status of all private and domestic wells that exist within the 25-square-mile area described in Finding No. 9; (b) monitor domestic supply wells within this area for contaminants to assure they are producing safe water for domestic use and are not adversely impacted by the wastewater the Discharger has discharged to area groundwater; and (c) conduct a comprehensive study to assess the fate and effects of the past and current discharge on the groundwater basin. DHS further recommends that the Board require the Discharger to (a) identify the types of crops grown in the area served by FID canals that receive groundwater extracted by the Operator’s reclamation wells and (b) provide information on the dilution of the extracted groundwater with fresh water prior to irrigation application. If the crop identification reveals that food crops are grown in the subject area, DHS recommends that the Board require the Discharger to
undertake a timely evaluation of the degree of soil treatment provided by the current recharge and extraction operation and a determination of the level of filtration and virus removal treatment provided. DHS also recommends the Board require the Discharger to provide continuous turbidity monitoring of representative reclamation wells for at least one year.

Stillage Guidelines

Stillage is the waste material produced by the distillation of wine, pomace, or raisins for fortifying spirits and is the least readily disposal of all winery wastes. In the mid-1940s, the Wine Institute funded a study by Coast Laboratories on wine stillage composition. The study's 1946 report, *The Disposal of Winery Waste*, characterized conventional stillage as follows: (a) total solids content average 1.6 percent, about one-third of which is suspended solids, largely yeast; (b) pH range from 3.4 to 4.2; and (c) BOD_5 content average 12,500 mg/L.

In 1979, the Wine Institute funded Metcalf & Eddy engineers to survey existing practices of 16 seasonally discharging stillage disposal operations. The study's 1980 report, *Land Application of Stillage Waste: Odor Control and Environmental Effects* (hereafter the Wine Institute Study), summarized the results of this study and recommended guidelines for stillage disposal operations to minimize water quality effects and nuisance conditions.

Board Resolution No. 83-105 amended the Basin Plan to prescribe guidelines for the land disposal of stillage wastes from wineries. The guidelines reflect the recommendations of the Wine Institute Study and prescribe minimum operational procedures for two types of stillage disposal (i.e., rapid infiltration and slow infiltration). The maximum application rates and minimum drying times prescribed by the Stillage Guidelines for rapid infiltration are outlined in the following table:

Period of Year	Depth of Stillage Application (inches)	Drying Time (days)	Minimum Land Requirement (acres per 100,000 gpd of stillage waste)
1 Aug to 30 Sep	3.7	6	7
1 Oct to 30 Nov	3	9	12.3
1 Dec to 1 May	2.5	13	20.6

The values below represent the organic load to land allowed by the Stillage Guidelines for rapid disposal systems. The values assume an average stillage BOD_5 concentration of 12,500 mg/L and reflect two different application time periods. The first is the organic load on the actual day of application, while the second is the organic load averaged over the entire application cycle (i.e., including drying days).

Period of Year	Application gallons/acre	On day of application lbs/acre/day	BOD_5 Loading Averaged over entire application cycle lbs/acre/day
1 Aug – 30 Sep	100,000	10,500	1,500
1 Oct – 30 Nov	81,000	8,500	850
1 Dec – 1 May	68,000	7,000	500

Excessive application of stillage waste to land can overload the shallow soil profile, cause anaerobic soil conditions, retard the degradation, stabilization, transformation, and immobilization of waste

constituents, and create objectionable odors that lead to public nuisance. Degradation of organic matter within the soil profile increases the concentration of alkalinity in soil pore water. Anaerobic soil conditions can lead to the dissolution of soil minerals such as calcium and magnesium. Hydraulic overloading flushes waste constituents, the by-products of organic degradation, and dissolved minerals into the soil profile where they will continue to leach into and unreasonably degrade groundwater.

In applying food-processing wastewater to land for biological treatment, loadings of total suspended solids (TSS) typically range from 70 to 200 lbs/acre/day and loadings of BOD_5 should not exceed 100 lbs/acre/day to prevent the creation of nuisances, according to EPA's *Pollution Abatement in the Fruit and Vegetable Industry* (Publication No. 625/3-77-0007) (hereafter *Pollution Abatement*). In well-operated land treatment systems, wastewater application is typically followed by several days of rest, according to *Pollution Abatement*. This management practice maintains aerobic conditions in the soil profile. Slow-rate systems with BOD_5 loading rates that occasionally exceed 300 lbs/acre/day have successfully avoided odor problems by using adequate drying times between applications, according to *Natural Systems for Waste Management and Treatment*, by Sherwood C. Reed and others.

Organic loadings recommended by the Wine Institute Study and allowed by the Stillage Guidelines, while exceeding the loading rates recommended by *Pollution Abatement,* reflect longstanding disposal practices by stillage disposal operations that discharged on a seasonal basis (e.g., from August to November). The Wine Institute Study rationalized its recommended organic loadings by assuming that 80 percent of stillage BOD_5 is contained in suspended solids trapped on the surface leaving 20 percent in soluble compounds to infiltrate the soil profile. The resultant organic loading to the soil profile (as soluble BOD_5) calculated at 120 lb/acre/day over the course of the entire application cycle.

The Wine Institute Study also cites work by Jewell and Loehr[2, 3] to support organic loads in excess of that recommended by *Pollution Abatement*, especially for acclimated soils (i.e., those that had been receiving waste for a number of years). Jewell and Loehr monitored the oxygen uptake of bacteria in soils collected from a land application site that had received vegetable processing wastewater. The experiment utilized a Warburg respirator apparatus, which is typically used to determine the oxygen uptake of microbial cells in liquid samples (e.g., 20 to 40 ml). In extrapolating the results of laboratory oxygen uptake experiments to field conditions, Jewell and Loehr concluded that food-processing waste disposal sites with acclimated soils could consume oxygen at rates exceeding 600 lbs/acre/day. Additionally, Jewell and Loehr concluded that acclimated soils could accommodate organic loads (as chemical oxygen demand) of up to 16,000 lbs/acre/day without suffering prolonged oxygen depletion and nuisance from organic overloading. Key to the rapid degradation of organic wastes applied to land is adequate drying time. While Jewell and Loehr may have identified the oxygen transfer rate in small samples of acclimated soil, their application of these rates to field conditions was premature given the lack of field validation. Further, it appeared that Jewell and Loehr were unconcerned about what leached to groundwater since the waste application sites they examined demonstrated clear and unambiguous

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[2] Jewell, W. J. and R.C. Loehr (1975) Land Treatment of Food Processing Waste. Presented at the American Society of Agricultural Engineering. Winter Meeting. Chicago. Paper No. 75-2513.

[3] Jewell, W. J. et al. (1978) Limitations of Land Treatment of Wastes in the Vegetable Processing Industries. Cornell University.

evidence that groundwater had been degraded, not only for total dissolved solids but also for organics (as COD).

Stillage is very high in organic nitrogen content compared to other food-processing wastes. Organic nitrogen (as total Kjeldahl nitrogen, or TKN) is primarily retained in the upper two to three feet of the soil profile. Soil bacteria transform organic into inorganic nitrogen (i.e., ammonia, nitrites and nitrates). Nitrate and nitrite are highly soluble, not bound to the soil, and are readily leached through the vadose zone and into groundwater subsequent to the application of water to the soil.

The Wine Institute Study describes stillage disposal sites as having soil TKN concentrations in excess of 2,500 mg/kg, with concentrations decreasing substantially at depths below two feet and reducing further to background levels at depths of six feet. Groundwater data collected during the Wine Institute Study was minimal and inconclusive regarding nitrogen contamination from stillage disposal operations.

The Stillage Guidelines recommend that stillage application sites be planted with crops, *if necessary,* to assist in the removal of residual nitrogen concentrations from the soil during periods when it is not used for stillage disposal. At the time of the Wine Institute Study, stillage disposal operations were seasonal, whereas now wineries such as Canandaigua operate and discharge year-round. The Stillage Guidelines further recognize the need to impose more stringent disposal requirements as necessary to comply with water quality objectives. "If necessary" was intended to be predicated on monitoring the buildup of nitrogen in the soil, but has been largely ignored by the industry.

Stillage Site

The Operator owns and operates a 145-acre wine Stillage Site, which consists of a 95-acre portion (SS-1) in operation since 1974 and a 50-acre portion (SS-2) in service since 1998. SS-1 was regulated by Order No. 74-10 until 1996, when regulation of the stillage disposal operation was included in the WWTF's waste discharge requirements (Order No. 96-054). Currently, the Stillage Site receives stillage waste year round from only one winery, Canandaigua Wine Company, a New York corporation (hereafter Canandaigua).

Recent monitoring data (1996 through 1998) indicates that during the crush season (from August to November), the Operator discharges an average 0.21 mgd of stillage to the 145-acre disposal site (1.0 mgd daily maximum). During the rest of the year, the Operator discharges an average of 0.12 mgd (0.71 mgd daily maximum). The waste is discharged to land without any prior treatment. The Discharger reports that the stillage pipeline is in need of extensive maintenance repairs. The lease agreement between the Discharger and Canandaigua for its discharge of stillage to the Stillage Site expires in 2004. By fall 2003, Canandaigua plans to relocate its stillage operation to its Paul Masson winery in Madera County and cease discharge of stillage to the Stillage Site. The WWTF does not have the treatment capacity to accommodate Canandaigua's stillage discharge.

In 2000, the Stillage Site received about 79 million gallons of stillage. Peak daily flows occurred in mid-June and ranged from 1.1 to 1.27 mgd. The table below compares year 2000 total monthly stillage discharge flows to those recommended by the Stillage Guidelines and currently permitted for the original 95-acre SS-1:

Month	Amount Discharged (mg)	Maximum Amount Allowed (mg)[1]
Jan	6.732	14.26
Feb	6.504	12.88
Mar	5.874	14.26
Apr	3.668	13.8
May	6.14	42.16
Jun	16.91	40.8
Jul	1.113	42.16
Aug	6.771	42.16
Sep	9.857	40.8
Oct	7.665	23.87
Nov	7.534	23.1
Dec	0.64	23.87
Total	79.4	335

[1] Value assumes the discharge complies with all other relevant stillage discharge specifications (e.g., no standing stillage after 24 hours of application)

As indicated above, the Operator's stillage discharge in 2000, in terms of monthly discharge flow, is less than 25 percent of that permitted by the Stillage Guidelines for the original 95-acre SS-1 (assuming the discharge complied with all remaining discharge specifications). In 1998, the Operator reduced the waste loading to the original SS-1 by placing into service the new 50-acre stillage disposal area (SS-2).

The following table compares the water quality from MW-2 that is in the middle of SS-1 and MW-5 (5,400 feet from MW-2) that is in the vicinity of the WWTF disposal ponds. The data show that the Operator's long-term stillage disposal operation has degraded area groundwater as evidenced by elevated concentrations of TDS, alkalinity, calcium, magnesium, and manganese.

Constituent	Units	MW-2	MW-5
Total Dissolved Solids	mg/L	1,700	450
Total Alkalinity (as $CaCO_3$)	mg/L	1,600	260
Calcium	mg/L	300	46
Magnesium	mg/L	200	24
Manganese	mg/L	10	0.1

In February and March 1999, the Operator performed laboratory tests to determine the soluble and insoluble fractions of stillage BOD_5. Specifically, the Operator split six samples of stillage and analyzed one sample for total suspended solids and total BOD_5, centrifuged the other sample at 2000

revolutions per minute for 15 minutes, and analyzed the resulting liquid for suspended solids and BOD_5. The results indicate that almost 90 percent of stillage BOD_5 is in soluble form. These results imply that the actual organic loading from the land application of stillage may be appreciably higher than previously thought.

As described previously, the Wine Institute Study assumed that most BOD_5 would be retained in surface organic solids and that biological degradation processes would mineralize the majority of the nitrogen, which would be then be biologically converted to nitrogen gas. In reality, most BOD_5 in stillage applied to the Stillage Site is soluble and only a small fraction is in the retained organic solids. In July 1992, the Operator tested Stillage Site soils for TKN analysis. The samples were taken at the surface, one foot, and two feet below the surface at six sites. When groundwater monitoring well 2 (MW-2) was drilled in SS-1, the Operator collected soil samples at 5, 10, 15, 20, 25, 30, 35, 40, and 45 feet bgs, and analyzed them for TKN. The Operator found that the majority of TKN occurs within the upper two feet of SS-1 soils, as indicated below:

Depth, ft	0.5	1	2	5	10	15	20	25	30	35	40	45
TKN, mg/kg	5,225	2,468	460	114	213	161	101	89	88	55	72	65

The average TKN from 5 to 45 feet is 106 mg/kg. There was no measurable nitrate or nitrite in the soil samples. These findings correspond with the data in the 1980 Wine Institute Study. In the 1992 study, the average TKN concentration was 2,700 mg/kg in the upper two feet of soil in SS-1. Assuming a minimum soil weight of 90 lbs/ft^3, there are 21,300 lbs-TKN/acre in the upper two feet in SS-1. The Discharger applied 104,000 lbs TKN to the site in 1998 and 245,000 lbs TKN in 1999. In 1992, based upon the 1998 and 1999 rates of application, there were 9 to 20 years of nitrogen accumulation in the top two feet of soil. Since stillage has been discharged to the site since 1974, the data indicates minimal biodegradation of the applied TKN.

In Finding No. 13 of Order No. 96-054, the Board found that no crops had been grown in the disposal area to aid in nitrogen control. Provision G.7 of Order No. 96-054 required the Operator to "submit a written technical report and schedule on measures to be implemented to provide for nutrient uptake in the stillage disposal area or justify why it should not be necessary." In its report, *Schedule of Measures to be Implemented to Provide for Nutrient Uptake in the Stillage Disposal Area* (April 1998), the Discharger investigated the use of Sudan grass for nitrogen uptake from Stillage Site soils. While this report recommended that the Operator plant and harvest crops to reduce the large accumulation of nitrogen in Stillage Site soil, the Operator has not yet initiated systematic cropping and harvesting. The SS-2 area was added in 1998 but has not been planted crops to remove nitrogen. In the report, *Technical Memorandum No. 1, Update of Groundwater Quality Conditions* (April 1999), groundwater monitoring from MW-2 showed high concentrations of EC and TDS.

Groundwater Monitoring and Evaluation

Area soils are coarse, well sorted sands with good permeability (i.e., from 0.7 to 1.0 in/hr). Groundwater underlying the WWTF occurs in an unconfined aquifer at depths ranging from 31 to 60 below ground surface (bgs). Regional groundwater generally moves southwesterly, according to FID groundwater elevation contour maps.

The Operator has one background monitoring well upgradient of the WWTF site, but no downgradient wells off-site. Several of the on-site monitoring wells are adjacent to localized areas of groundwater degradation (hereafter hot spots) such as existing or historic confined animal facilities with plumes that mask the impacts of the discharge on area groundwater. Consequently, the impacts of the discharge upon the chemical characteristics of the regional aquifer are not well defined.

Since 1990, the Operator has been investigating potential impacts on groundwater quality associated with current and past discharges from the WWTF as well as discharges to the 145-acre Stillage Site. It has documented these investigations in the following reports:

- *Wastewater Treatment Facility, Phase I Investigation, Groundwater Impacts from Effluent Disposal*, June 1991;

- *Wastewater Treatment Facility, Phase II Investigation, Groundwater Impacts from Effluent Disposal*, February 1993;

- *Master Plan Report, Task 700, Technical Memorandum No. 3, Evaluation of Reclamation Operations and Recommended Groundwater Monitoring Program*, August 1996;

- *Update of Groundwater Quality Conditions, Vicinity of Fresno/Clovis Regional Wastewater Reclamation Facility*, July 1998; and

- *Technical Memorandum No. 1, Update of Groundwater Quality Condition*, April 1999.

The reports contain the following findings. The groundwater mound created by percolating WWTF effluent persists year-round and is less than 20 feet below the bottom of the percolation/disposal ponds. The Operator's extraction wells pull from the deep zone aquifer (approximately 200 feet) rather than the shallow zone that is associated with the percolation/disposal ponds (approximately 50 feet). This is reportedly due to low yields associated with pumping from the shallow zone. Groundwater extracted and discharged to FID canals recovers less than 36 percent of the percolated water. Percolated effluent has contributed to increases in constituents such as EC, TDS, sodium, chloride, manganese, and phosphorus and decreases in nitrate concentrations. Impaired groundwater quality is associated with localized on-site plant operations such as the Stillage Site and former dairy sites. Groundwater beneath the former sludge disposal area in the northeastern portion of the WWTF is characterized by high nitrate and EC concentrations. The off-site extent and impact of recharged effluent downgradient of the WWTF is unknown, although the resultant groundwater quality beyond the WWTF boundary is believed to be adequate for agricultural use.

The reports made the following recommendations. Groundwater extraction needs to be increased to provide increased groundwater/pond bottom separation and to control off-site migration of treated effluent and groundwater affected by on-site chemical sources. The groundwater monitoring network and program should be revised to provide for depth-specific monitoring on-site and off-site and to evaluate future wastewater management actions on water quality beneath and downgradient of the plant.

Chloride, a conservative ion, is known to pass through soil untransformed and relatively uninhibited by the sorption process and thereby is a reliable marker ion for comparing two liquid streams. Staff compiled data from self-monitoring reports for effluent chloride concentrations for the period of January 1997 through June 2000. The Discharger presented staff with mineral analyses collected from extraction wells for the period of January 1989 through June 1999. Staff calculated the mean, variance, and number of samples for each set of data. Staff used the standard normal deviate, z, to compare the mean chloride concentration in the effluent with the mean chloride concentration for the extraction wells. Based upon a calculated z = 1.42, staff concluded that the mean concentration of 74.5 (n=38) mg/L from the reclamation wells was not statistically significantly different from the mean concentration of 77.8 mg/L (n=210) in the effluent.

$$z = \frac{\overline{X_A} - \overline{X_B}}{\sqrt{\frac{s_A^2}{n_A} + \frac{s_B^2}{n_B}}}$$

The Discharger has designated monitoring well 10A as the shallow zone and monitoring well 10B as the deep zone background water quality. The mean chloride concentration (16.1 mg/L) in the shallow zone was significantly greater (5.19 mg/L) than in the deep zone (z=21.6). The chloride concentration in the effluent and the composite chloride concentration in the extraction wells were significantly greater than in both MW-10A (z=27.6) and MW-10B (z=25.3).

Nitrate was measured in the effluent of reclamation well RW-15 from May 1993 through September 1996. A plot of the data showed an exponential decrease in the nitrate from 9.2 mg/L in May 1993 to a baseline value of 0.6 mg/L in May 1996. An analysis of RW-12 data presented similar results. Reclamation wells located in proximity to identified hot spots have significantly higher nitrogen concentrations than those with lower nitrogen application rates.

At the proposed discharge flow of 80 mgd (89,600 af/yr) and continued direct reuse of 4,000 af/yr, about 85,600 af/yr will be discharged to the 1,660 acres of disposal ponds, of which 8,600 af/yr (10 percent) will evaporate and 77,000 af/yr (90 percent) will percolate to groundwater. The concentration affect of evaporative losses will cause an 11 percent increase in concentrations of waste constituents in effluent percolating to groundwater. This is illustrated in the mass balance calculation below.

(85,600 af/yr) (100 mg/L) = (8,600 af/yr) (0 mg/L) + (77,000 af/yr) (X mg/L)

X = 111 mg/L, or 11 percent greater that the concentration discharged to the disposal ponds.

The table below shows the concentrations of salinity constituents in WWTF effluent, effluent percolating to groundwater, and in four monitoring wells situated in an area removed from dairies or other concentrated sources of waste discharges.

				Shallow groundwater		Deeper groundwater	
Constituent	Units	Effluent to ponds[1]	Effluent to groundwater[2]	MW 13A[3]	MW 14A[3]	MW 13B[3]	MW 14B[3]
Chloride	mg/L	72	80	70	78	70	82
EC	µmhos/cm	780	866	901	781	1,170	902
Sodium	mg/L	81	90	78	83	81	92
TDS	mg/L	440	488	566	460	742	575

[1] Average values based on 2000 monitoring data
[2] Estimated at 11% greater than concentration in effluent discharged to disposal ponds
[3] Average values based on quarterly monitoring data from April 2000 through May 2001

As indicated above, the concentrations of salinity constituents in groundwater comprised predominately of percolating effluent are comparable to that of WWTF effluent as it is concentrated due to the effect of evaporation.

Water quality data from October 2000 for groundwater extracted from three recently-installed Flowpath™ reclamation wells, which extract groundwater from depths of 80 to 240 feet bgs, indicate the following average concentrations in mg/L: chloride (79), dissolved iron (0.19), dissolved manganese (1.24), total nitrogen (< 2), sodium (76), TDS (490), and total organic carbon (5). With few exceptions (i.e., MW-14A, MW-14B, and MW-15A), manganese concentrations in groundwater extracted from the WWTF's
monitoring wells are typically less than the detection limit of 0.02 mg/L. In contrast, the average manganese concentration of 1.24 mg/L in groundwater extracted from the Flowpath™ wells is almost 25 times the drinking water standard of 0.05 mg/L.

A reasonable explanation for the low concentrations of nitrate and high concentrations of manganese and total organic carbon in groundwater extracted from reclamation wells is the microbial degradation of organic carbon in percolating effluent. Biological wastewater treatment is the process of dissimilation and assimilation whereby organic compounds are broken down (dissimilation) or incorporated into cell mass (assimilation). The biochemical oxidation of organic carbon compounds to carbon dioxide and water and the conversion of nitrogen to nitrate provide cells energy. These processes occur in an aqueous solution giving the byproducts of carbonic acid and nitric acid.

If effluent percolating to groundwater contains more organic carbon than can be oxidized by the residual oxygen in the effluent, the soil and groundwater beneath the ponds may be an anoxic or oxygen deficient environment. In an aqueous environment under anoxic conditions, nitrate and oxidized forms of manganese and iron substitute for oxygen as a terminal electron acceptor whereby nitrate is reduced to nitrogen and manganese and iron are transformed to reduced forms. The reduced forms of manganese

and iron have a higher solubility product, K_{sp}, and therefore become more soluble in water. This reduced form dissolves in water and migrates.

Basin Plan

The *Water Quality Control Plan for the Tulare Lake Basin, Second Edition* (hereinafter Basin Plan) designates beneficial uses and contains water quality objectives for all waters of the Basin. Beneficial uses often determine the water quality objectives that apply to a water body. For example, waters designated as municipal and domestic supply must meet the maximum contaminant levels (MCLs) for drinking waters. The Basin Plan sets forth the applicable beneficial uses (industrial, agricultural, and domestic supply in this instance), procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity. The Basin Plan incorporates plans and policies of the State Water Resources Control Board by reference.

The Houghton and Dry Creek Canals are Valley Floor Waters, according to the Basin Plan. The beneficial uses of Valley Floor Waters are identified in the Basin Plan as agricultural supply, aesthetics, and groundwater recharge. The beneficial uses of underlying ground water are domestic, industrial, and agricultural supply. Dry Creek Canal originates in the City of Fresno within the Tulare Lake Basin and flows seasonally downstream of the WWTF. Houghton Canal flows seasonally downstream of the WWTF and originates within the Tulare Lake Basin at a junction with Dry Creek Canal in the City of Fresno. For irrigation purposes, they carry surface waters from the Kings River and Friant Kern Canal, both waters of the United States. They also carry urban storm runoff and surface waters from upgradient ephemeral streams. Downstream of the WWTF, the known beneficial uses are agricultural supply, aesthetics, and groundwater recharge.

The Basin Plan indicates that degradation of groundwater in the Tulare Lake Basin by salts is unavoidable without a plan for removing the salts from the Basin. In the absence of a valley wide drain to carry salts out of the valley, the Basin Plan indicates that the only other solution is to manage the rate of degradation by minimizing the salt loads to groundwater. The Board implements this policy, in part, by prescribing effluent salinity limits in waste discharge requirements for all discharges to land in the Basin. The Basin Plan's discharge salinity limit consists of narrative and numerical limits:

> The incremental increase in salts from use and treatment must be controlled to the extent possible. The maximum EC shall not exceed the EC of the source water plus 500 µmhos/cm. When the source water is from more than one source, the EC shall be a weighted average of all sources.

The Basin Plan encourages reclamation and does not consider disposal by evaporation/percolation or discharge to surface waters a permanent disposal solution when the potential exists for reclamation. Further, the Basin Plan requires that project reports for new or expanded wastewater facilities shall include plans for wastewater reclamation or the reasons why this is not possible.

Antidegradation

The antidegradation directives of section 13000 of the California Water Code require that waters of the State that are better in quality than established water quality objectives be maintained "consistent with

the maximum benefit to the people of the State." Waters can be of high quality for some constituents or beneficial uses and not others. Policies and procedures for complying with this directive are set forth in the Basin Plan (including by reference State Water Board Resolution No. 68-16, "Statement of Policy With Respect to Maintaining High Quality Waters in California," or "Antidegradation" Policy).

Resolution 68-16 is applied on a case-by-case, constituent-by-constituent basis in determining whether a certain degree of degradation can be justified. It is incumbent upon the Discharger to provide technical information for the Board to evaluate that fully characterizes:

- all waste constituents to be discharged, the background quality of the uppermost layer of the uppermost aquifer
- the background quality of other waters that may be affected
- the underlying hydrogeologic conditions
- waste treatment and control measures
- how treatment and control measures are justified as best practicable treatment and control
- the extent the discharge will impact the quality of each aquifer
- the expected degradation compared to water quality objectives

In allowing a discharge, the Board must comply with CWC section 13263 in setting appropriate conditions. The Board is required, relative to the groundwater that may be affected by the discharge, to implement the Basin Plan and consider the beneficial uses to be protected along with the water quality objectives essential for that purpose. The Board need not authorize the full utilization of the waste assimilation capacity of the groundwater (CWC 13263(b)) and must consider other waste discharges and factors that affect that capacity. The applicable beneficial uses (industrial, agricultural, and domestic supply in this instance), procedure for application of water quality objectives, and the process for and factors to consider in allocating waste assimilation capacity are set forth in the Basin Plan.

This discharge has been occurring for years. Previous conditions of discharge have specified that, except for EC, the discharge, in combination with other sources, shall not cause underlying groundwater to contain waste constituents in concentrations statistically greater than background quality. In the case of EC, the previous Order stipulated that the combined effect of the discharges shall not cause an incremental increase greater than 20 µmhos/cm in EC over the most recent five-year period. Certain waste constituents in municipal wastewater are not fully amenable to waste treatment and control and it is reasonable to expect some impact on groundwater. Some degradation for certain constituents is consistent with maximum benefit to the people of California because the technology, energy, water recycling, and waste management advantages of municipal utility service to the State far outweigh the environmental impact damage of a community that would otherwise be reliant on numerous concentrated individual wastewater systems. Economic prosperity of the Cities of Fresno and Clovis is of maximum benefit to the people of California, and therefore sufficient reason to accommodate increases in wastewater discharge provided terms of reasonable degradation are defined and met. The proposed Order authorizes some degradation consistent with the maximum benefit to the people of the State.

Groundwater monitoring data at this site is insufficient to establish the most appropriate receiving water limits. In addition, as explained elsewhere in this information sheet, certain aspects of waste treatment and control practices have not been and are unlikely to be justified as representative of BPTC. Reasonable time is necessary to gather specific information about the facility and the site to make informed, appropriate, long-term decisions. This proposed Order, therefore, establishes receiving water limitations to assure protection of the beneficial uses of waters of the State pending the completion of certain tasks and provides time schedules to complete specified tasks. The tasks provide that the Discharger is expected to identify, implement, and adhere to best practicable treatment and control as individual practices are reviewed and upgraded in this process. During this period, degradation may occur from certain constituents, but by interim conditions can never exceed water quality objectives (or background water quality should it exceed objectives) or cause nuisance.

Water quality objectives define the least stringent limits that could apply as water quality limitations for groundwater at this location, except where background quality unaffected by the discharge already exceeds the objective. The values below reflect water quality objectives that must be met to maintain specific beneficial uses of groundwater. Unless natural background for a constituent proves higher, the groundwater quality limit established in proposed Order is the most stringent of the values listed for the listed constituents.

Constituent	Units	Value	Beneficial Use	Criteria or Justification
Ammonia	mg/L	0.5	MUN[1]	Taste and Odor[2]
Boron	mg/L	0.7	AGR[3]	Boron senstivity[4]
Chloride	mg/L	106	AGR[3]	Chloride sensitivity on certain crops irrigated via sprinklers[4]
		142	AGR[3]	Chloride sensitivity on certain crops[4]
		250	MUN[1]	Recommended Secondary MCL[5]
		500	MUN[1]	Upper Secondary MCL[5]
Conductivity (EC)	µmhos/cm	750	AGR[3]	Salt sensitivity[4]
		900	MUN[1]	Recommended Secondary MCL[5]
		1,600	MUN[1]	Upper Secondary MCL[5]
Iron	mg/L	0.3	MUN[1]	Secondary MCL[6]
Manganese	mg/L	0.05	MUN[1]	Secondary MCL[6]
Nitrate as N	mg/L	10	MUN[1]	Primary MCL[7]
Nitrite as N	mg/L	1	MUN[1]	Primary MCL[7]
pH	pH Units	6.5 to 8.5	MUN	Secondary MCL[8]
Sodium	mg/L	69	AGR[3]	Sodium sensitivity on certain crops[4]
Total Coliform Organisms	MPN/100 mL	2.2	MUN[1]	Basin Plan
Total Dissolved Solids	mg/L	450	AGR[3]	Salt sensitivity[4]

Constituent	Units	Value	Beneficial Use	Criteria or Justification
		500	MUN[1]	Recommended Secondary MCL[5]
		1,000	MUN[1]	Recommended Upper MCL[5]
Total Trihalomethanes	µg/L	100	MUN[1]	MCL[9]
Chloroform	µg/L	1.1	MUN[1]	Narrative Toxicity Criteria[10]
Bromodichloromethane	µg/L	0.27	MUN[1]	Narrative Toxicity Criteria[10]
Dibromochloromethane	µg/L	0.37	MUN[1]	Narrative Toxicity Criteria[10]
Bromoform	µg/L	4.3	MUN[1]	Narrative Toxicity Criteria[10]

See footnotes next page

[1] Municipal and domestic supply
[2] Council of the European Union, On the Quality of Water Intended for Human Consumption, Council Directive 98/83/EC (3 November 1998).
[3] Agricultural supply
[4] Ayers, R. S. and D. W. Westcot, Water Quality for Agriculture, Food and Agriculture Organization of the United Nations – Irrigation and Drainage Paper No. 29, Rev. 1, Rome (1985)
[5] Title 22, California Code of Regulations (CCR), section 64449, Table 64449-B
[6] Title 22, CCR, section 64449, Table 64449-A
[7] Title 22, CCR, section 64431, Table 64431-A
[8] United States Environmental Protection Agency
[9] Title 22, CCR, section 64439
[10] California Environmental Protection Agency, Office of Environmental Health Hazard Assessment Cancer Potency Factor as a Drinking Water Level, *California Environmental Protection Agency Toxicity Criteria Database*

Municipal wastewater contains numerous dissolved inorganic waste constituents (i.e., salts, minerals) that together comprise total dissolved solids (TDS). Each component constituent is not individually critical to any beneficial use. Constituents that are critical are individually listed. The cumulative impact from these other constituents, along with the cumulative affect of the constituents that are individually listed can be effectively controlled using TDS as a generic indicator parameter. Most dissolved inorganic substances in water are in the ionized form and so contribute to a solution's ability to carry an electrical current, or its "electrical conductivity" (EC). EC varies both with the number and type of ions the solution contains and is strongly temperature dependent. It is standard practice to report a solution's EC at 25° Celsius (this value is technically called "specific conductance"). Only ions can carry a current, however. Un-ionized species of weak acids or bases will not carry a current, nor will uncharged soluble organic materials, such as ethyl alcohol and glucose, even though these constituents comprise a portion of TDS. Although EC is affected by the nature of the various ions, their relative concentrations, and ionic strength of the water, EC measurements can give a practical estimate of the variations in a solution's dissolved mineral content. An empirical factor may be developed from simultaneous measurements of TDS and EC that allows for the rapid estimation of TDS from EC measurements.

Treatment Technology and Control

Given the character of municipal wastewater, secondary treatment technology is generally sufficient to control degradation of groundwater from decomposable organic constituents. Adding disinfection significantly reduces populations of pathogenic organisms, and reasonable soil infiltration rates and unsaturated soils can reduce them further. Total coliform, the indicator parameter for pathogenic organisms, should not be found in groundwater beneath a well-designed, well-operated facility. The Discharger indicates, however, that groundwater extracted from municipal wells occasionally contains detectable concentrations of coliform organisms.

Municipal wastewater typically contains nitrogen in concentrations greater than water quality objectives, which vary according to the form of nitrogen. Degradation by nitrogen can be controlled by an appropriate secondary treatment system (e.g., oxidation ditch), tertiary treatment for nitrogen reduction, and agronomic reuse on harvested crops. The effectiveness varies, but generally best practicable treatment and control should be able to control nitrogen degradation at a concentration well below the water quality objectives.

Waste constituents that are forms of salinity pass through the treatment process and soil profile and effective control of long-term affects relies upon effective source control and pretreatment measures. In the best of circumstances, long-term land discharge of treated municipal wastewater will degrade groundwater with salt (as measured by TDS and EC) and the individual components of salts (e.g., sodium, chloride). Not all TDS constituents pass through the treatment process and soil profile in the same manner or rate. Chloride tends to pass through both rapidly to groundwater. As chloride concentrations in most groundwaters in the region are much lower than in treated municipal wastewater, chloride is a useful indicator parameter for evaluating the extent to which effluent reaches groundwater.

Other indicator constituents for monitoring for groundwater degradation due to recharged effluent include total coliform bacteria, ammonia, total nitrogen, and total trihalomethanes (when the effluent is chlorinated). Chlorine disinfection of effluent causes formation of trihalomethanes, which are priority pollutants. Treatment to reduce these in wastewater generally has not been performed, and little is known at this point on the typical impact on groundwater. Total trihalomethanes (TTHMs) are chlorinated organic materials that are toxic at low concentrations. Common TTHMs include bromoform, bromodichloromethane, dibromochloromethane, and chloroform. While the State drinking water regulations (i.e., Title 22, CCR, section 64439) establish a maximum contaminant level for TTHMs of 100 µg/L, the actual concentrations at which THMs components are considered "toxic" to humans are much lower (e.g., chloroform's human health toxicity limit is 1.1 µg/L). The Basin Plan states that groundwaters "shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life associated with designated beneficial uses."

Boron is another TDS constituent that may occur in wastewater in concentrations greater than groundwater depending on the source water, to the extent residents use cleaning products containing boron, and whether any industrial dischargers utilize boron (e.g., glass production, cosmetics). Still other constituents in treated municipal waste that may pass through the treatment process and the soil

profile include recalcitrant organic compounds (e.g., ethylene glycol, or antifreeze), radionuclides, and pharmaceuticals. Hazardous compounds are not usually associated with domestic wastes and when present are reduced in the discharge to inconsequential concentrations through dilution with domestic waste, treatment, and the implementation of effective pretreatment programs.

A discharge of wastewater that overloads soils with nutrients and organics can result in anaerobic conditions in the soil profile, which in turn creates organic acids and decreases soil pH. Under conditions of low soil pH (i.e., below 5), iron and manganese compounds in the soil can solubilize and leach into groundwater. Discharge of residual sludge to land may also lead to increases in groundwater alkalinity and hardness to concentrations that impair the water's beneficial uses and contribute to an overall increase in TDS. Overloading soils with nutrients and organics is preventable and does not constitute BPTC as used in Resolution 68-16. Elevated concentrations in groundwater compared to percolating effluent of dissolved iron, dissolved manganese, alkalinity, and hardness are useful indicators to determine whether components of the WWTF with high-strength waste constituents, such as sludge handling facilities, are ineffective in containing waste.

Title 27

Title 27, CCR, section 20380 et seq. ("Title 27"), contains regulations to address certain discharges to land. Title 27 establishes a waste classification system, specifies siting and construction standards for full containment of classified waste, requires extensive monitoring of groundwater and the unsaturated zone for any indication of failure of containment, and specifies closure and post-closure maintenance requirements. Generally, no degradation of groundwater quality by any waste constituent is acceptable.

Discharges of domestic sewage and treated effluent can be treated and controlled to a degree that will not result in unreasonable degradation of groundwater. For this reason, they have been conditionally exempted from Title 27, except for residual sludge and solid waste generated as part of the treatment process [section 20090(a) of Title 27]. The condition requires that the discharge not result in violation of any water quality objective in groundwater.

Treatment and storage facilities for sludge that are part of the WWTF are considered exempt from Title 27 under section 20090(a), under the condition that the facilities not result in a violation of any water quality objective. However, residual sludge (for the purposes of the proposed order, sludge that will not be subjected to further treatment by the WWTF) is not exempt from Title 27. Solid waste (e.g., grit and screenings) that results from treatment of domestic sewage and industrial waste also is not exempt from Title 27. This residual sludge and solid waste are subject to the provisions of Title 27.

Accordingly, the municipal discharge of effluent and the operation of treatment or storage facilities associated with a municipal wastewater treatment plant can be allowed without requiring compliance with Title 27, but only if resulting degradation of groundwater is in accordance with the Basin Plan. This means, among other things, degradation of groundwater must be consistent with Resolution 68-16 and in no case greater than water quality objectives.

PROPOSED ORDER TERMS AND CONDITIONS

Discharge Specifications

As in other WDRs orders for municipal discharges recently adopted by the Board, the proposed Order implements a two-phased approach to setting final groundwater limitations. While the Board has determined that some degradation is in the public interest, it cannot yet determine how much due to incomplete data and evaluation of treatment and control measures. In Phase 1 of this 'implementation approach,' WDRs orders establish receiving water limitations that assure protection of the beneficial uses of groundwater pending the completion of certain tasks in accordance with a time schedule. In Phase 2, determination of site-specific groundwater limitations to be adopted in WDRs will depend upon the Board's evaluation of the results of the tasks. The numerical implementation of many Basin Plan narrative water quality objectives in Phase 1, in accord with the procedures prescribed in the Basin Plan, represents the threshold above which there will be adverse impacts on beneficial uses of groundwater (e.g., drinking water MCLs). Since the proposed Order implements existing water quality objectives, the Board is not required to undertake further consideration of the factors in Water Code section 13241, including economic considerations.

The discharge specifications prescribed in this Order for BOD_5, TSS, and EC, are based on the Basin Plan. The proposed Order carries over the effluent limitations for BOD_5, TSS, settleable solids, and EC from the previous Order. The Basin Plan requires municipal facilities discharging in excess of 1 mgd to provide removal of 80 percent or reduction to 40 mg/L, whichever is more restrictive, of both 5-day BOD and suspended solids. While the current Order prescribes a monthly average daily discharge limit of 40 mg/L for BOD and for TSS, it does not require 80 percent removal. The proposed Order's WWTF Discharge Specification B.3 implements the Basin Plan's 80 percent removal requirement. From January 2000 to September 2001, monthly average influent and effluent BOD and suspended solids concentrations indicate that percent removals range from 47 to 94 and average 86 for BOD and range from 64 to 97 and average 90 for suspended solids. The Discharger currently relies on groundwater recharge for effluent disposal. In 2000, the discharge's monthly average chloride concentration ranged from 59 to 87 mg/L, averaged 70 mg/L, and had a 95% confidence level of 82 mg/L. The Basin Plan establishes a maximum effluent chloride limit of 175 mg/L for discharges to areas that may recharge to good quality groundwater. The previous Order prescribed monthly average and daily maximum chloride discharge limitations of 175 and 205 mg/L, respectively. As discussed later, the proposed Order prescribes a groundwater chloride limitation of 106 mg/L to protect the existing and future beneficial uses of area groundwater. Rather than carrying over the previous Order's discharge chloride limitations, which, if approached, would result in exceedances of the proposed Order's groundwater chloride limitation, the proposed Order does not prescribe a discharge chloride limitation. The proposed Order requires the Discharger to conduct a study that establishes appropriate groundwater limitations based on the factual circumstances of the discharge. In lieu of continuing to impose an effluent chloride limitation that may not be protective of groundwater given the present information, Staff is recommending a limit be formulated and proposed for Board consideration after the Discharger completes its groundwater study. The discharge specifications regarding dissolved oxygen and freeboard are consistent with Board policy for the prevention of nuisance conditions, and are applied to all such facilities.

The proposed Order limits the use of recycled water to flood irrigation of fodder, fiber, seed crops, and of crops such as wine grapes that undergo extensive commercial, physical, or chemical processing before human consumption, and requires the Discharger to comply with the provisions of Title 22. To ensure compliance with Title 22 and Board reclamation policy, the proposed Order requires the Discharger to implement best management practices with respect to effluent reuse (e.g., to reuse effluent at reasonable agronomic rates considering the crop, soil, climate, and irrigation management plan). The setback distances prescribed in Reclamation Specification F.3 are carried over from the previous Order with one exception. While the previous Order required a setback distance of 100 feet for both irrigation and domestic wells, the proposed Order prescribes a setback distance of 150 feet for domestic wells in accordance with Title 22, section 60307(d).

The conditions for sludge, solid waste, and biosolids management proposed in the proposed Order are intended to assure that degradation resulting from the City's management of sludge is in accordance with the Basin Plan. The proposed Order requires that storage, use and disposal of biosolids comply with the self-implementing federal regulations of 40 CFR 503, which are subject to enforcement by the U.S. Environmental Protection Agency not the Board, and the Statewide General Order for the Discharge of Biosolids (Water Quality Order No. 2000-10-DWQ) (or any subsequent document which replaces Order No. 2000-10-DWQ).

In accordance with DHS recommendations described earlier, the proposed Order requires the Discharger to (a) assess the current status of all private and domestic wells that exist within the 25-square-mile area described in Finding No. 9, (b) monitor domestic supply wells within this area for contaminants, and (c) conduct a comprehensive study to assess the fate and effects of the past and current discharge on the groundwater basin. The proposed Order further requires the Discharger to (a) identify the types of crops grown in the area served by FID canals that receive groundwater extracted by the Operator's reclamation wells and (b) provide information on the dilution of the extracted groundwater with fresh water prior to irrigation application. Because it is likely that food crops are grown or could be grown in the subject
area, the proposed Order requires the Discharger to undertake a timely evaluation of the degree of soil treatment provided by the current recharge and extraction operation and a determination of the level of filtration and virus removal treatment provided.

Regarding the discharge of stillage to the Stillage Site, the proposed Order carries over the previous Order's specifications for stillage disposal, which were adapted from the Stillage Guidelines. While the Operator has been discharging stillage to SS-1 for decades, it only recently began discharging stillage to SS-2. The groundwater impacts from the Operator's long-term discharge of stillage appear to be limited to salinity constituents, although there is the potential for nitrate contamination due to the accumulation of organic nitrogen in SS-1 soils. In the event the stillage discharge causes or contributes to exceedances of water quality objectives, the proposed Order has a Provision that allows the Board to reopen the Order to consider adding or revising appropriate stillage discharge specifications or groundwater limitations for the problem constituents.

Canandaigua's discharge to the Stillage Site is scheduled to cease by fall 2003, and the WWTF does not have the capacity to treat the discharge. While the continued discharge of stillage during the next two years may further degrade area groundwater for salinity, Staff is recommending that the Board allow it

to it be continued in the manner previously permitted, provided the Board requires the Operator to commence regularly planting and harvesting crops in the Stillage Site and to store collected leathers in a manner that will violate Groundwater Limitations. Staff is also recommending that the Board require the Operator to provide more detailed monitoring data on its stillage disposal operation, including data on the quality of soil-pore water under the Stillage Site. The technical report required by Provision H.5 of the proposed Order includes a description of the manner in which the Discharger proposes to monitor the quality of soil pore water beneath the Stillage Site. Vadose zone liquid can be readily sampled via lysimeters. The proposed Order's Monitoring and Reporting Program identifies the minimum sample size required for listed monitored constituents. The benefits of acquiring soil pore water quality data through vadose zone monitoring justify the costs involved in lysimeter acquisition, installation, sample collection, and laboratory analysis. Analytical results from this effort will be instrumental in evaluating the efficacy of treatment provided by the soil profile within the Stillage Site. Analytical results collected after stillage disposal ceases by January 2004 will monitor the extent to which stillage waste constituents (or their decomposition byproducts) continue to leach through the soil profile, especially in the original 95-acre stillage disposal area (SS-1). As indicated in Finding No. 44, the long-term discharge of stillage to SS-1 has resulted in a massive accumulation of organic nitrogen in the upper two feet of the soil profile. Attenuation of this massive loading through cropping is expected to take numerous years. At such time when SS soil nitrogen content is comparable to background, the Discharger may request termination of vadose zone monitoring. Such a modification in the proposed Order's Monitoring and Reporting Program can be executed by the Executive Officer.

The proposed Order prescribes groundwater limitations that reflect numerical and narrative water quality objectives (WQOs) for groundwater established in the Basin Plan. The proposed Order requires the discharge not to cause or contribute to exceedances of the groundwater limitations. Designated beneficial uses of area groundwater include municipal (MUN) and agricultural (AGR) supply. The Basin Plan states that "[w]ater quality objectives apply to all waters within a surface or ground water resource for which beneficial uses have been designated, rather than at an intake, wellhead or other point of consumption." Groundwater WQOs include (1) chemical constituents (including pesticides and radioactivity), (3) salinity, (4) tastes and odors, and (5) toxicity. For groundwaters designated MUN, the Basin Plan establishes numerical WQOs for bacteria and chemical constituents. The latter consists of drinking water maximum contaminant levels (MCLs) in Title 22, sections 64431 (Inorganic Chemicals); 64431 (Fluoride); 64443 (Radioactivity) 64444 (Organic Chemicals); 64449 (Secondary MCLs – Consumer Acceptance Limits); and lead not to exceed 0.015 mg/L.

The total coliform organism limitation of 2.2 MPN/100 mL in Groundwater Limitation G.1.a is based on the Basin Plan's WQO (i.e., the concentration of TCO over any 7-day period shall be less than 2.2/100 mL). Groundwater Limitation G.1.b prescribes a value of 10 mg/L as total nitrogen to ensure that groundwater nitrate levels will remain at or below the Title 22 primary drinking water MCL for nitrate (45 mg/L as nitrate or 10 mg/L as N). The limitations for chemical constituents prescribed in Groundwater Limitation G.1.c reflect the Title 22 drinking water MCLs. Groundwater Limitation G.2 prescribes limits for boron, chloride, EC, sodium, and TDS to protect existing and future beneficial uses of area groundwater for agriculture. The majority of area agriculture water supply is currently delivered via flood irrigation. Accordingly, it may not be critical to maintain the low salt concentrations in agricultural supply required for sprinkler irrigation. Additionally, the Discharger has implemented best practicable control for salt constituents through its implementation of an effective salinity source control

program.

The proposed Order requires the Discharger to conduct a BPTC evaluation of the discharge (including source control, pretreatment, and treatment). Once it completes its BPTC evaluation, the Discharger may, at its discretion, propose for Board consideration site-specific, constituent-specific limits for salinity constituents (e.g., chloride, EC, sodium, and TDS). In the next Order regulating the discharge, the Board will evaluate the Discharger's justification of BPTC implementation and its proposed groundwater salinity limitations. It is possible upon further documentation that the resulting degradation from salt can be found consistent with Resolution 68-16. Monitoring data submitted to date for WWTF effluent and groundwater indicates that the discharge will not result in exceedances of the proposed Order's groundwater limitation for boron of 0.7 mg/L. Staff determined the groundwater limitations for the remaining constituents as follows. The proposed Order prescribes an effluent EC limit of 900 µmhos/cm. Currently, WWTF effluent averages less than 800 µmhos/cm. As described previously, the concentration effect of evaporative losses are such that the concentration of waste constituents in effluent percolating to groundwater is about 11 percent greater than that discharged to disposal ponds. It is reasonable to assume that the relative concentrations of chloride and sodium in WWTF effluent will remained unchanged as the effluent EC approaches the 900 µmhos/cm limitation. The table below summarizes the derivation of the proposed Order's groundwater limitations for chloride, EC, sodium, and TDS.

Constituent	Units	Current discharge to disposal ponds[1]	Discharge to disposal ponds at maximum EC[2]	Discharge to groundwater at maximum EC[3]	Proposed Limitation
Chloride	mg/L	72	832	91.3	106[4]
EC	µmhos/cm	780	900	990	990
Sodium	mg/L	81	94[2]	103	103
TDS	mg/L	440	507[5]	557	560

[1] Average values based on 2000 monitoring data
[2] Assumes relative concentrations remain unchanged at higher EC concentration
[3] Estimated at 11% greater than concentration in effluent discharged to disposal ponds
[4] Reflects maximum chloride concentration for chloride-sensitive crops
[5] Assumes unchanged ratio of TDS:EC of 440:780 (i.e., TDS = 0.564 * EC)

The last two groundwater limitations reflect narrative WQOs contained in the Basin Plan. Groundwater Limitation G.3 implements the Basin Plan's WQO for taste and odor. The taste threshold for ammonia, a waste constituent in municipal wastewater, is 0.5 mg/L. The limitation of 0.5 mg/L for ammonia ensures that this waste constituent will not adversely affect the beneficial use of area groundwater for human consumption. Lastly, Groundwater Limitation G.4 implements the Basin Plan's WQO for toxicity.

Monitoring Requirements

Section 13267 of the CWC authorizes the Board to require monitoring and technical reports as necessary to investigate the impact of a waste discharge on waters of the state. In recent years there has been increased emphasis on obtaining all necessary information, assuring the information is timely as

well as representative and accurate, and thereby improving accountability of any discharger for meeting the conditions of discharge. Section 13268 of the CWC authorizes assessment civil administrative liability where appropriate.

The proposed Order prescribes monitoring of discharge BOD_5, TSS, pH, and EC. The monitoring of these constituents is necessary to check compliance with discharge specifications. The proposed Order also prescribes monitoring of discharge nitrogen (as nitrite, nitrate, TKN, and total nitrogen), quarterly monitoring of minerals, and semiannual monitoring of metals and priority pollutants for discharges from Plant 1 and Plant 2 (when in operation), and quarterly and annual monitoring of source water quality. Staff is recommending the Discharger monitor effluent for priority pollutants to evaluate whether there is reasonable potential for the discharge to cause toxicity in groundwater. The source water monitoring, at the request of the Operator, utilizes data compiled in the Operator's electronic database for DHS reporting requirements. This lessens the financial burden on the Operator and increases the likelihood that source water quality is adequately characterized. Monitoring by the Operator over the years has not revealed any significant radiological waste constituents in either WWTF effluent or area groundwater. As such, the proposed Order eliminates the monitoring of radiological constituents in the discharge and groundwater.

The previous Order required the Discharger to sample systematically a representative number of disposal ponds at least once every seventh calendar day for dissolved oxygen (DO) and freeboard. During the two-year period beginning 1 January 1998, the Operator measured pond DO 7,624 times and found the value to be less than 1.0 mg/L for only 14 separate occurrences for a frequency of 0.0018 (0.18%). Therefore, the proposed Order decreases the frequency of pond DO monitoring to an as-needed basis.

Monitoring available freeboard in disposal ponds is necessary for several reasons. It documents compliance Disposal Pond Specification C.4, which requires all ponds to have a minimum of two feet available freeboard. It provides data for detecting reductions in effluent infiltration rates, which may, in turn, signify the need for pond maintenance to restore design infiltration rates. It also provides data that may signify levee damage (i.e., a sudden drop in freeboard may signify leakage caused by burrowing animals). The proposed Order requires the Discharger to (1) inspect pond freeboard of all disposal ponds daily and document all instances of noncompliance with Disposal Pond Specification C.4, which requires all ponds to have a minimum of two feet available freeboard; (2) monitor pond freeboard daily in external disposal ponds; (3) monitor pond freeboard at least once every seventh calendar day in a internal disposal ponds.

The proposed Order prescribes monitoring of stillage waste, including flow, BOD_5 (total and soluble), COD (total and soluble), total organic carbon, total nitrogen (nitrate and TKN), phosphorus, TDS, and EC. The monitoring of these constituents is necessary to check compliance with stillage discharge specifications and to monitor constituents that have a potential impact upon groundwater or will potentially create nuisance conditions. Further, the proposed Order requires the Operator to provide detailed descriptions on the manner in which it conducts its stillage discharge operation, perform periodic monitoring of Stillage Site soils, monitor vadose zone water quality, and monitor the quantity and chemical characteristics of groundwater passing under the Stillage Site. This information will be used by the Board to evaluate similar stillage disposal operations elsewhere in the Central Valley Region.

The proposed Order requires the Discharger to collect composite samples of sludge when it is removed in accordance with EPA's *POTW SLUDGE SAMPLING AND ANALYSIS GUIDANCE DOCUMENT, AUGUST 1989,* and test for arsenic, cadmium, molybdenum, copper, lead, mercury, nickel, selenium, and zinc. The proposed Order requires the Discharger to submit an annual summary of sludge discharge operations.

The Title 27 zero leakage protection strategy relies heavily on extensive groundwater and unsaturated zone monitoring to increase a discharger's awareness of, and accountability for, compliance with the prescriptive and performance standards. With a high volume, concentrated, uncontained discharge to land, monitoring takes on even greater importance. The proposed Order includes monitoring of applied waste quality, application rates, and groundwater.

The proposed Order requires a monitoring well network that effectively measures the quality of groundwater that could be impacted by the discharge. The existing well network monitors the uppermost layer of the aquifer, and data indicate a number of problem areas that call into question some aspects of treatment and control. The proposed Order requires the Discharger to evaluate the uppermost aquifer for a representative zone against which groundwater limitations will be applied. Use of the existing network will continue for the purposes of monitoring the effects of the discharge on the uppermost layer of groundwater until an alternate network suitable for evaluating the effectiveness of BPTC and compliance with Groundwater Limitations is approved by the Executive Officer in accord with the process outlined in the proposed Order.

The proposed Order also requires monitoring of groundwater extracted by the reclamation wells. The proposed Order's groundwater monitoring requires quarterly sampling from identified monitoring wells for constituents in the discharge that may degrade groundwater quality and for which numerical limitations have been prescribed (e.g., nitrate, total nitrogen, chloride, sodium, etc.). Additional monitored constituents include total organic carbon, general minerals, metals, dissolved oxygen, and oxidation-reduction potential. The last two parameters, which can be readily obtained through the use of hand-held probes during the time of sample collection, provide information to evaluate the extent to which microbial degradation of organic matter has created anoxic or anaerobic conditions (i.e., conditions of very low or no dissolved oxygen). Factual evidence of organic overloading would include the presence of total organic carbon and soluble manganese in extracted groundwater along with very low or no dissolved oxygen and nitrate, and oxidation-reduction potentials corresponding to manganese reduction.

Consistent with the implementation approach taken in the proposed Order, evaluation of compliance with Groundwater Limitations cannot occur until the initiation of the approved representative zone monitoring program. The approved representative zones of the aquifer will be identified in the hydrogeologic investigation described in Provision H.7. Wells must be installed to measure the quality of water within these zones for comparison with Groundwater Limitations as part of the proposed Order. The proposed Order provides a schedule for proposing, then providing the monitoring network, for these representative zones. Until the network is installed and monitoring initiated, the Board cannot evaluate compliance with Groundwater Limitations.

In accordance with DHS recommendations described earlier, the proposed Order requires the Discharger to monitor a representative sample of domestic supply wells within the 25-square-mile area encompassed by the mound of percolated effluent. The collected data will be used to determine if these supply wells are producing safe water for domestic use. In addition, the proposed Order requires the Discharger to install continuous turbidity meters on representative reclamation wells and to collect continuous turbidity data for at least one year. Acquisition of turbidity data for groundwater extracted from the Operator's reclamation wells is essential in determining the quality of percolated effluent that the Operator discharges to FID canals for unrestricted use. To qualify as a "filtered" wastewater pursuant to Title 22, section 60301.320, the groundwater extracted from reclamation wells must not have a turbidity that exceeds an average of 2 NTU within a 24-hour period, 5 NTU more than 5 percent of the time within a 24-hour period, and 10 NTU at any time.

As described previously, the proposed Order requires the Discharger to provide detailed monitoring data on its stillage disposal operation, including water quality data for soil-pore water collected from lysimeters installed in Stillage Site soils.

CEQA CONSIDERATIONS

The City of Fresno certified a final environmental impact report (EIR) dated 31 October 1995 for an expansion in WWTF treatment and disposal capacity in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code section 21000 et seq.) and the State CEQA Guidelines. The expansion project includes (a) increasing Plant 1 treatment capacity to 80 mgd to accommodate urban growth in the Discharger's service area, (b) discontinuing use of Plant 2 to improve the WWTF's overall air emissions, reliability, and operations, and (c) constructing an additional 600 acres of infiltration basins (i.e., effluent disposal ponds) to provide disposal capacity for the increased flows and to comply with Board-prescribed pond freeboard requirements. The EIR estimates that, at full build out, the project would discharge an additional 11,200 af/yr of effluent to area groundwater. While the EIR states that the infiltration of effluent over the years has caused concentrations in groundwater of TDS, EC, and sodium to increase, the EIR states that the project would not affect public or private water supplies. The EIR identifies the project's impact on groundwater as temporary, as the City "shall commit to developing a plan for the reclamation of water infiltrated at the plant by 1997." The EIR promises that the City "shall continue to develop and implement a reuse program for its treated wastewater to reduce the need for future infiltration basins. The EIR further states that the City "is also developing a reuse program for its treated wastewater to alleviate groundwater conditions under the treatment plant…[to]…mitigate the cumulative effects to water resources to a level of less than significant."

The project certified by the City of Fresno as described in the EIR differs from the project characterized in the Discharger's 31 December 1996 Report of Waste of Discharge (RWD). The RWD describes a project that increases Plant 1's treatment capacity to 88 mgd, continues use of Plant 2, and adds 600 acres of disposal ponds. The increase in amount of effluent percolating from the project described in the RWD is nearly 25,000 af/yr, well over the 11,200 af/yr identified in the EIR. Since submitting the RWD, the Discharger indicates that (a) it plans to treat some industrial flows in Plant 2, as necessary, prior to their full treatment in Plant 1; (b) the 80 mgd specified in the EIR represents the annual monthly average daily discharge flow (i.e., the average of the monthly average daily discharge flow for the

calendar year); and (c) the EIR did not correctly reflect that the Plant 1 would be designed, constructed, and operated to treat a short-term maximum monthly average daily discharge flow of 88 mgd. The additional 8 mgd treatment capacity accommodates seasonal peaks from food-processing industries that generally occur in September.

This Order, in accordance with the terms of the certified EIR, limits treatment and disposal capacity to 80 mgd, and requires the Discharger to implement one or more reuse projects by spring 2004 to recycle an additional 4,200 acre-feet of treated wastewater in addition to that currently either directly or indirectly recycled or is proposed to be recycled by Calpine.

The Board has reviewed the City of Fresno's EIR for the WWTF expansion project and finds that any potential significant adverse impacts to water quality will be mitigated to insignificant levels or is acceptable due to overriding considerations provided the Discharger complies with the terms in the proposed Order. The proposed Order, in accordance with the terms of the City of Fresno's certified EIR, limits the WWTF's annual monthly average daily discharge flow to 80 mgd and its maximum monthly average daily discharge flow to 88 mgd. The proposed Order requires the Discharger to implement by 2004 one or more reuse projects to recycle at least 4,200 af/yr in order to render as temporary the WWTF expansion project's impacts to groundwater. It further requires the Discharger to evaluate, in consultation with DHS, the discharge's impact on area groundwater's use as a domestic and municipal supply.

On 25 March 1998, the City of Fresno adopted a negative declaration (Environmental Assessment 98-03), in accordance with CEQA and State CEQA Guidelines for the discharge of stillage to the 50-acre stillage disposal site (SS-2) adjacent to the existing 95-acre stillage disposal site (SS-1). Mitigation measures 3 – 15 are identical to Stillage Discharge Specifications C.1 – C.13 from WDRs Order No. 96-054. In its review of this document, the Board, as a responsible agency under CEQA, finds that it does not adequately mitigate the potentially significant adverse impact to groundwater due to the accumulation of nitrogen in stillage disposal area soils, nor does it monitor the fate of waste constituents as it percolates through the upper soil profile. This Order requires the Discharger to commence planting and harvesting crops in the Stillage Site to reduce the nitrogen content in stillage disposal area soils. It also requires the Discharger to implement vadose zone monitoring for waste constituents and their decomposition by-products.

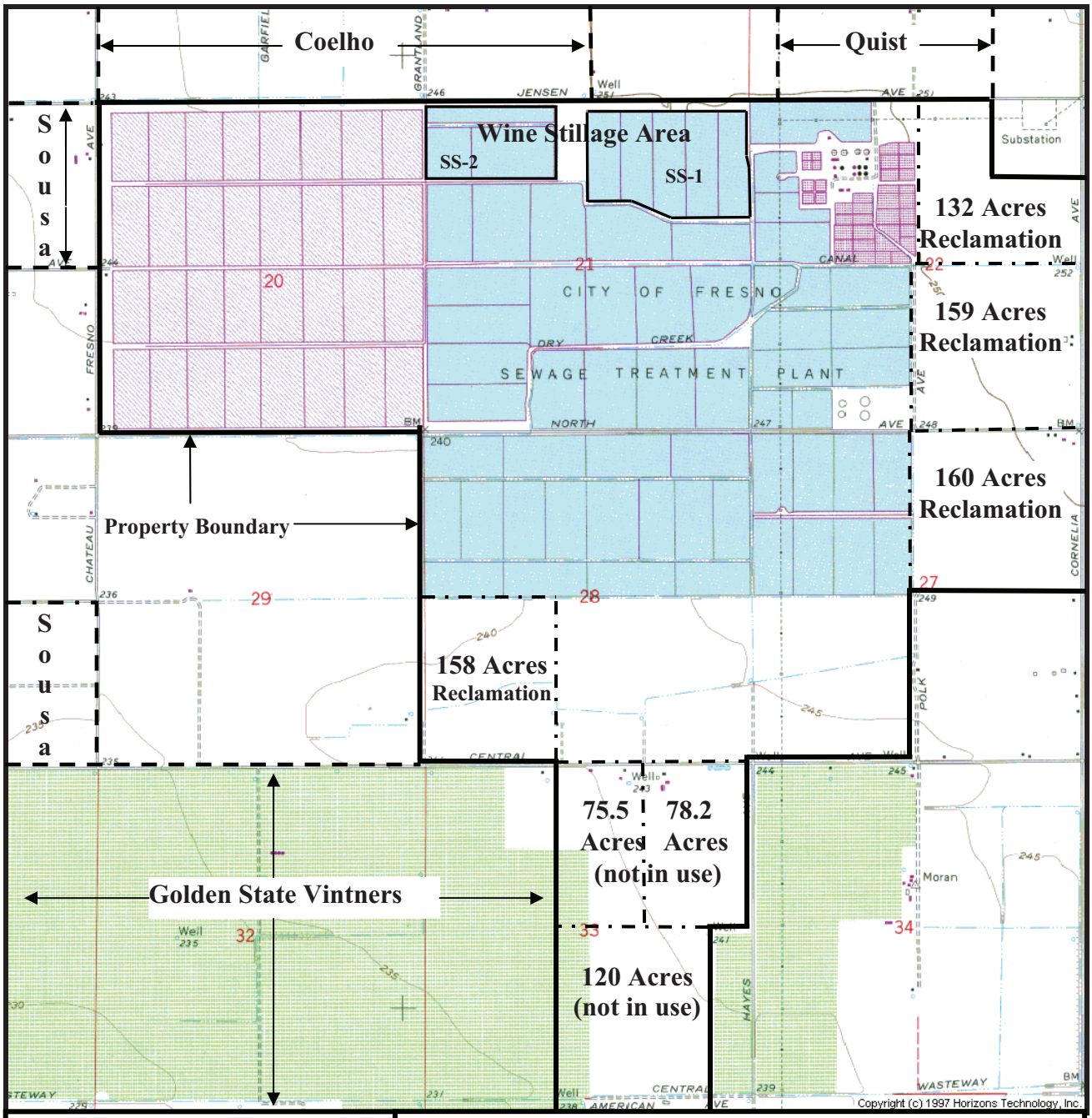
Reopener

The conditions of discharge in the proposed Order were developed based on currently available technical information and applicable water quality laws, regulations, policies, and plans, and are intended to assure conformance with them. However, information is presently insufficient to develop final effluent and groundwater limitations, so the proposed Order contains interim limitations. Additional information must be developed and documented by the Discharger as required by schedules set forth in the proposed Order. As this additional information is obtained, decisions will be made concerning the best means of assuring the highest water quality possible may that could involve substantial cost. It may be

appropriate to reopen the Order if applicable laws and regulations change, but the mere possibility that such laws and regulations may change is not sufficient basis for reopening the Order. The CWC requires that waste discharge requirements implement all applicable requirements.

Several other more likely reasons for reconsidering terms of the Order exist, and the Order may be opened for this purpose at the Board's discretion. For example, Board procedures require periodic review of the effectiveness of requirements at a frequency proportional to the threat the discharge has to water quality with update as appropriate. The Order will definitely be reopened for consideration of BPTC and establishing final numeric groundwater limitations. It is also conceivable that monitoring of compliance may identify a waste constituent, possibly a toxic waste constituent, that violates or threatens to violate groundwater limitations, establishing a need to consider an appropriate numeric effluent limit for that waste constituent.

BLH:jlk:10/19/01 AMENDED



1700 FT
(approximate)

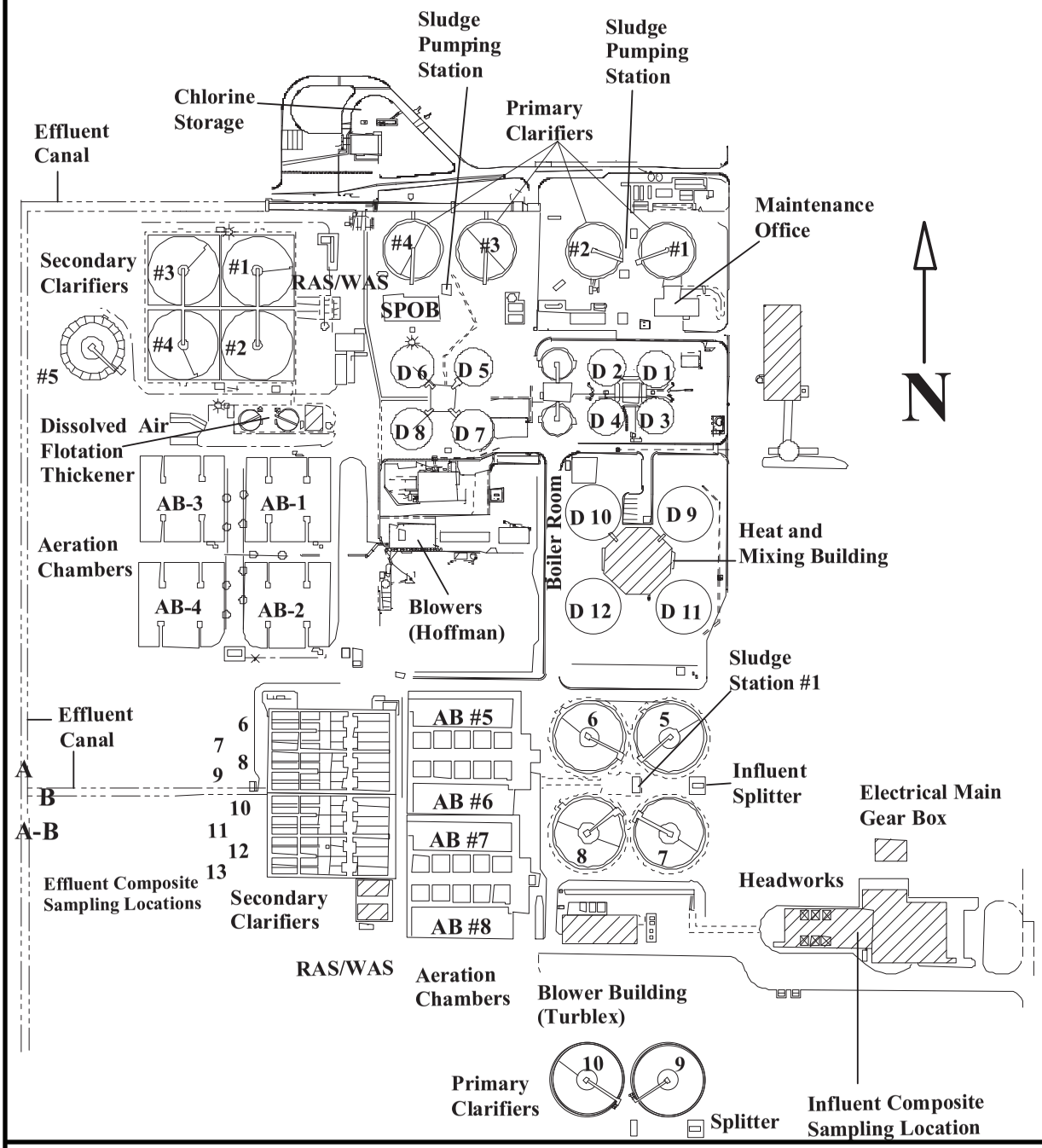
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Attachment A

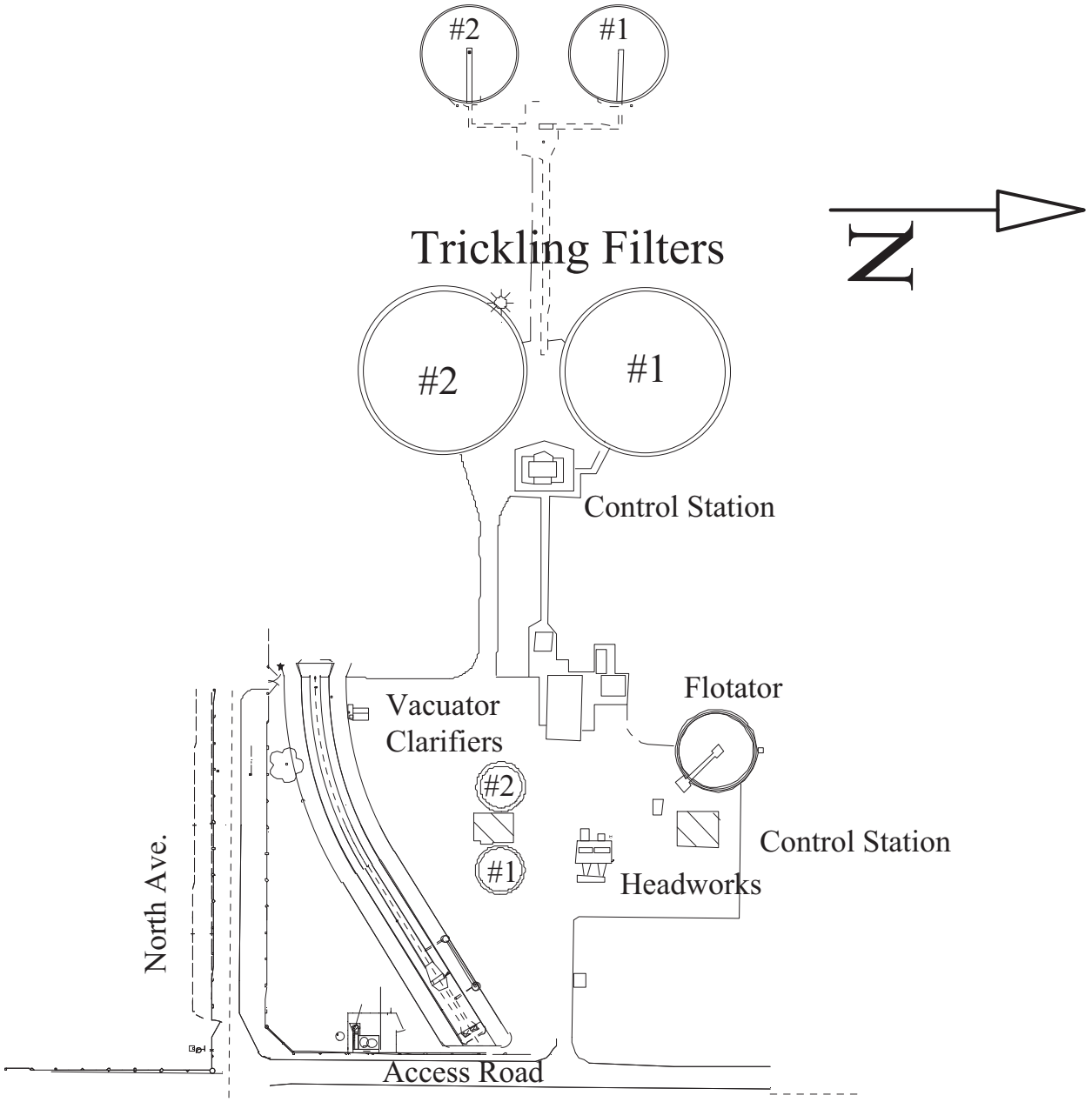
Vicinity Map

WASTE DISCHARGE ORDER NO. 5-01-254

Cities of Fresno and Clovis
Wastewater Treatment Facility
Fresno County
Sections 20, 21, 22, 27, 28, and 33 of T14S R19E
Fresno, CA USGS 15' Quadrangle



ATTACHMENT B
PLANT 1 DIAGRAMMATIC LAYOUT
WASTE DISCHARGE REQUIREMENTS ORDER NO 5-01-254
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY



ATTACHMENT C
PLANT 2 DIAGRAMMATIC LAYOUT
WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-254
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY



ATTACHMENT D

Symbol for Recycle Water Signs
WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-254
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

TENTATIVE WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-254
FOR
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

ATTACHMENT E
INFORMATION NEEDS FOR SLUDGE MANAGEMENT PLAN

A. Wastewater Treatment Facility (WWTF)

1. Describe treatment processes at the wastewater treatment facility.
2. List significant industrial users (SIUs) that discharge to the wastewater treatment facility and describe how SIUs affect sludge production, sludge handling, and biosolids disposal.
3. Indicate whether the WWTF has an adopted source control ordinance or a pretreatment program, and if the latter whether the program is approved by the Board.
4. Indicate whether WWTF accepts septage and, if so, describe septage handling operation facilities.
5. Provide a WWTF site map showing:
   a. existing sludge handling facilities (e.g., sludge drying beds and sludge storage areas)
   b. abandoned sludge handling facilities (if applicable)
   c. location of groundwater monitoring wells, if any, and groundwater gradient.

B. Sludge Production

1. Provide a schematic diagram showing solids flow and sludge handling operations; include, where applicable, supernatant flow and handling operations.
2. Specify the quantity of sludge expected to annually accumulate in each wastewater treatment process, how it is quantified, and the expected removal frequency.
3. For sludge handling facilities with sludge drying beds:
   a. Describe number and size of sludge drying beds.
   b. Describe sludge drying bed construction (e.g., liner, leachate collection system).
   c. If sludge drying beds are not lined, thoroughly describe measures taken to ensure that area groundwater is not adversely affected by sludge drying operations.
   d. Indicate the expected frequency with which sludge will be applied to and removed from sludge drying beds.
4. Describe how biosolids are transferred to onsite biosolids storage facility (if applicable). If biosolids are removed directly from sludge drying beds, provide a plan that indicates when during the year you expect to dispose of biosolids and explain that whoever is responsible for disposing of your biosolids will be able to remove and dispose it at this time.

C. Biosolids Characterization

1. Describe proposed sampling procedures by indicating number of samples, sample locations, and sample composition. For reference consult *POTW Sludge Sampling an Analysis Guidance Document*, published by the EPA Publication No. 833-B-89-100.
2. Describe the methods proposed to meet the necessary levels of pathogen reduction (i.e., Class A or B according to 40 CFR 503.32) for the proposed method of sludge disposal.
3. Describe the methods proposed to meet vector reduction requirements, in accordance with 40 CFR Part 503.33.

D. Biosolids Storage

1. If on-site biosolids storage is used,
   a. Describe:
      i. Size of biosolids storage area
      ii. How frequently it will be used (emergency basis only or routine use)
      iii. Typical storage duration
      iv. Leachate controls
      v. Erosion controls
      vi. Run-on/runoff controls
   b. Indicate measures that will be taken to ensure that area groundwater is not adversely affected by the biosolids storage facility.
   c. For biosolids storage facilities that contain biosolids between 1 October and 30 April, describe how facilities are designed and maintained to prevent washout or inundation from a storm or flood with a return frequency of 100 years.
   d. Provide a map of showing setback distances from (where applicable)
      i. Property lines
      ii. Domestic water supply wells
      iii. Non-Domestic water supply wells
      iv. Public roads and occupied onsite residences
      v. Surface waters, including wetlands, creeks, ponds, lakes, underground aqueducts, and marshes
      vi. Primary agricultural drainage ways
      vii. Occupied non-agricultural buildings and off-site residences
      viii. Primary tributary to a waterway or reservoir used for domestic water supply
      ix. Domestic surface water supply intake

E. Spill Response Plan

1. Emergency contacts and notification procedures
2. Personal protective equipment requirements
3. Response instructions for
   a. spill during biosolids transport
   b. storage facility failure
   c. when hazardous or other unauthorized material is found

F. Method of Disposal

1. Describe and provide the following information related to biosolids disposal method(s). If more than one method will be utilized, include the percentage of annual biosolids production expected to be disposed of by each method.

   a. Landfill Disposal

      i. Name(s) and location(s) of landfill(s).

      ii. Waste discharge requirements order numbers adopted by the Regional Board that regulate the landfill(s).

      iii. Present classification of the landfill(s).

      iv. Name and telephone number of the contact person at the landfill(s).

   b. Incineration

      i. Name(s) and location(s) of incineration site(s).

      ii. Waste discharge requirements order numbers adopted by the Regional Board that regulate the incineration site(s).

      iii. Method of disposal of ash from the incineration site(s).

      iv. Names and locations of facilities receiving ash from the incineration site(s), if applicable.

      v. Name and telephone number of the contact person at the incineration site(s).

   c. Composting

      i. Name(s) and location(s) of composting site(s).

      ii. Waste discharge requirements order numbers adopted by the Regional Board that regulate the composting site(s).

      iii. Name and telephone number of the contact person at the composting site(s).

   d. Land Application

i. Ownership of the site(s) where biosolids are applied.

ii. Assessor Parcel Numbers (APNs) of site(s) where biosolids are applied.

iii. Waste discharge requirements order numbers adopted by the Regional Board that regulate the biosolids application site(s).

TENTATIVE WASTE DISCHARGE REQUIREMENTS ORDER NO. 5-01-254
FOR
CITIES OF FRESNO AND CLOVIS
WASTEWATER TREATMENT FACILITY
FRESNO COUNTY

ATTACHMENT F
STANDARD MONITORING WELL PROVISIONS

Prior to installation of groundwater monitoring wells, the Discharger shall submit a workplan containing at least the information specified in this document. Wells may be installed after the executive officer's approval of the workplan. Upon installation of the monitoring wells, the Discharger shall submit a report of results, as described below. A registered geologist, certified engineering geologist, or civil engineer registered or certified by the State of California must sign all workplans and reports.

Monitoring Well Installation Workplan

A. General Information:
   Monitoring well locations and rationale
   Survey details
   Equipment decontamination procedures
   Health and safety plan
   Topographic map showing any existing monitoring wells, proposed wells, waste handling facilities, utilities, and other major physical and man-made features.

B. Drilling Details: describe drilling and logging methods

C. Monitoring Well Design:
   Casing diameter
   Borehole diameter
   Depth of surface seal
   Well construction materials
   Diagram of well construction
   Type of well cap
   Size of perforations and rationale
   Grain size of sand pack and rationale
   Thickness and position of bentonite seal and sand pack
   Depth of well, length and position of perforated interval

D. Well Development:
   Method of development to be used
   Method of determining when development is complete
   Method of development water disposal

E. Surveying Details: discuss how each well will be surveyed to a common reference point

F. Soil Sampling (if applicable):
   Cuttings disposal method

Analyses to be run and methods
Sample collection and preservation method
Intervals at which soil samples are to be collected
Number of soil samples to be analyzed and rationale
Location of soil samples and rationale
QA/QC procedures

G. Well Sampling:
Minimum time after development before sampling (48 hours)
Well purging method and amount of purge water
Sample collection and preservation method
QA/QC procedures

H. Water Level Measurement:
The elevation reference point at each monitoring well shall be within 0.01 foot. Ground surface elevation at each monitoring well shall be within 0.1 foot. Method and time of water level measurement shall be specified.

I. Proposed time schedule for work.

Monitoring Well Installation Report of Results

A. Well Construction:
Number and depth of wells drilled
Date(s) wells drilled
Description of drilling and construction
Approximate locations relative to facility site(s)
A well construction diagram for each well must be included in the report, and should contain the following details:
Total depth drilled
Depth of open hole (same as total depth drilled if no caving occurs)
Footage of hole collapsed
Length of slotted casing installed
Depth of bottom of casing
Depth to top of sand pack
Thickness of sand pack
Depth to top of bentonite seal
Thickness of bentonite seal
Thickness of concrete grout
Boring diameter
Casing diameter
Casing material
Size of perforations

Number of bags of sand
Well elevation at top of casing
Depth to ground water
Date of water level measurement
Monitoring well number
Date drilled
Location

B. Well Development:

Date(s) of development of each well
Method of development
Volume of water purged from well
How well development completion was determined
Method of effluent disposal
Field notes from well development should be included in report.

C. Well Surveying: provide reference elevations for each well and surveyor's notes

D. Water Sampling:

Date(s) of sampling
How well was purged
How many well volumes purged
Levels of temperature, EC, and pH at stabilization
Sample collection, handling, and preservation methods
Sample identification
Analytical methods used
Laboratory analytical data sheets
Water level elevation(s)
Groundwater contour map

E. Soil Sampling (if applicable):

Date(s) of sampling
Sample collection, handling, and preservation method
Sample identification
Analytical methods used
Laboratory analytical data sheets

NOVA DISK FILTER EVALUATION AT ORANGE COUNTY SOUTH REGIONAL WATER RECLAMATION FACILITY – SAND LAKE ROAD

DISK FILTER EVALUATION AT ORANGE COUNTY SOUTH REGIONAL WATER RECLAMATION FACILITY – SAND LAKE ROAD



NOVA WATER DISK FILTER MODEL 1001 - ULTRASCREEN

Introduction – Nova Water Technologies in conjunction with Carter and Verplanck received permission to test the Ultrascreen disk filter at the SLR water reclamation facility on secondary clarifier effluent. The objectives include a real time comparison with the existing Aqua Aerobic disk filters for multiple parameters and the ability to demonstrate compliance with the California State Department of Health Title-22 standards for public access reuse of reclaimed water from municipal sewage.

The comparison with the Aqua filters is being organized and overseen by managerial level county utility staff while the Title-22 documentation is being conducted by Carollo

Engineers from their Sarasota, FL office (Sean Poust) and being supported by Dr Keith Bourgeous from the Sacramento, CA office.

Background – The Ultrascreen disk filter is a product originally developed by Nuove Energie located in Vicenza, Italy. Nuove has been involved in liquid/solid separation process equipment for almost 20 years and has teamed with Nova Water for developing applications for the Ultrascreen filter in North America. Since teaming with Nova the Ultrascreen technology has been demonstrated with good results at more than a dozen wastewater facilities including the Orange County NW facility. The Ultrascreen disk filter is available in multiple capacities. The model 1001 represents the smallest standard production unit and has 17 square feet of filtration media.

The key difference in the filtration media used on the Ultrascreen versus the Aqua filter is the material and the weave configuration. The Ultrascreen uses a precision woven stainless steel mesh allowing for precise micron size adjustments for the specific process purpose. The Aqua filter can use several types of media from needle felt to nonwoven nylon or acrylic mounted on a woven backing.

Objectives – For the performance comparison between the Aqua filter and the Nova filter the following major parameters were proposed for data collection and review:

Flow to each filter measured as gpm per square foot of media. Both filters have flow meters installed. The Aqua filter is using a Panametrics brand unit. The Nova filter is using an Endress and Hauser brand mag meter.

Influent NTU which is the same to both filters as the Nova filter draws water from the Aqua feed trough. The influent NTU is being measured by a HACH brand continuous on line turbidimeter.

Effluent NTU measured at the filter discharge for both filters. Both filters are using HACH brand continuous on line turbidimeters.

Measure the volume of backwash reject water produced by both filters. The Aqua filter is using an ABB brand mag flow meter. The Nova filter is using a physical capture tank for reject collection that can hold more than 250 gallons. This can accommodate at least one full 24 hour period of reject collection. These values are being measured and recorded manually and supervised by Carollo Engineers weekly.

The final filter layout is shown below with feed and drain piping and a temporary observation platform. The building in the background houses the VFD’s for the filter drive, the filter feed pump and the backwash pump, the data recorder and the turbidimeter analyzers.



Data Collection – The influent flow rate to the Aqua filter is being recorded by the plant SCADA system. The influent flow to the Nova filter is being recorded by an ABB brand Videographic data recorder. Some typical graphs are included.

The influent turbidity for both filters is being recorded by the same data recorder.

The effluent turbidity for the Aqua filter is being recorded by the plant SCADA system and the ABB data recorder.

The Aqua reject flow meter is being read and recorded manually.

The Nova filter data is being recorded for influent feed gpm, influent NTU, effluent NTU, and backwash pump operating cycles. These are being recorded on the ABB data recorder.

Sample Collection – Samples are being collected by the county plant staff on an established schedule. The influent and effluent for both filters are sampled at approximately the same time and the samples are collected multiple times each day. The Carollo staff has also collected samples from both filters for additional analysis. The Carollo staff will continue collecting samples each Monday for the duration of the Title-22 protocol. The county staff is also collecting samples for Carollo to support the Title-22 collection.

Note: Nova Water staff has not collected any of the samples being analyzed by either party for either filter.

Sample Analysis and Results – The lab results from county collected samples will be tabulated and reviewed by county staff. To date Nova Water has not been informed as to any results.

The lab results from Carollo collected samples are being reviewed by Carollo and some of the data has been forwarded to Nova Water for our review. Some of the Carollo data is included in this progress report.

Test Protocol and Schedule – The testing calendar was originally targeted for a March to April time frame. Several factors prevented this from being accomplished. The main issues were electrical and instrumentation. The filter was reliably on line in May and Nova Water began a series of tests to determine possible loading rates, reject rates and particle capture capabilities. The nature of the secondary clarifier effluent suspended particles indicated the need for Nova to apply a filtration mesh with finer weave characteristics. Fortunately this is accomplished fairly easily with the Ultrascreen design but even so there was a lead time required to get the fabric and that caused some additional waiting time.

Once the new mesh was installed (20 micron) the Nova filter was tested again for establishing the basic parameters. Our original goal was to operate at a maximum hydraulic loading rate of 16 gpm per square foot. Both the original 25 micron mesh and the current 20 micron mesh have demonstrated they can meet this hydraulic throughput

For the purpose of data collection we have operated the Nova filter initially at 102 gpm average or 6 gpm/sq ft and 5 rpm rotation speed. During this time the Aqua filter was operated at approximately 3 gpm/sq ft.

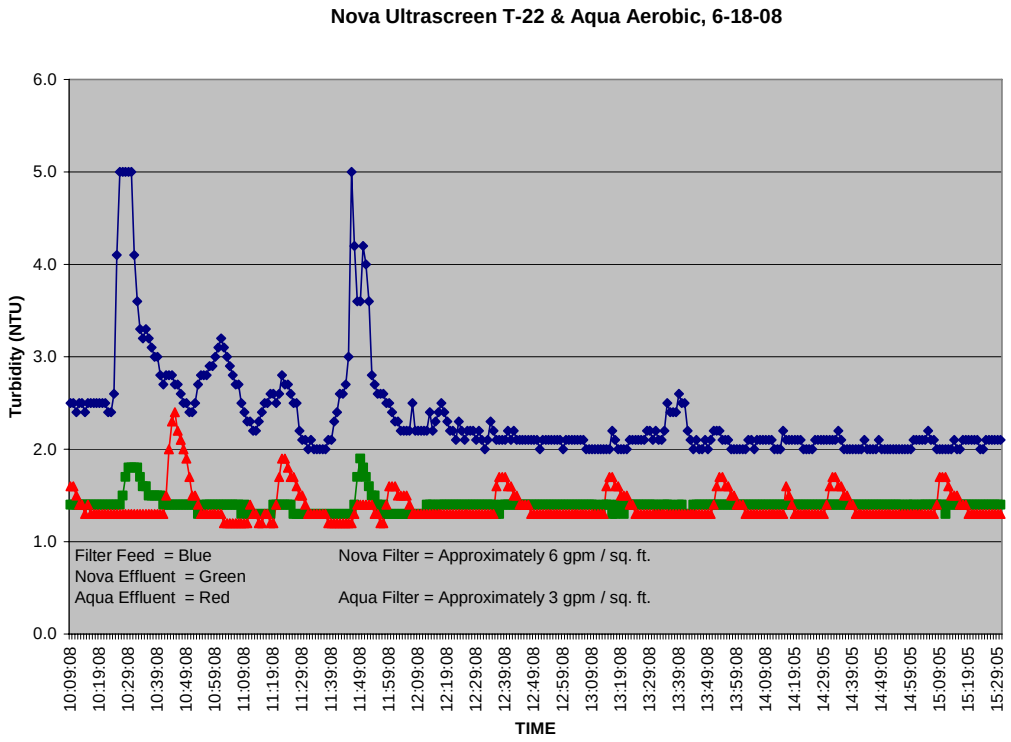
The second operating point for the Nova filter was 6 gpm/sq ft and 6 rpm rotation speed. The Aqua filter was operated at approximately 4 gpm/sq ft.

Moving forward into the coming weeks the Nova filter will be increased incrementally up to 16 gpm/sq ft and the Aqua filter is proposed to operate at up to 8 gpm/sq ft.

Observations – To date the filters have been operating well and each design is producing approximately equal results for effluent turbidity as expressed in NTU's. The Nova filter has so far demonstrated that it can operate at 6 gpm/sq ft continuously over a wide range of influent turbidity values and maintain effluent values of less than 2.0 NTU which is our target for the Title-22 criteria. The Aqua filter has also operated well at the 3-4 gpm/sq ft loading rates.

A typical data recording is shown in the graph below. Both filters are showing the expected responses to significant spikes in influent turbidity. Both filters are performing within expectations. The Nova filter has been able to handle the NTU spikes as effectively as the Aqua filter overall. For the data period covered the Nova filter is

operating at approximately double the hydraulic loading rate of the Aqua filter based on readings from the two influent flow meters.

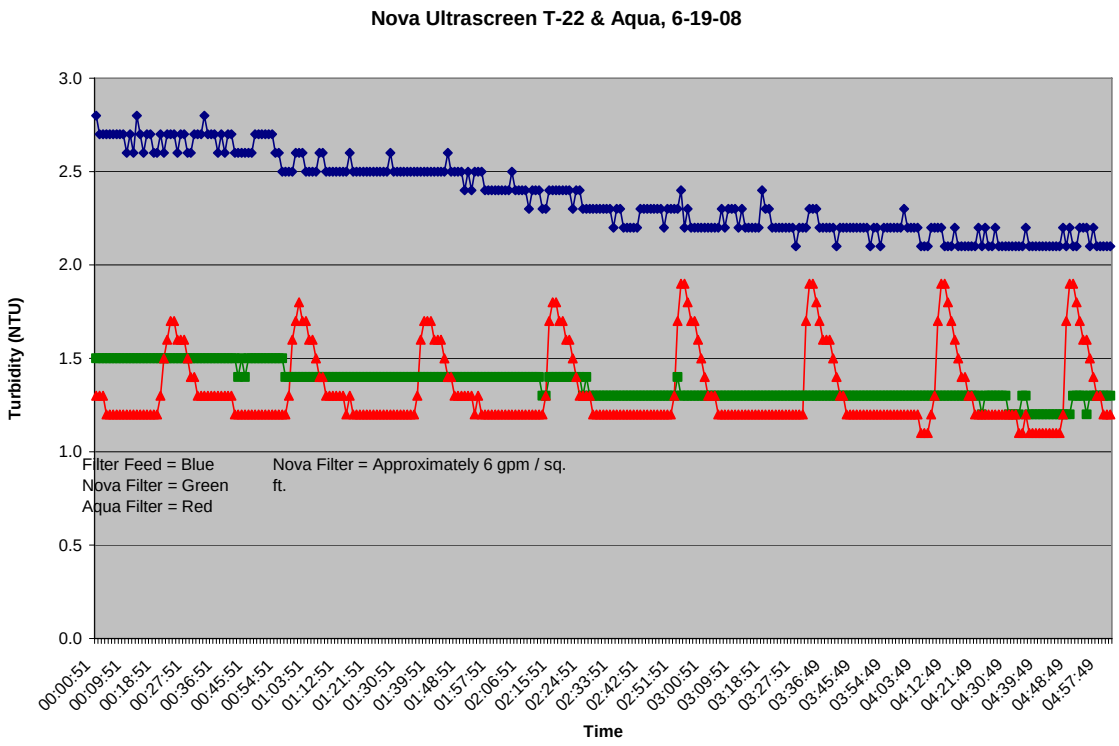


The Nova filter displays a relatively flat effluent turbidity trend when compared to the Aqua filter. The reason for this difference is the pulse wash nature of the Ultrascreen. The duration of backwash for the Ultrascreen is brief and the frequency is more often than the Aqua technology employs. The Ultrascreen uses a pressure washing concept where the Aqua filter is using a vacuum suction approach. Both concepts work and the Aqua backwash frequency can be noted on the chart as a brief increase in turbidity accompanies each of the backwash cycles.

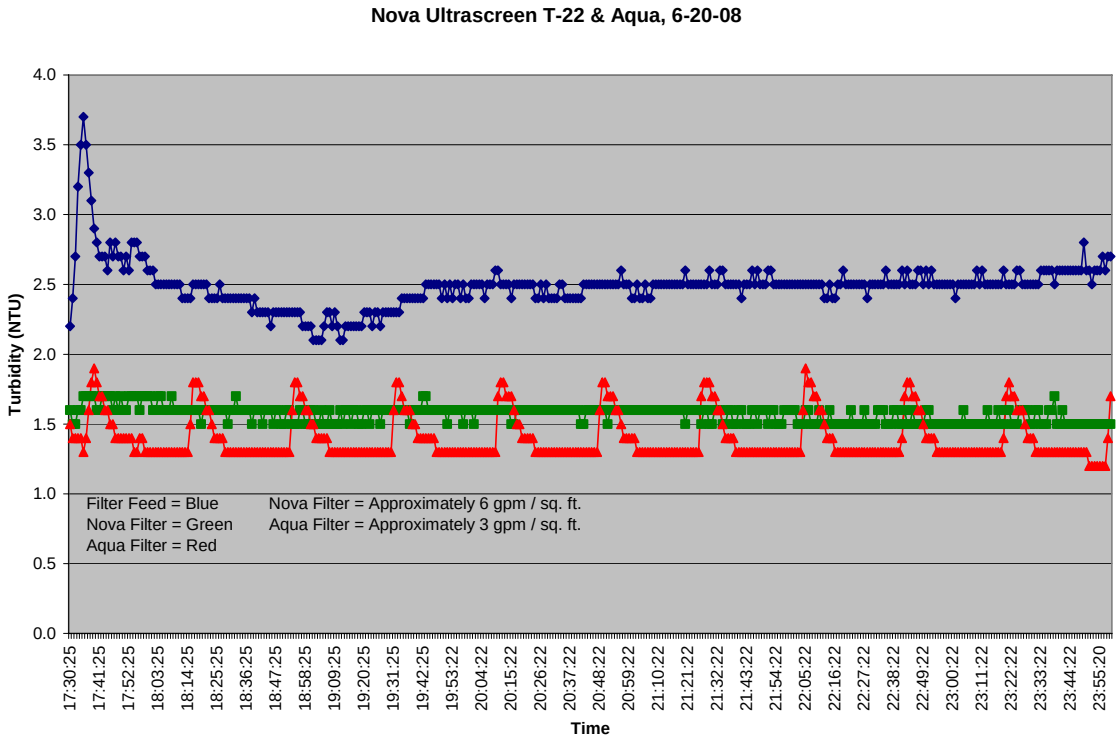
The backwash cycle for the Aqua filter is presently controlled by the filter water elevation above the disks (differential) versus the filter effluent elevation. The Nova filter is being operated at a consistent elevation for initiating the backwash cycle during the testing at SLR.

Note: It is also possible to operate the Nova filter using a PLC with programmed logic that can vary the desired backwash initiation elevation to optimize the filter operation for changing influent condition like flow and turbidity.

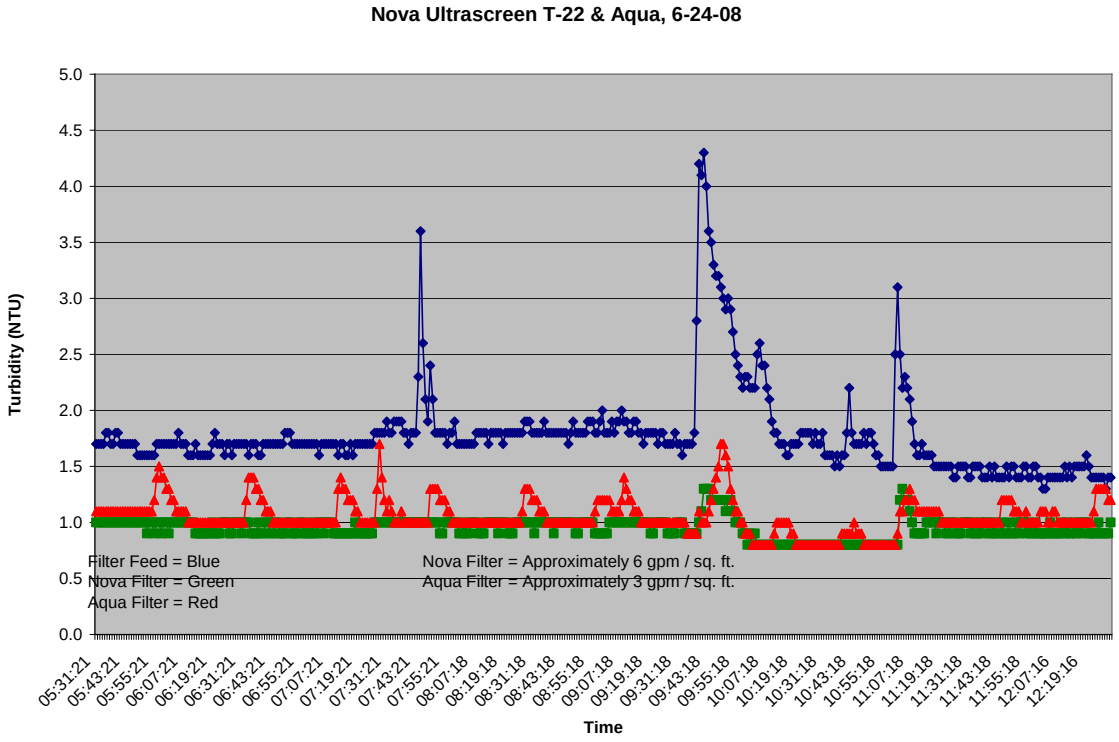
Additional turbidity graphic displays are shown below.



The Nova filter is producing a relatively flat NTU trend line even with variable influent.

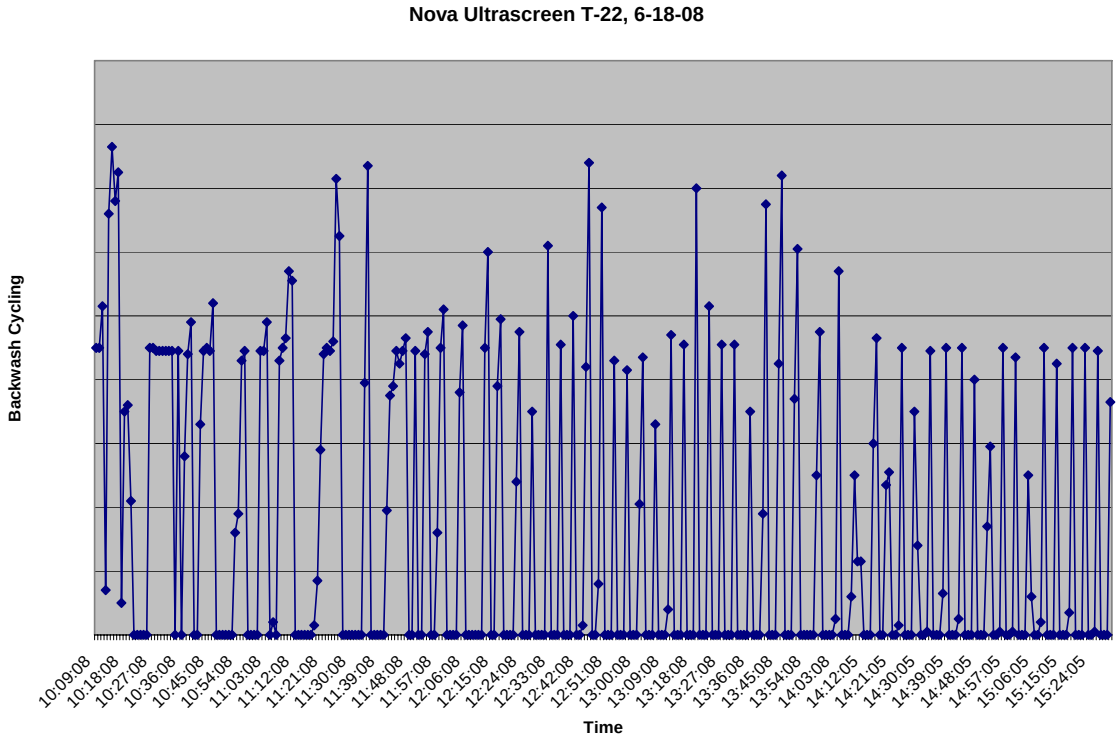


Both filters are producing effluent below the Title-22 threshold value of 2.0 NTU.



Both filters show response to influent turbidity spike on June 24th around 10 AM.

<u>Backwash and Reject</u> - The pulse backwash concept employed by the Nova filter takes advantage of three principles; media, pressure and elevation. Each is discussed below.



Media – The precision woven stainless steel media provides fine pore size control while presenting a shallow profile to the water being filtered. Particles rejected on the feed side of the media do not penetrate the mesh at any depth as is the design concept employed with cloth filtration. This allows the particles to be separated from the mesh easily when the time comes for backwashing.

Pressure – The original cloth filtration concepts using needle felt employed high pressure washing cycles for removing the captured particles. Once the particles are deeply embedded in the cloth fabric a substantial amount of volume and pressure is required to extract them

The Ultrascreen concept uses the opposite approach. The precision mesh maintains a dynamic film layer of rejected solids at the surface of the media and because there is no significant depth to the media particles are easily washed at low pressure from the outside to the inside using previously filtered water. At SLR we have demonstrated that wash pressures as low as 20 psig can be used for keeping the media clean at an acceptable level for extended periods of time.

Elevation – The Ultrascreen disks are in constant slow rotation during filtration cycles. The disks are approximately 50% submerged at the maximum normal operating liquid level. This allows the 50% of the disk above the water level elevation to be washed as it rotates above the filter feed well. The filter initiates a backwash cycle when the internal feed water elevation reaches a preset point. This allows the disks to be cleaned when they need to be without hindering the ongoing filtration of continuous influent flow.

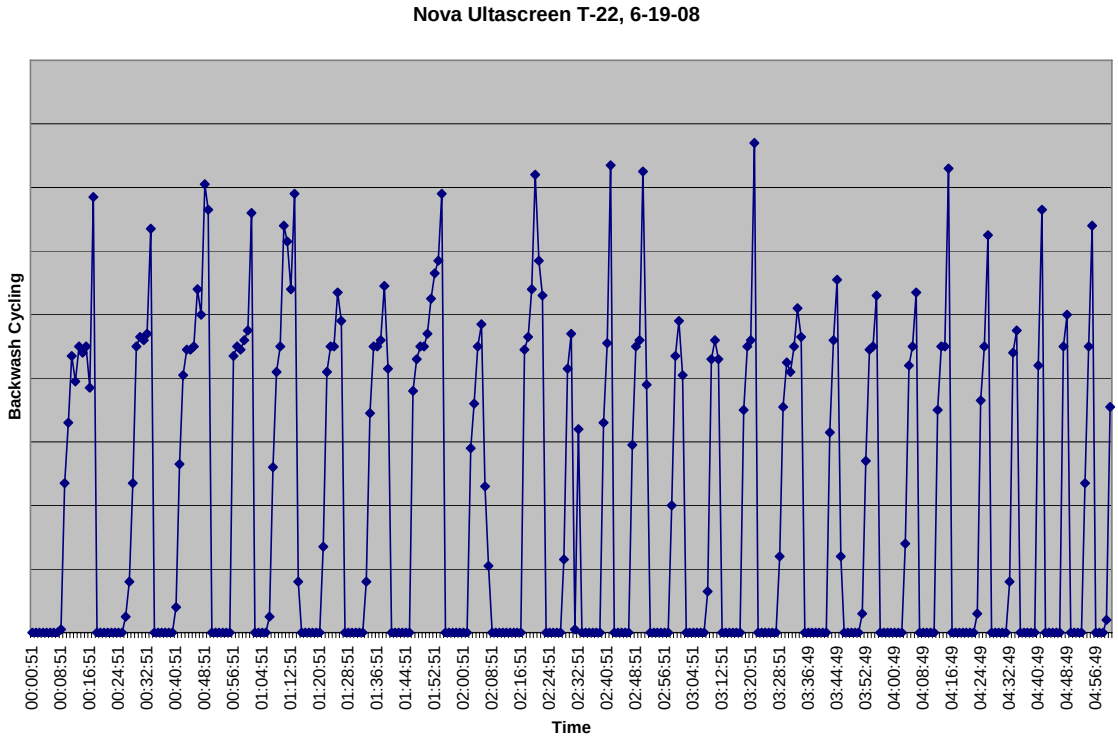
During times of low turbidity in the influent water the disks can operate for many minutes without requiring a backwash cycle. Eventually captured particles begin to coat the disk media and headloss increases. When the backwash elevation is reached the wash pump energizes and the disks are washed just long enough to return the headloss to normal. The wash pump shuts off and the process repeats itself.

The dirty water is caught in a simple collection trough and leaves the filter under gravity flow. The entire backwash cycle normally takes 10-15 seconds to complete. The time between backwash cycles is highly variable based on influent turbidity and TSS loading. The typical cycles at SLR have been 1.5 – 2.0 minutes so far.

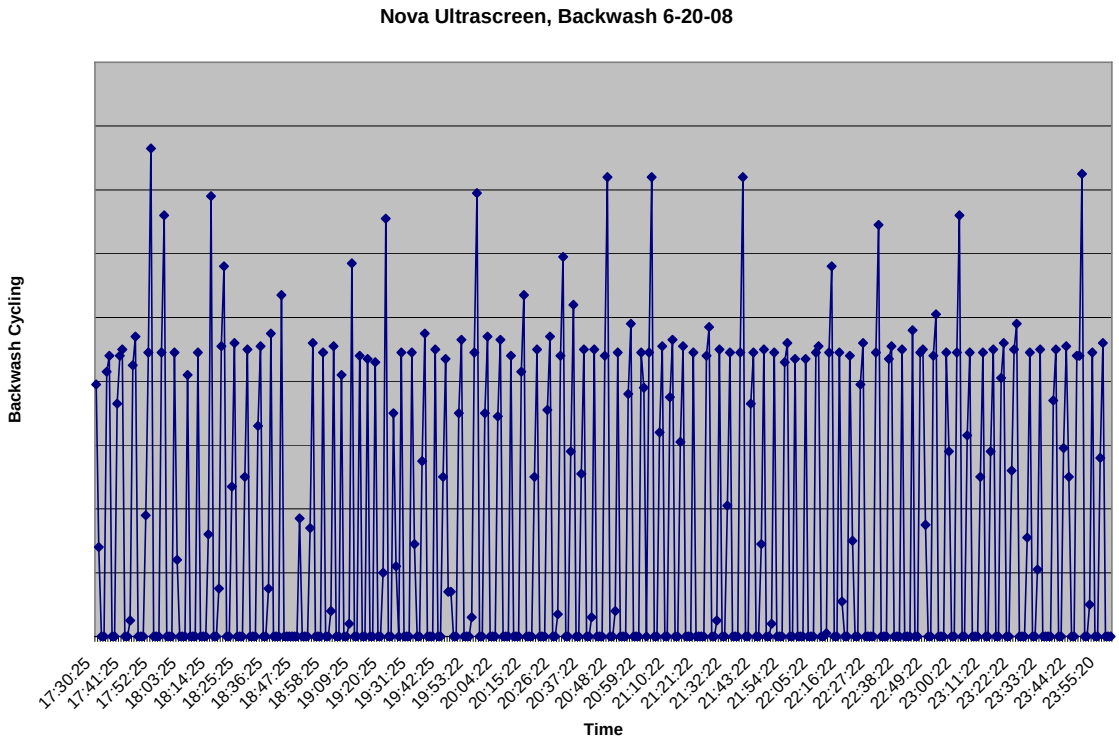
Reject – Using the pulse backwash approach the Nova filter has been able to produce reject rates that have been below one quarter of one percent to date. This is well below the reject rates of traditional cloth disk filters.

Note: On larger systems the individual backwash pumps would be replaced by a typical wash water pressure manifold that can feed wash water to all the filters in a given configuration. A simple solenoid controlled valve can operate at each filter to allow backwash water to flow when called for.

Additional backwash graphs and feed flow rate graphs are shown below.

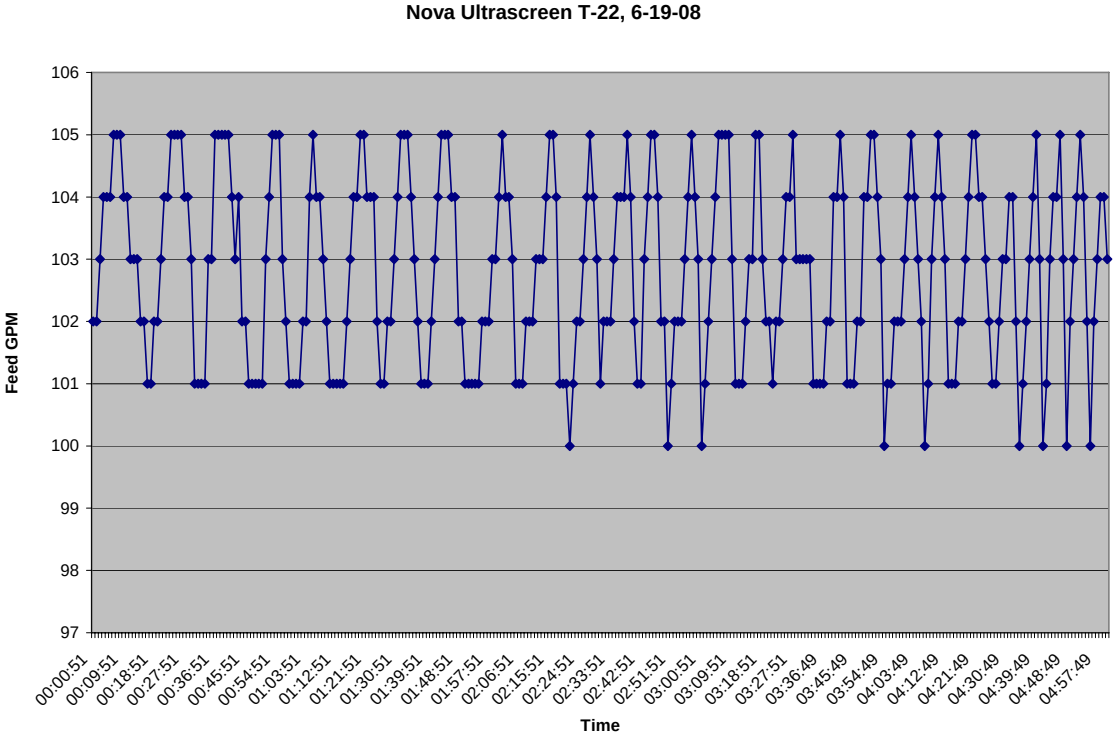


Typical pulse backwash cycles from June 19th.

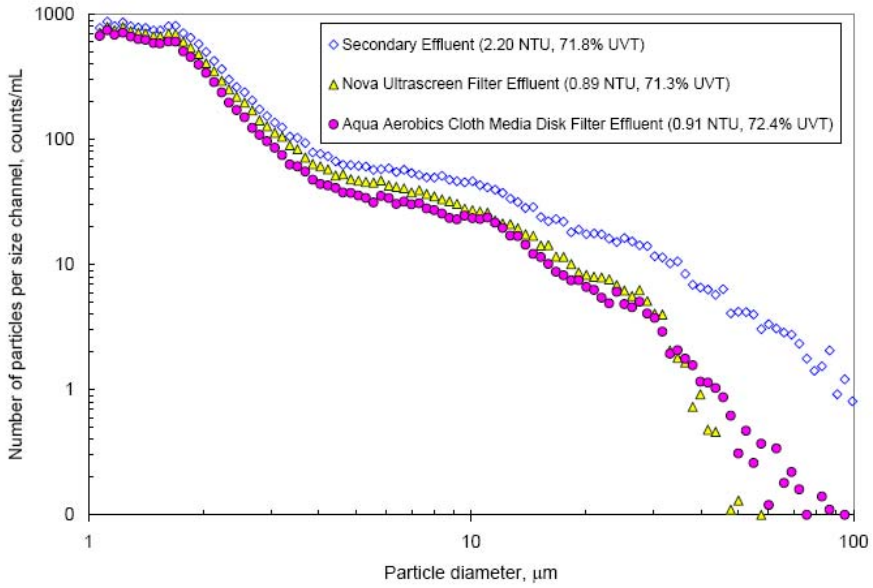


Typical pulse backwash cycles from June 20th.

The influent flow rate has also been data recorded. An example is below. The target flow rate is 102 gpm average for the Nova filter with 17 sq ft of filtration media for a hydraulic loading rate of 6 gpm/sq ft.



<u>Particle Counting and Size Distribution</u> - The Carollo testing is also looking at particle size removal and particle size distribution as part of their analytical work. Early test indications from samples suggest there is minimal difference between the cloth filter media and the stainless steel mesh performance in this regard. See the graph below.



In reviewing the graph show above it can be seen that the secondary clarifier is producing effluent with relatively low turbidity. The number of particles being removed by filtration in either filter is minimal until the 9-10 micron particle size range is reached. Both filters show approximately the same particle size distribution on particles smaller than about 9 microns and both filters show good removal of particles larger than 10 microns.

Summary - The significant difference in media selection appears to make little difference in the particle size distribution overall. The dynamic disk operation associated with the Nova filter is allowing the filter to operate at higher hydraulic loading and maintain approximately the same water quality as the cloth filter, 6 gpm/sq ft versus 3 gpm/sq ft for the first two weeks of testing.

The Nova filter so far has produced essentially equivalent turbidity performance compared to the cloth filter technology over a wide range of influent NTU values.

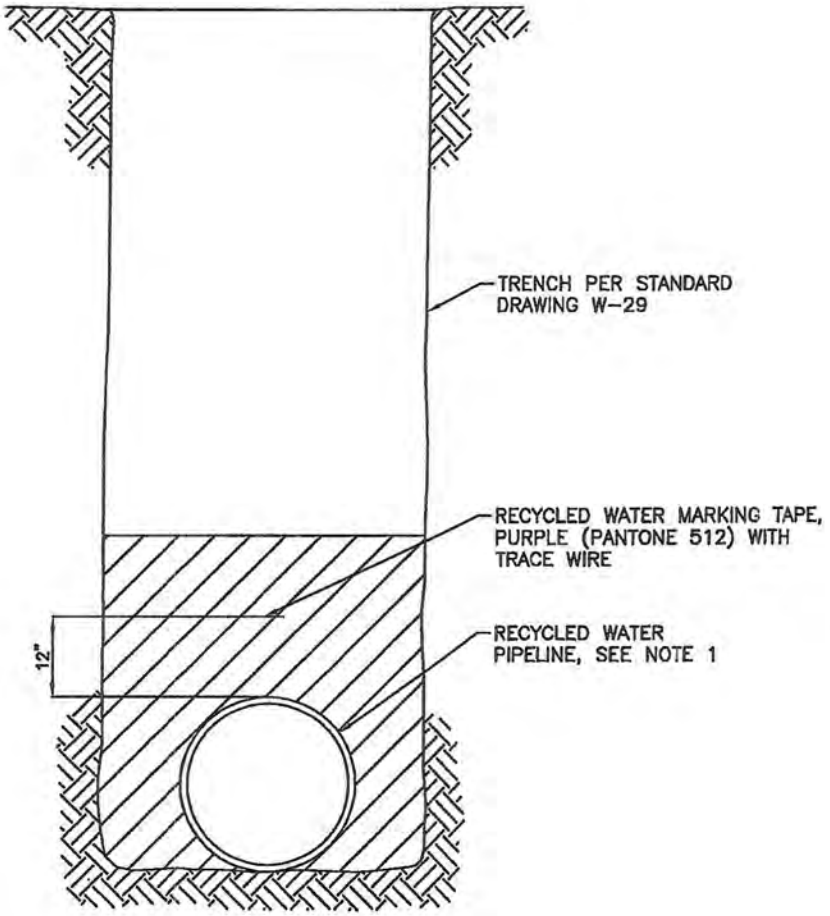
The Nova filter reject rate while operating at 6 gpm/sq ft has been measured in a separate collection vessel on multiple calibration runs and has been measured to be about one tenth of the reject rate of the cloth filter technology.

We also wish to thank Orange County for allowing us to be on site and utilizing their facility for this work.

APPENDIX E
STANDARD SPECIFICATIONS AND DRAWINGS FOR RECYCLED WATER FACILITIES

RECYCLED WATER STANDARD DRAWINGS

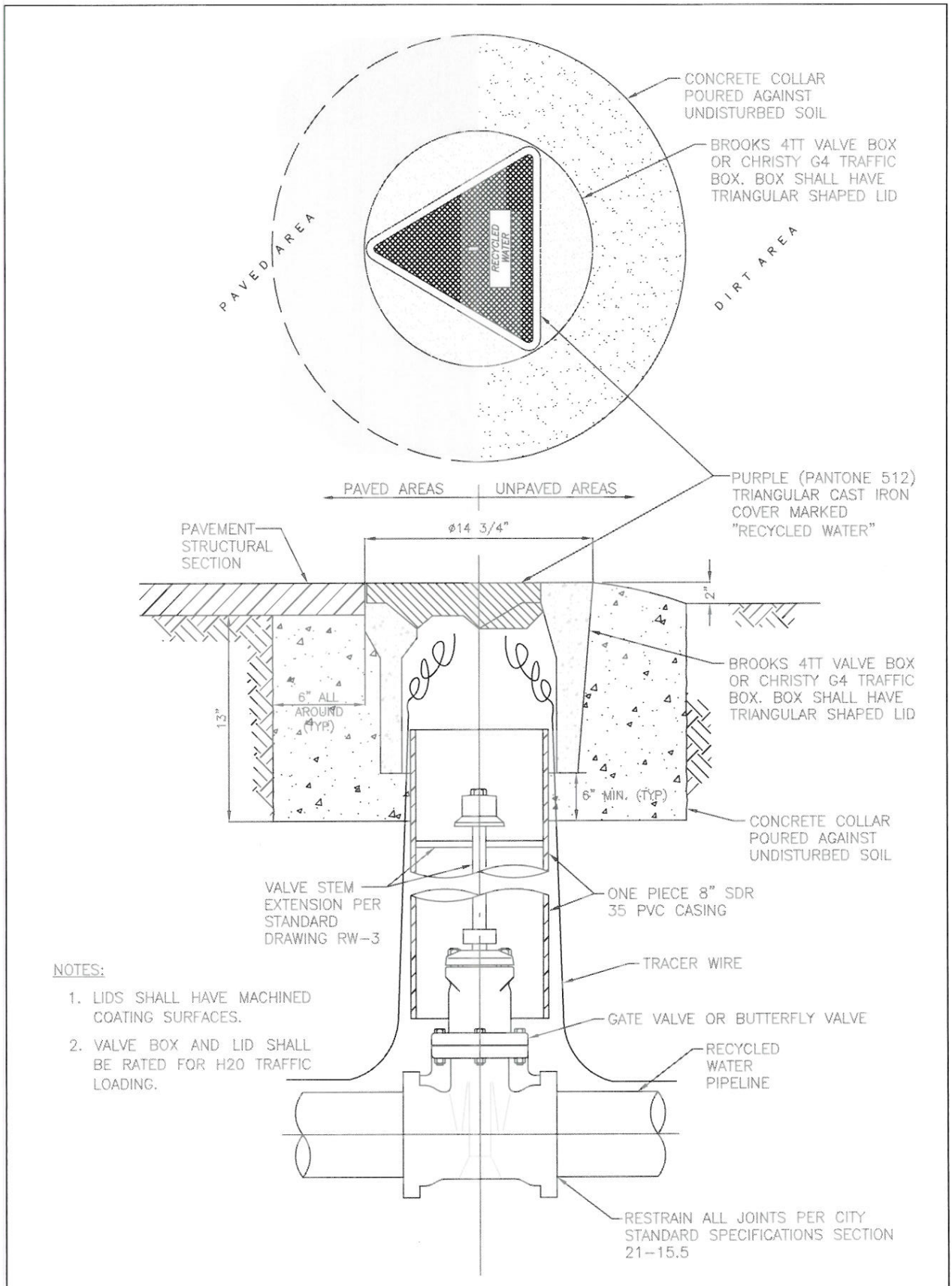
NO.	TITLE OF DRAWING
☐RW-1	Recycled Water Main Identification
☐RW-2	Recycled Water Valve and valve Box
☐RW-3	Recycled Water Valve Stem Extension
☐RW-4	1" Service Connection & Meter Box Installation
☐RW-5	1-1/2" & 2" Service Connection & Meter Box Installation
☐RW-6	4" Recycled Water Service
☐RW-7	Temporary 2" Recycled Water Blow-off
☐RW-8	Recycled Water Blow-off Assembly
☐RW-9	Recycled Water 1" or 2" Air Release/Vacuum Breaker Station
☐RW-10	Recycled Water 4" Air Release/Vacuum Breaker Station
☐RW-11	1" or 2" Air Release/Vacuum Breaker Valve Enclosure
☐RW-12	Recycled Water Main Separation Requirements
☐RW-13	Recycled Water Irrigation Information Sign
☐RW-14	Recycled Water Remote Control Irrigation valve Identification
☐RW-15	Recycled Water Backflow Preventer Identification
☐RW-16	Recycled Water Irrigation Box Cover Markings
☐RW-17	Recycled Water Irrigation System Clock Marking
☐RW-18	General Recycled Water Identification Tag
☐RW-19	Recycled Water Landscape Irrigation Head Identification
☐RW-20	Quick Coupling Valve
☐RW-21	Cross Connection Control Test Station
☐RW-22	Temporary Potable Water Supply to On-site Recycled Water System
☐RW-23	Temporary Potable Water Supply to Recycled Water System



NOTE:

1. RECYCLED WATER PIPELINES SHALL BE COLORED PURPLE (PANTONE 512) AND INTEGRALLY STAMPED "RECYCLED WATER – DO NOT DRINK" ON OPPOSITE SIDES OF THE PIPE. ALTERNATIVELY, NON-PVC RECYCLED WATER PIPELINES MAY BE MARKED WITH LETTERING ON PURPLE MARKING TAPE BEARING THE CONTINUOUS WORDING "RECYCLED WATER-DO NOT DRINK". THE MARKING TAPE SHALL BE A MINIMUM OF SIX INCHES WIDE AND SHALL BE SECURELY ATTACHED DIRECTLY TO THE TOP OF THE PIPELINE EVERY FIVE FEET.

RECYCLED WATER MAIN IDENTIFICATION	REF. & REV. JUNE 2014	CITY OF FRESNO RW-1



NOTES:

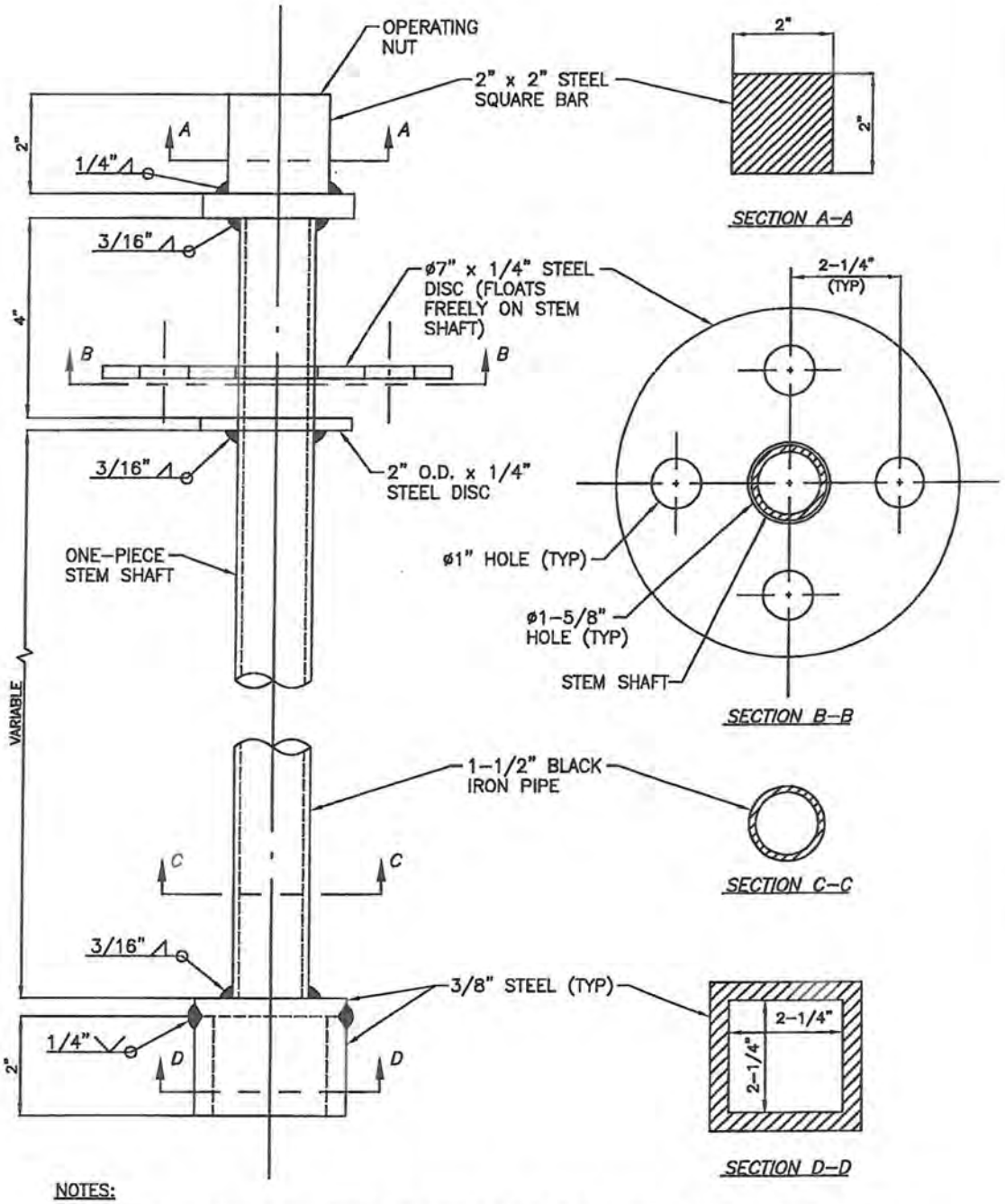
1. LIDS SHALL HAVE MACHINED COATING SURFACES.
2. VALVE BOX AND LID SHALL BE RATED FOR H20 TRAFFIC LOADING.

RECYCLED WATER VALVE AND VALVE BOX

REF. & REV. AUGUST 2015

CITY OF FRESNO

RW-2



NOTES:

1. EXTENSION STEM SHAFT SHALL BE ROUND OR SQUARE STEEL TUBING OF ONE-PIECE DESIGN (NO PINNED CONNECTIONS OR COUPLINGS PERMITTED).
2. VALVES DEEPER THAN 5' REQUIRE A VALVE STEM EXTENSION.
3. EXTENSION STEMS SHALL NOT BE ATTACHED/BOLTED TO OPERATING NUT OF THE VALVE.
4. VALVE STEM EXTENSION SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IS COMPLETE.

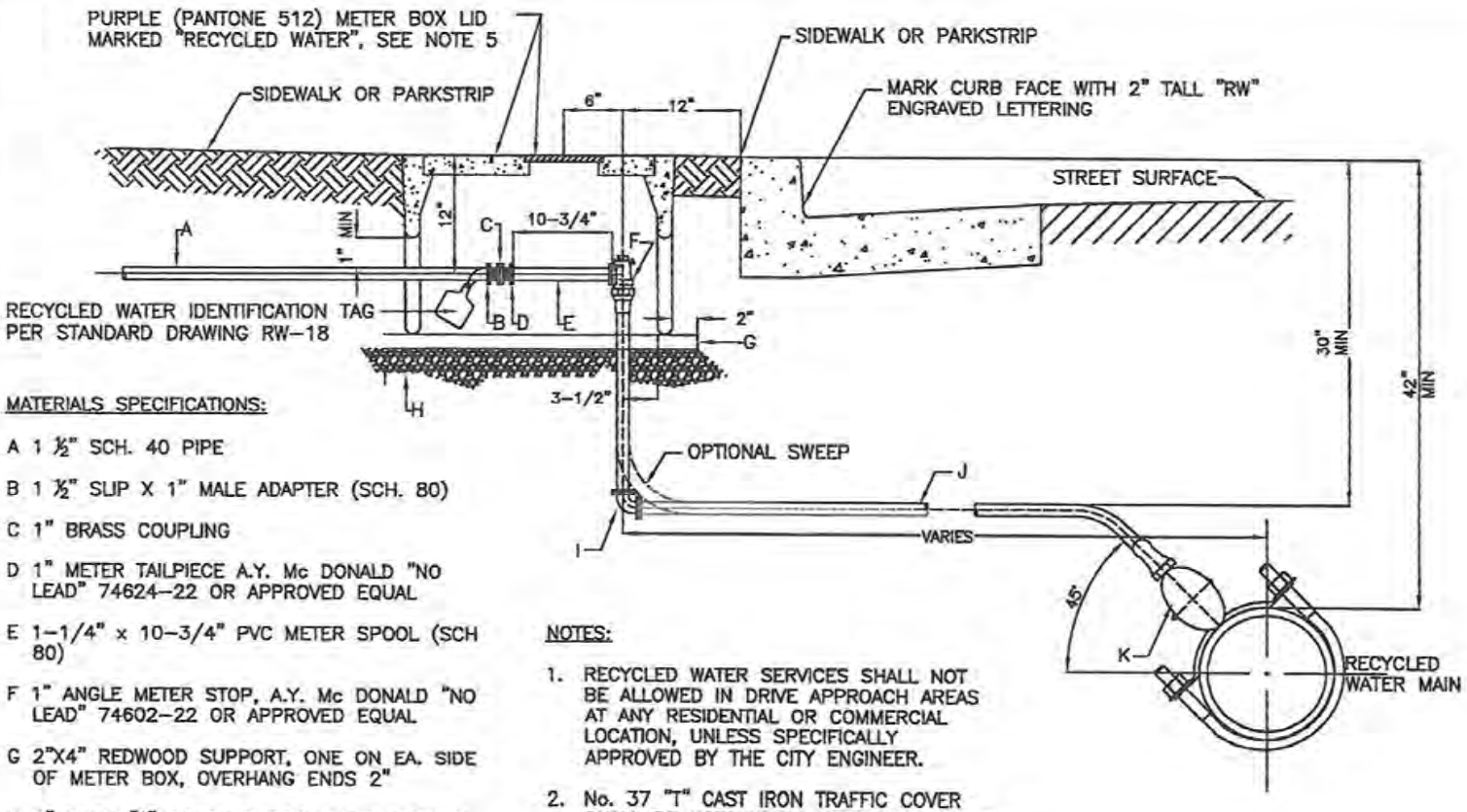
RECYCLED WATER VALVE STEM EXTENSION	REF. & REV. JUNE 2014	CITY OF FRESNO RW-3

1" SERVICE CONNECTION & METER BOX INSTALLATION

REF. & REV. JUNE 2014.

CITY OF FRESNO

RW-4



MATERIALS SPECIFICATIONS:

A 1 ½" SCH. 40 PIPE

B 1 ½" SLIP X 1" MALE ADAPTER (SCH. 80)

C 1" BRASS COUPLING

D 1" METER TAILPIECE A.Y. Mc DONALD "NO LEAD" 74624-22 OR APPROVED EQUAL

E 1-1/4" x 10-3/4" PVC METER SPOOL (SCH 80)

F 1" ANGLE METER STOP, A.Y. Mc DONALD "NO LEAD" 74602-22 OR APPROVED EQUAL

G 2"X4" REDWOOD SUPPORT, ONE ON EA. SIDE OF METER BOX, OVERHANG ENDS 2"

H 6" THICK ¾" CRUSHED ROCK WHEN BOX IS PLACED IN ALLEYS WITH TRASH PICK UP ONLY. ALL BOXES IN ALLEYS SHALL BE PLACED PARALLEL TO ALLEY

I COMP X COMP 90° ELL, A.Y. Mc DONALD "NO LEAD" 74761-22 OR APPROVED EQUAL

J TYPE "K" SOFT DRAWN COPPER TUBING CONTINUOUSLY WRAPPED IN PURPLE MARKING TAPE OR PURPLE (PANTONE 512) POLYETHYLENE CTS SDR-9 PE 3408, USE COMPRESSION JOINTS WITH STAILESS STEEL INSERT

K 1" CORPORATION STOP A.Y. Mc DONALD "NO LEAD" 74701-22 OR APPROVED EQUAL

NOTES:

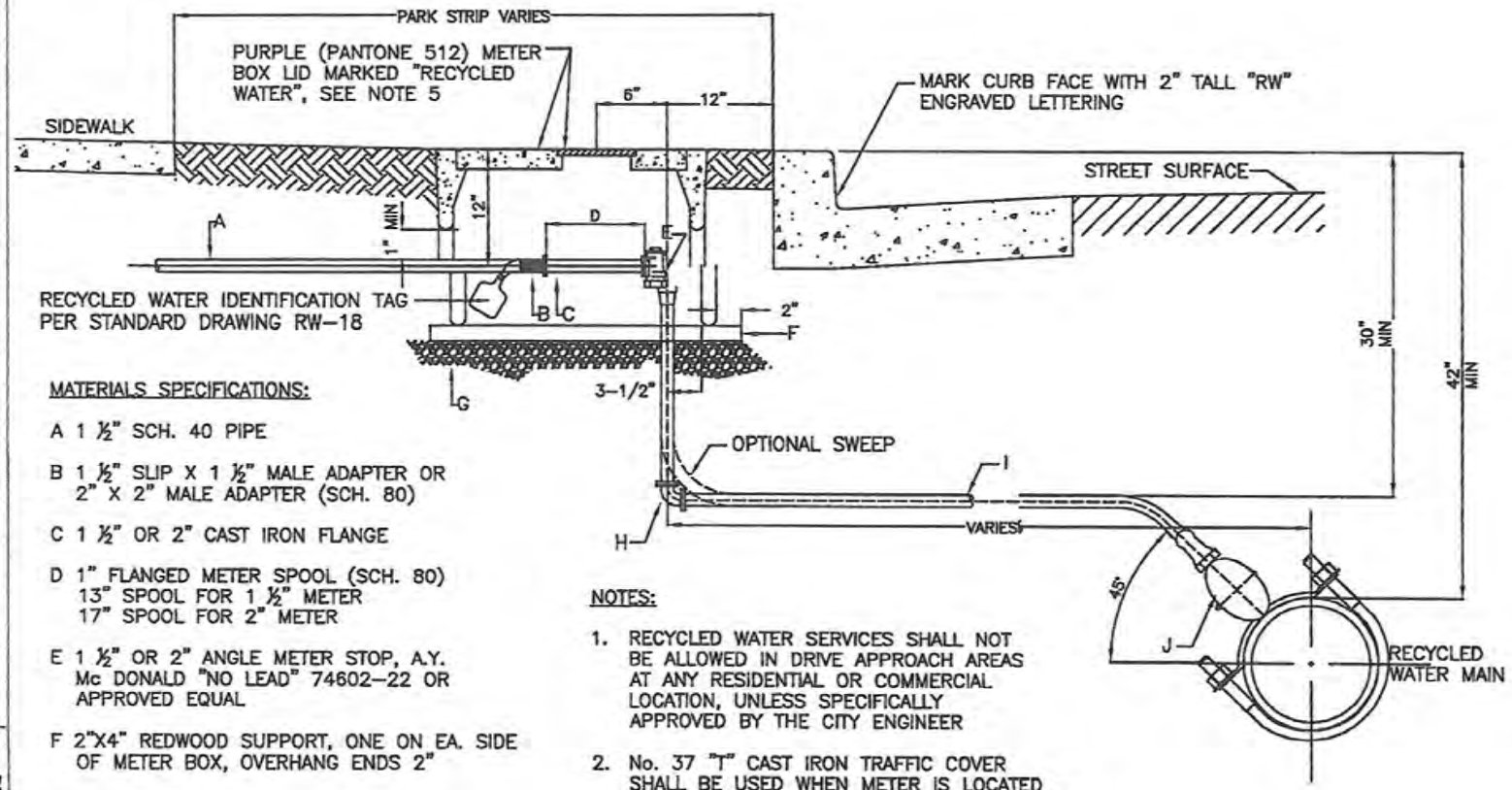
1. RECYCLED WATER SERVICES SHALL NOT BE ALLOWED IN DRIVE APPROACH AREAS AT ANY RESIDENTIAL OR COMMERCIAL LOCATION, UNLESS SPECIFICALLY APPROVED BY THE CITY ENGINEER.
2. No. 37 "T" CAST IRON TRAFFIC COVER SHALL BE USED WHEN METER IS LOCATED IN ALLEYS OR DRIVE APPROACH AREAS, OR BEHIND ROLLED CURBS.
3. ALL COPPER FITTINGS SHALL BE CAMPAK COMPRESSION-TYPE.
4. FOR PVC RECYCLED WATER MAIN TAPS, SERVICE SADDLES WITH CIRCUMFERENTIAL TYPE BANDS SHAPED TO FIT THE ACTUAL O.D. OF THE PIPE AND HAVING A MINIMUM BEARING WIDTH OF 3" (1-1/2" PER BAND) SHALL BE USED. FOR DUCTILE AND CAST IRON MAINS USE BRONZE OR DUCTILE IRON SERVICE SADDLES, WITH BRONZE OR STAINLESS DOUBLE STRAPS.
5. METER BOX SHALL BE OLD CASTLE B16 OR N16 BOX WITH CAST-IN CORNER BRACKETS. USE ARMORCAST A6000489T-COF LID
6. RECYCLED WATER SERVICES SHALL BE LOCATED A MINIMUM OF 4' CLEAR OF POTABLE WATER SERVICES.

1-1/2" & 2" SERVICE CONNECTION & METER BOX INSTALLATION

REF. & REV. JUNE 2014

CITY OF FRESNO

RW-5



MATERIALS SPECIFICATIONS:

A 1 ½" SCH. 40 PIPE

B 1 ½" SLIP X 1 ½" MALE ADAPTER OR 2" X 2" MALE ADAPTER (SCH. 80)

C 1 ½" OR 2" CAST IRON FLANGE

D 1" FLANGED METER SPOOL (SCH. 80)
13" SPOOL FOR 1 ½" METER
17" SPOOL FOR 2" METER

E 1 ½" OR 2" ANGLE METER STOP, A.Y. Mc DONALD "NO LEAD" 74602-22 OR APPROVED EQUAL

F 2"X4" REDWOOD SUPPORT, ONE ON EA. SIDE OF METER BOX, OVERHANG ENDS 2"

G 6" THICK ¾" CRUSHED ROCK WHEN BOX IS PLACED IN ALLEYS WITH TRASH PICK UP ONLY. ALL BOXES IN ALLEYS SHALL BE PLACED PARALLEL TO ALLEY

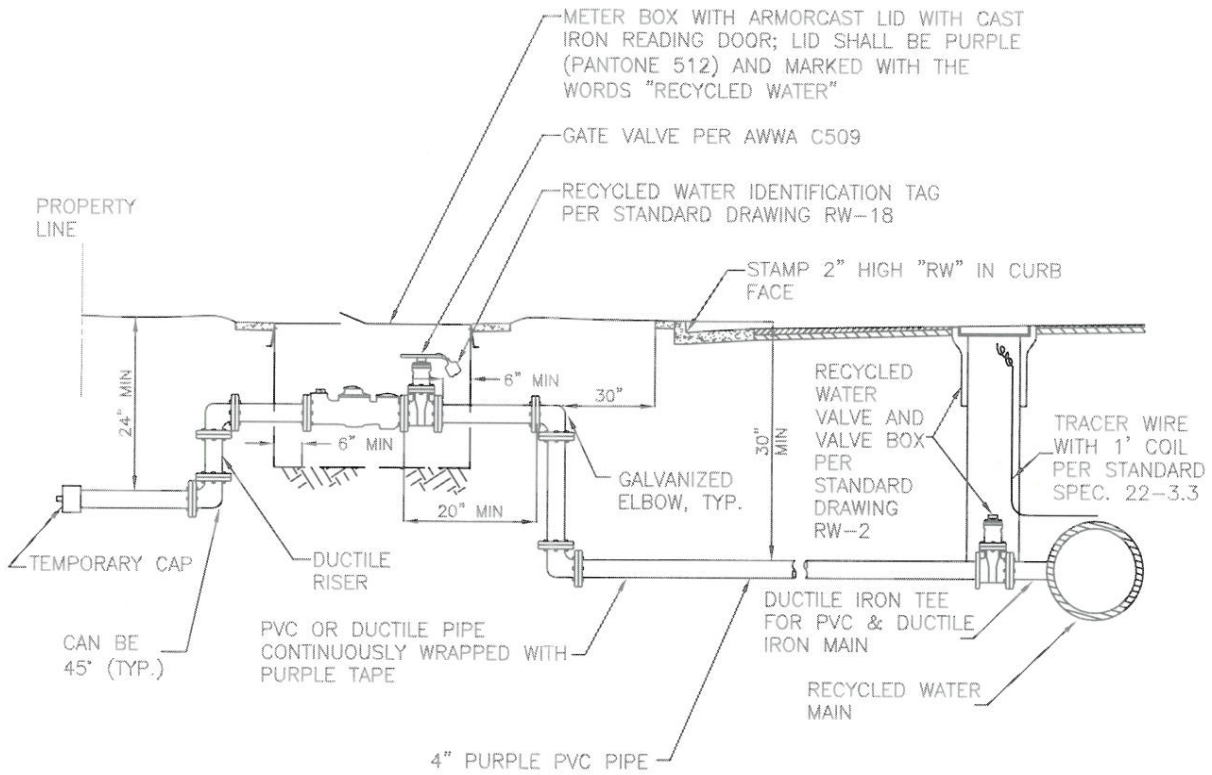
H COMP X COMP 90° ELL, A.Y. Mc DONALD "NO LEAD" 74761-22 OR APPROVED EQUAL

I TYPE "K" SOFT DRAWN COPPER TUBING CONTINUOUSLY WRAPPED IN PURPLE MARKING TAPE OR PURPLE (PANTONE 512) POLYETHYLENE CTS SDR-9 PE 3408, USE COMPRESSION JOINTS WITH STAINLESS STEEL INSERT

J 1" CORPORATION STOP A.Y. Mc DONALD "NO LEAD" 74701-22 OR APPROVED EQUAL

NOTES:

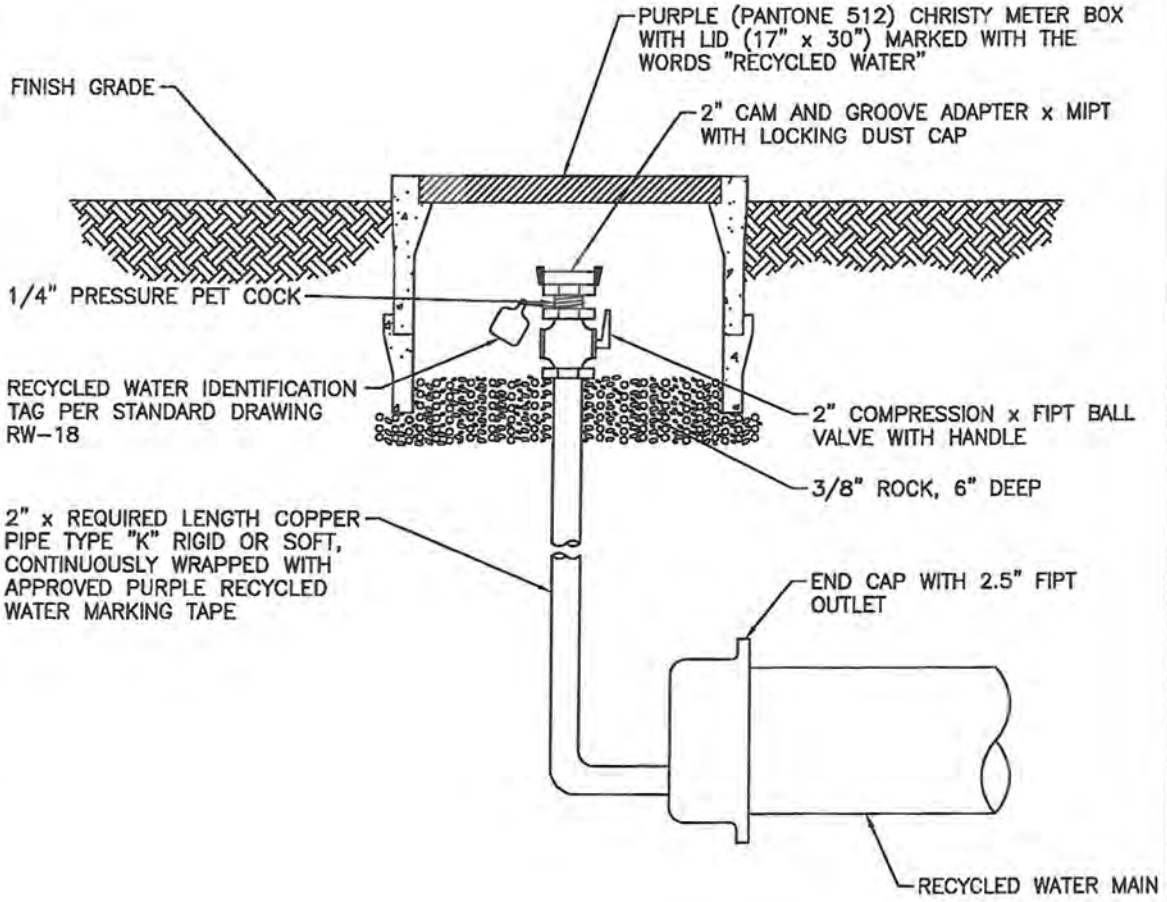
1. RECYCLED WATER SERVICES SHALL NOT BE ALLOWED IN DRIVE APPROACH AREAS AT ANY RESIDENTIAL OR COMMERCIAL LOCATION, UNLESS SPECIFICALLY APPROVED BY THE CITY ENGINEER
2. No. 37 "T" CAST IRON TRAFFIC COVER SHALL BE USED WHEN METER IS LOCATED IN ALLEYS OR DRIVE APPROACH AREAS, OR BEHIND ROLLED CURBS.
3. ALL COPPER FITTINGS SHALL BE CAMPAK COMPRESSION-TYPE.
4. POLYETHYLENE PIPE SHALL USE CAMPAK COMPRESSION-TYPE JOINTS WITH STAINLESS STEEL INSERT.
5. FOR 1½" SERVICE, METER BOX SHALL BE ARMORCAST OR APPROVED EQUAL. OLD CASTLE B30 BOX W/ CAST-IN CORNER BRACKETS ARMORCAST A6001969-COF LID FOR 1 ½" METER OR OLD CASTLE B36 BOX W/ CAST-IN CORNER BRACKETS & ARMORCAST A6001947T-COF LID FOR 2" METER.
6. FOR PVC RECYCLED WATER MAIN TAPS, SERVICE SADDLES WITH CIRCUMFERENTIAL TYPE BANDS SHAPED TO FIT THE ACTUAL O.D. OF THE PIPE AND HAVING A MINIMUM BEARING WIDTH OF 3" (1-1/2" PER BAND) SHALL BE USED. FOR DUCTILE AND CAST IRON MAINS USE BRONZE OR DUCTILE IRON SERVICE SADDLES, WITH BRONZE OR STAINLESS DOUBLE STRAPS.
7. RECYCLED WATER SERVICES SHALL BE LOCATED A MINIMUM OF 4' CLEAR OF POTABLE WATER SERVICES.



NOTES:

1. RECYCLED WATER SERVICE AND METER BOX INSTALLATION SHALL BE INSPECTED AND APPROVED BY CITY PRIOR TO SIDEWALK INSTALLATION.
2. RECYCLED WATER SERVICES SHALL BE LOCATED A MINIMUM OF 4' CLEAR OF POTABLE WATER SERVICES.
3. ALL MATERIALS SHALL BE AS NOTED OR CITY-APPROVED EQUAL.
4. ALL METER BOXES IN DIRT OR LANDSCAPE AREAS SHALL BE SET IN A 6" CONCRETE SLAB MEASURING AT LEAST 1' BEYOND METER BOX ON ALL SIDES.
5. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5
6. RECYCLED WATER SERVICES SHALL NOT BE ALLOWED IN DRIVEWAY APPROACH AREAS AT ANY RESIDENTIAL OR COMMERCIAL LOCATION.

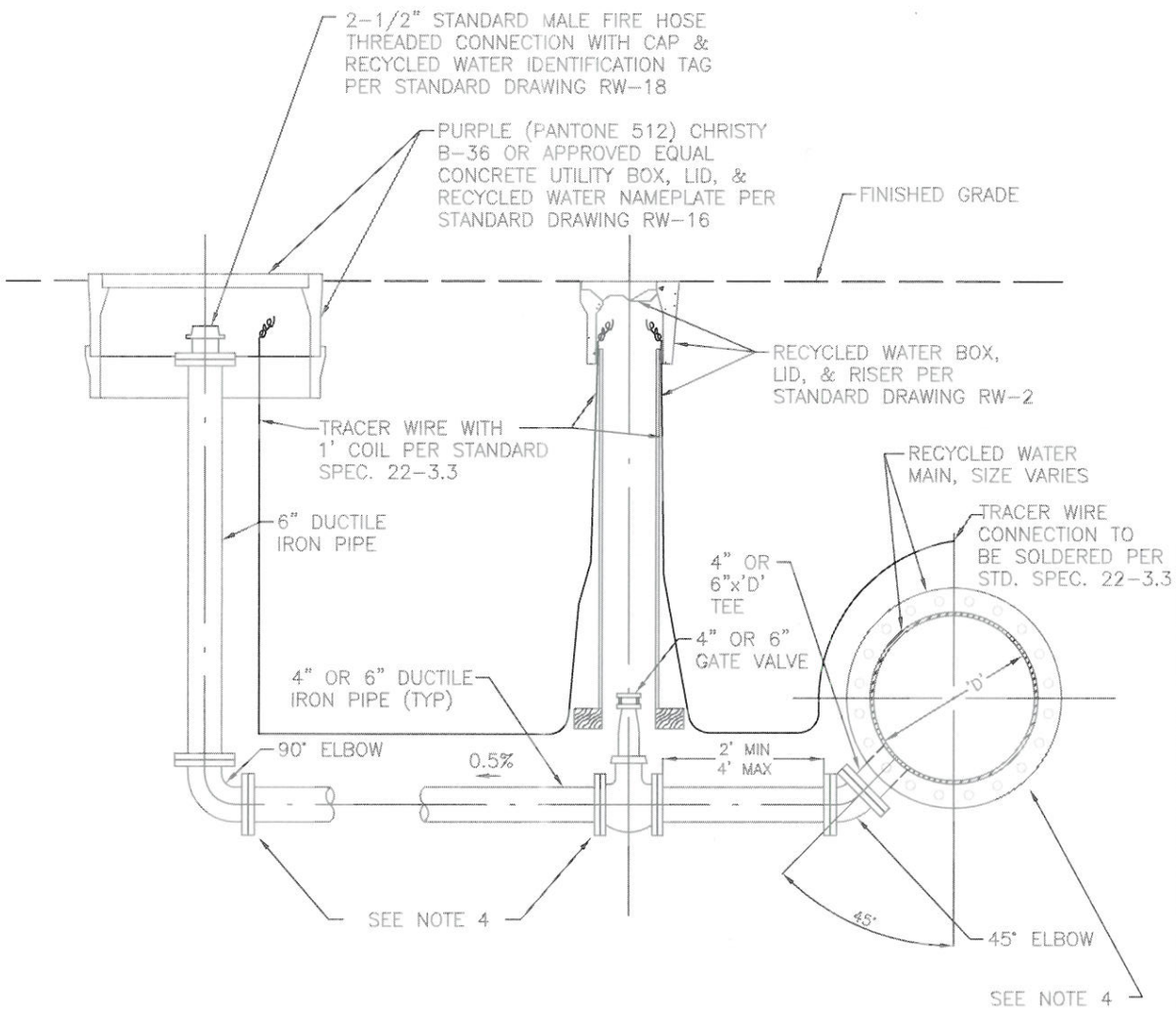
4" RECYCLED WATER SERVICE	REF. & REV. AUGUST 2015	CITY OF FRESNO RW-6



NOTES:

1. SET TOP OF METER BOX 2" ABOVE FINISH GRADE.
2. THE CONSTRUCTION OF A TEMPORARY BLOW-OFF FOR THE USE OF TESTING AND FLUSHING OF NEW RECYCLED WATER MAINS ONLY.
3. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5

TEMPORARY 2" RECYCLED WATER BLOW-OFF	REF. & REV. JUNE 2014	CITY OF FRESNO RW-7



NOTES:

1. ALL FITTINGS SHALL BE SECURED WITH FLANGE CONNECTION, HARNESSES OR TIE-RODS AS APPLICABLE.
2. PLACE VALVES AND BLOW-OFFS OUTSIDE SIDEWALK AND DRIVEWAY AREAS.
3. ALL RISERS SHALL BE FLANGED, 6" DIAMETER.
4. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5

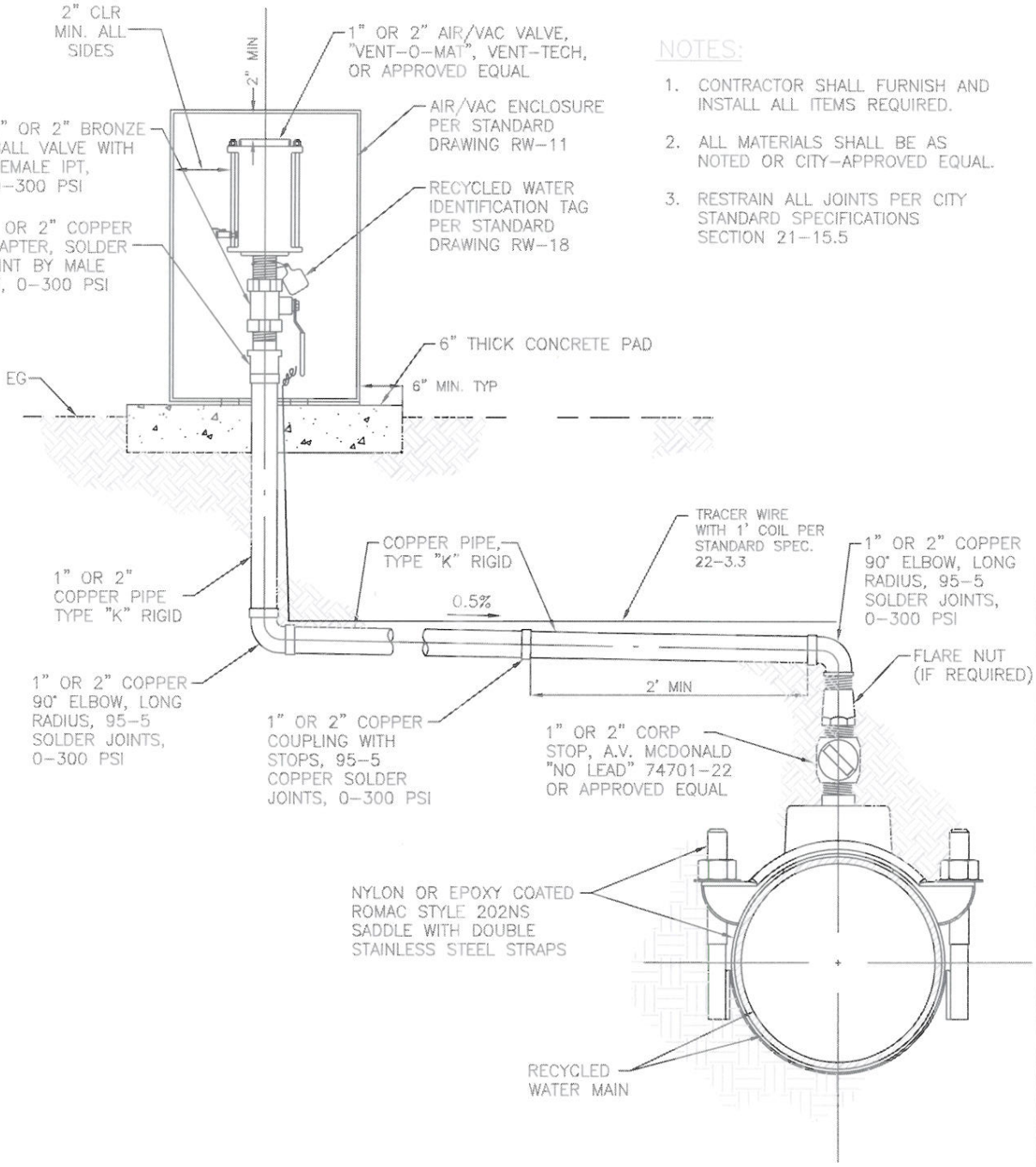
BLOW-OFF PIPE SIZE SCHEDULE	
MAIN	BLOW-OFF
6"	4"
8"	4"
10"	4"
12"	6"
14"	6"
16"	6"
18"	6"
24"	6"
30"	6"

RECYCLED WATER BLOW-OFF ASSEMBLY

REF. & REV. AUGUST 2015

CITY OF FRESNO

RW-8



NOTES:

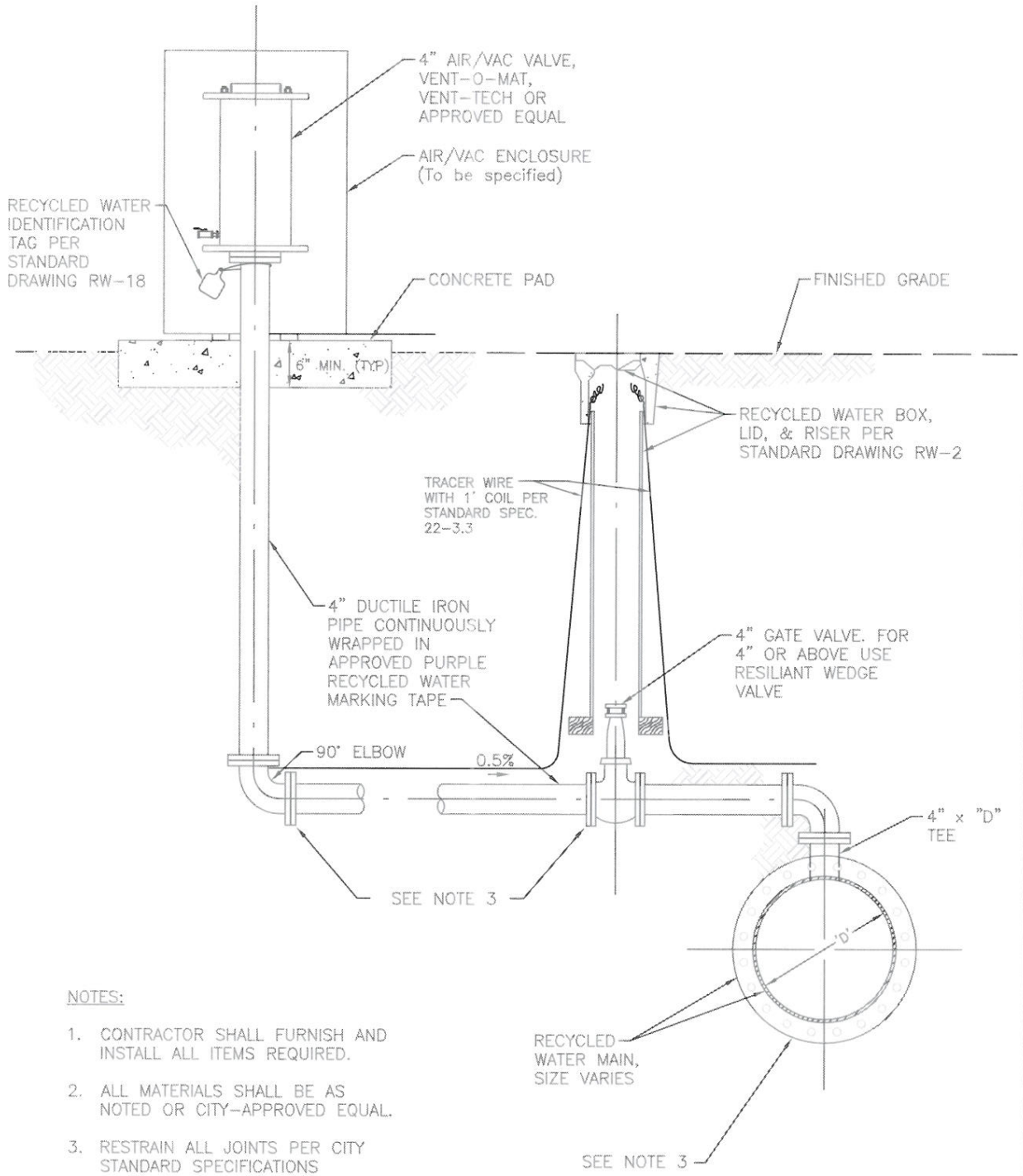
1. CONTRACTOR SHALL FURNISH AND INSTALL ALL ITEMS REQUIRED.
2. ALL MATERIALS SHALL BE AS NOTED OR CITY-APPROVED EQUAL.
3. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5

RECYCLED WATER 1" OR 2" AIR RELEASE/VACUUM BREAKER STATION

REF. & REV.
AUGUST 2015

CITY OF FRESNO

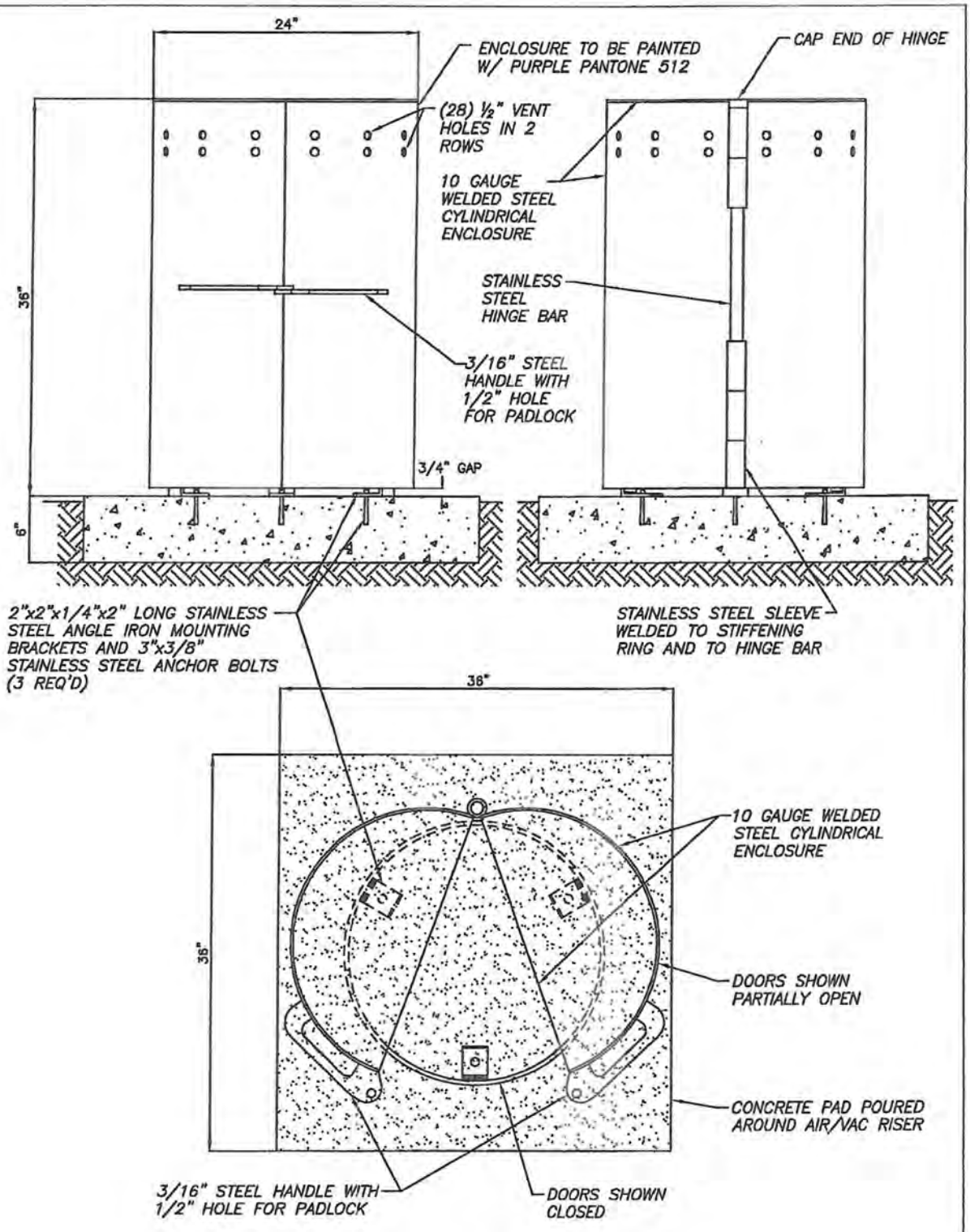
RW-9



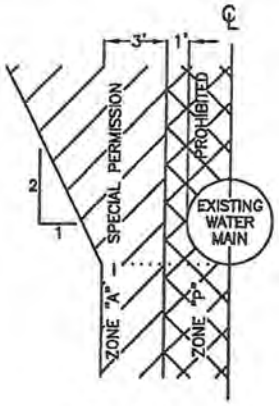
NOTES:

1. CONTRACTOR SHALL FURNISH AND INSTALL ALL ITEMS REQUIRED.
2. ALL MATERIALS SHALL BE AS NOTED OR CITY-APPROVED EQUAL.
3. RESTRAIN ALL JOINTS PER CITY STANDARD SPECIFICATIONS SECTION 21-15.5

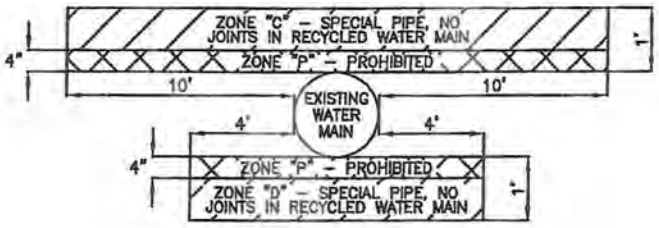
RECYCLED WATER 4" AIR RELEASE/ VACUUM BREAKER STATION	REF. & REV. AUGUST 2015	CITY OF FRESNO RW-10



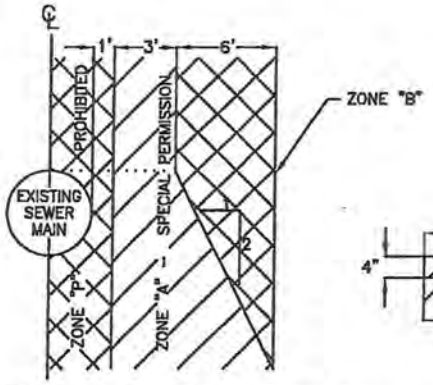
1" OR 2" AIR RELEASE/ VACUUM BREAKER VALVE ENCLOSURE	REF. & REV. JUNE 2014	CITY OF FRESNO RW-11



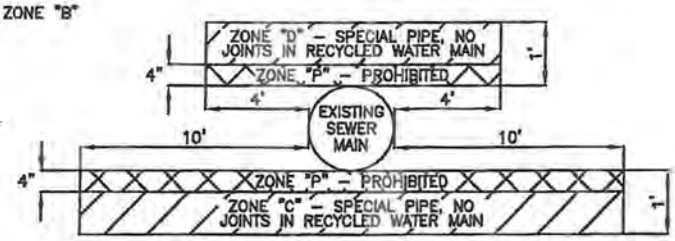
RECYCLED WATER MAIN PARALLEL TO POTABLE WATER MAINS



RECYCLED WATER MAIN CROSSING POTABLE WATER MAINS



RECYCLED WATER MAIN PARALLEL TO SEWER MAINS



RECYCLED WATER MAIN CROSSING SEWER MAINS

SPECIAL CONSTRUCTION REQUIRED FOR RECYCLED WATER

ZONE:

"A" NO RECYCLED WATER LINES PARALLEL TO WATER MAINS SHALL BE PERMITTED IN THIS ZONE WITHOUT PRIOR WRITTEN APPROVAL FROM COUNTY, CALIFORNIA DEPARTMENT OF PUBLIC HEALTH AND THE CITY.

"B" RECYCLED WATER MAIN SHALL BE CONSTRUCTED OF:
1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING.
2. DIPPED AND WRAPPED 1/4" THICK WELDED STEEL PIPE.
3. CLASS 305 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
4. REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE, PER AWWA (C300 OR C302 OR C303).

"C" A RECYCLED WATER MAIN SHALL BE CONSTRUCTED OF:
1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING.
2. DIPPED AND WRAPPED 1/4" THICK WELDED STEEL PIPE.
3. CLASS 305 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
4. REINFORCED CONCRETE PRESSURE PIPE, STEEL CYLINDER TYPE PER AWWA (C300 OR C302 OR C303).

"D" A RECYCLED WATER MAIN SHALL BE CONSTRUCTED OF:
1. DUCTILE IRON PIPE WITH HOT DIP BITUMINOUS COATING.
2. DIPPED AND WRAPPED 1/4" WELDED STEEL PIPE.
3. CLASS 200 PRESSURE RATED PLASTIC WATER PIPE (DR 14 PER AWWA C900) OR EQUIVALENT.
4. REINFORCED CONCRETE PRESSURE PIPE STEEL CYLINDER TYPE, PER AWWA (C300 OR C302 OR C303).

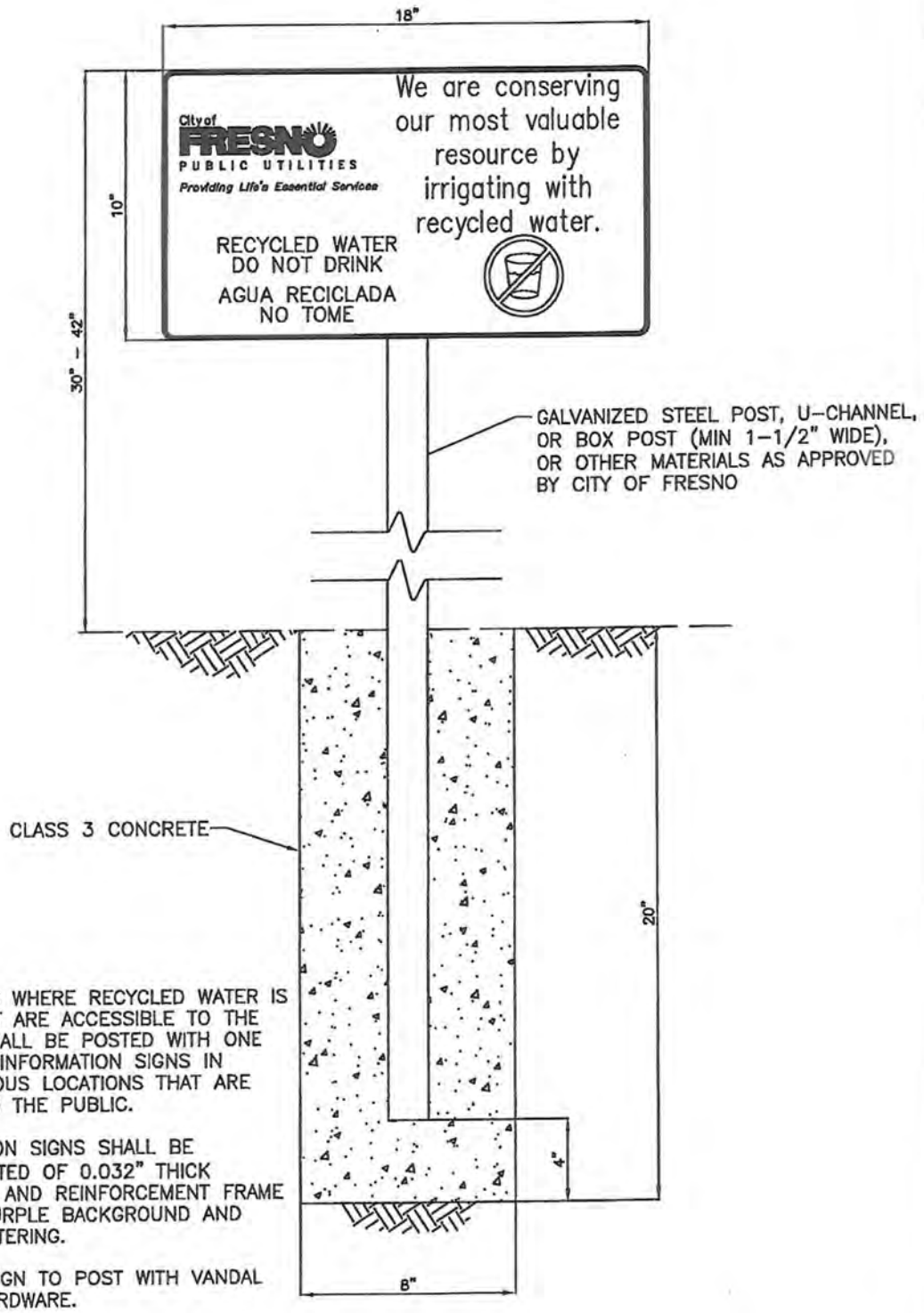
"P" NO RECYCLED WATER MAIN SHALL BE CONSTRUCTED

BASIC SEPARATION STANDARDS

1. SEPARATION DISTANCE SHALL BE MEASURED FROM THE NEAREST OUTSIDE EDGE OF PIPE.

2. WATER MAINS AND SUPPLY LINES OF 24" DIAMETER OR GREATER MAY CREATE SPECIAL HAZARDS BECAUSE OF THE LARGE VOLUMES OF FLOW. INSTALLATIONS OF WATER MAINS AND SUPPLY LINES 24" DIAMETER OR LARGER MUST BE REVIEWED AND APPROVED BY THE HEALTH AGENCY AND CITY ENGINEER PRIOR TO CONSTRUCTION.

RECYCLED WATER MAIN SEPARATION REQUIREMENTS	REF. & REV. JUNE 2014	CITY OF FRESNO RW–12



NOTES:

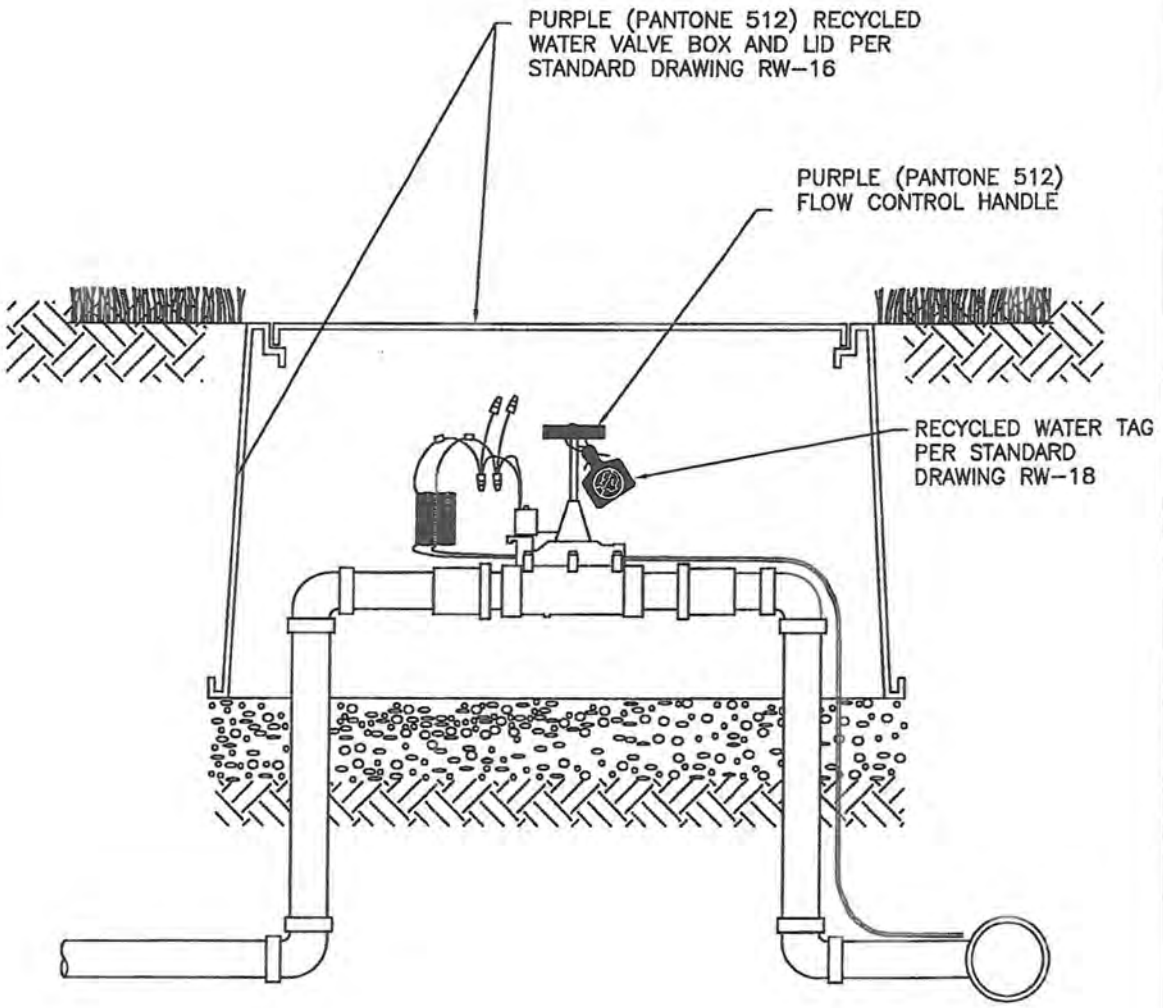
1. ALL AREAS WHERE RECYCLED WATER IS USED THAT ARE ACCESSIBLE TO THE PUBLIC SHALL BE POSTED WITH ONE OR MORE INFORMATION SIGNS IN CONSPICUOUS LOCATIONS THAT ARE VISIBLE TO THE PUBLIC.
2. INFORMATION SIGNS SHALL BE CONSTRUCTED OF 0.032" THICK ALUMINUM AND REINFORCEMENT FRAME WITH A PURPLE BACKGROUND AND WHITE LETTERING.
3. SECURE SIGN TO POST WITH VANDAL PROOF HARDWARE.

RECYCLED WATER IRRIGATION INFORMATION SIGN

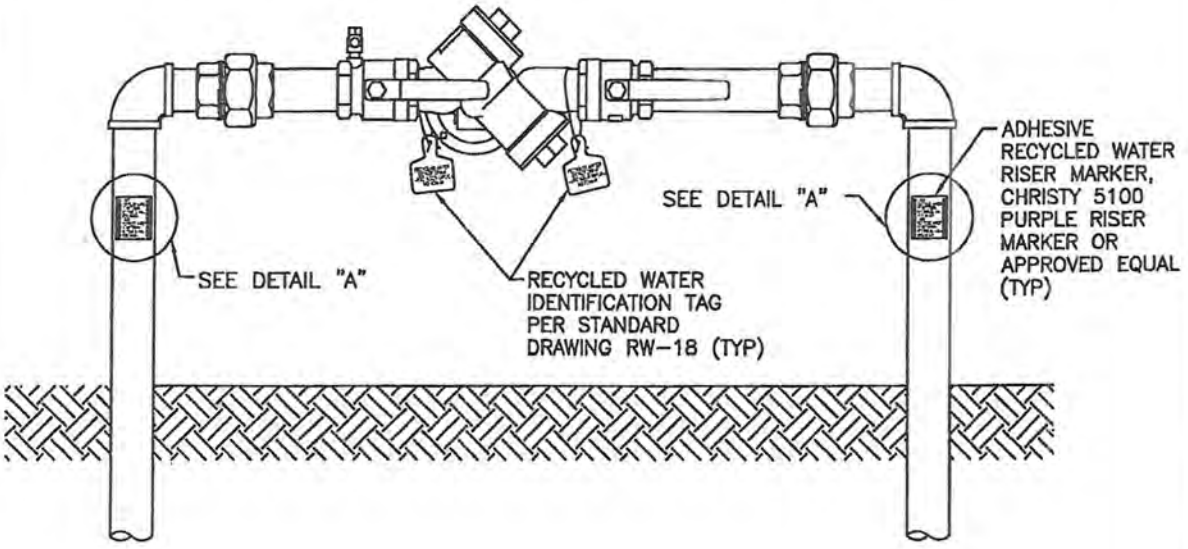
REF. & REV. JUNE 2014

CITY OF FRESNO

RW–13



RECYCLED WATER REMOTE CONTROL IRRIGATION VALVE IDENTIFICATION	REF. & REV. JUNE 2014	CITY OF FRESNO RW-14





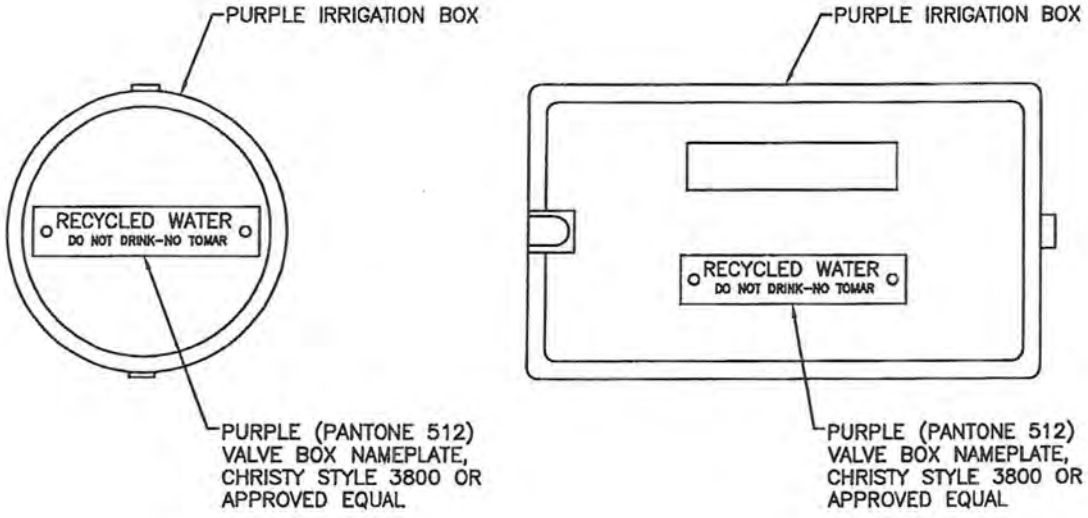
DETAIL "A"

RECYCLED WATER BACKFLOW PREVENTER IDENTIFICATION

REF. & REV.
JUNE 2014

CITY OF FRESNO

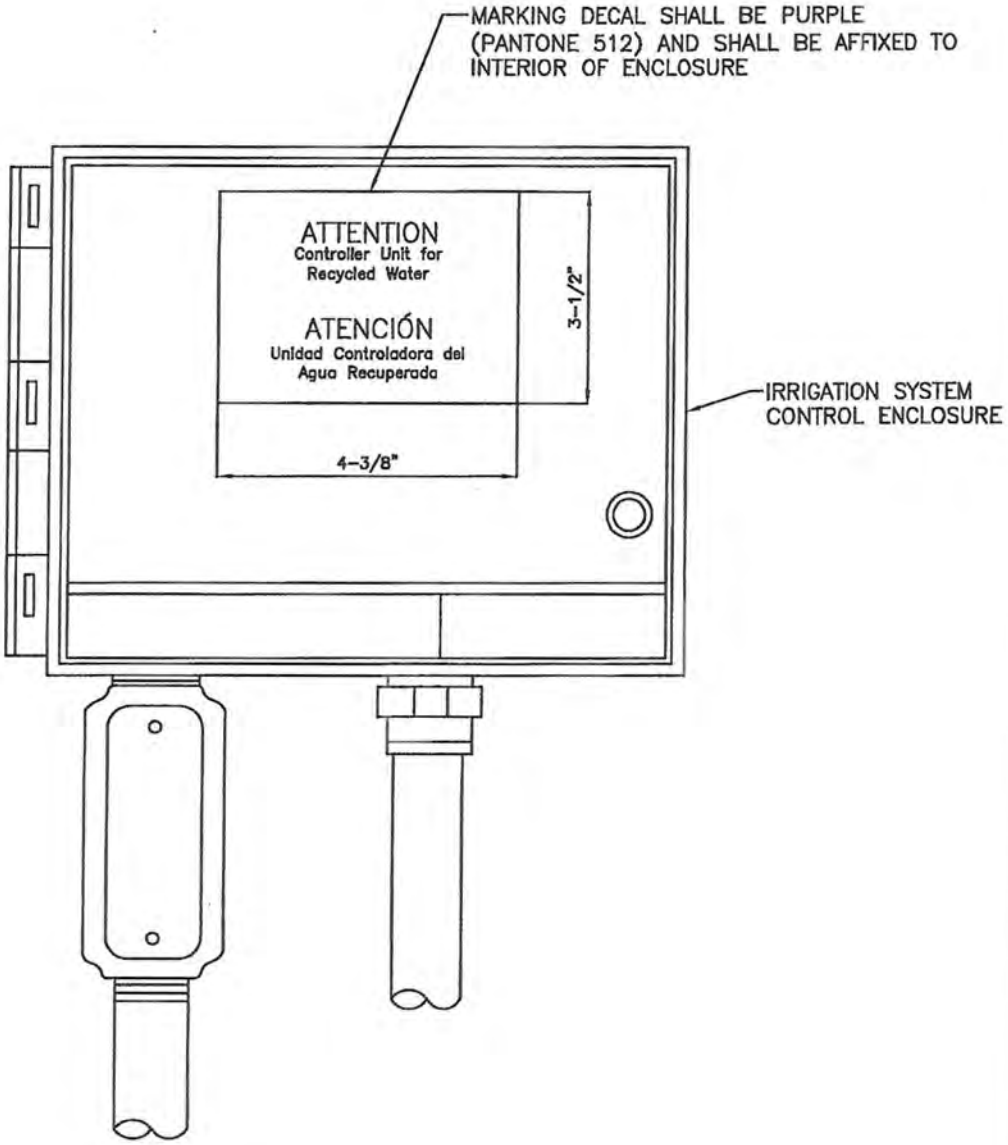
RW-15



NOTES:

1. ALL RECYCLED WATER IRRIGATION BOXES AND LIDS SHALL BE COLORED PURPLE (PANTONE 512).
2. NAMEPLATE SHALL BE 5.75" LONG AND 1.25" WIDE AND SHALL BE MANUFACTURED IN PURPLE, WITH A UV RESISTANT CO-POLYMER PLASTIC.
3. NAMEPLATE SHALL BE ATTACHED TO VALVE BOX WITH TWO TAMPER-PROOF RIVETS.

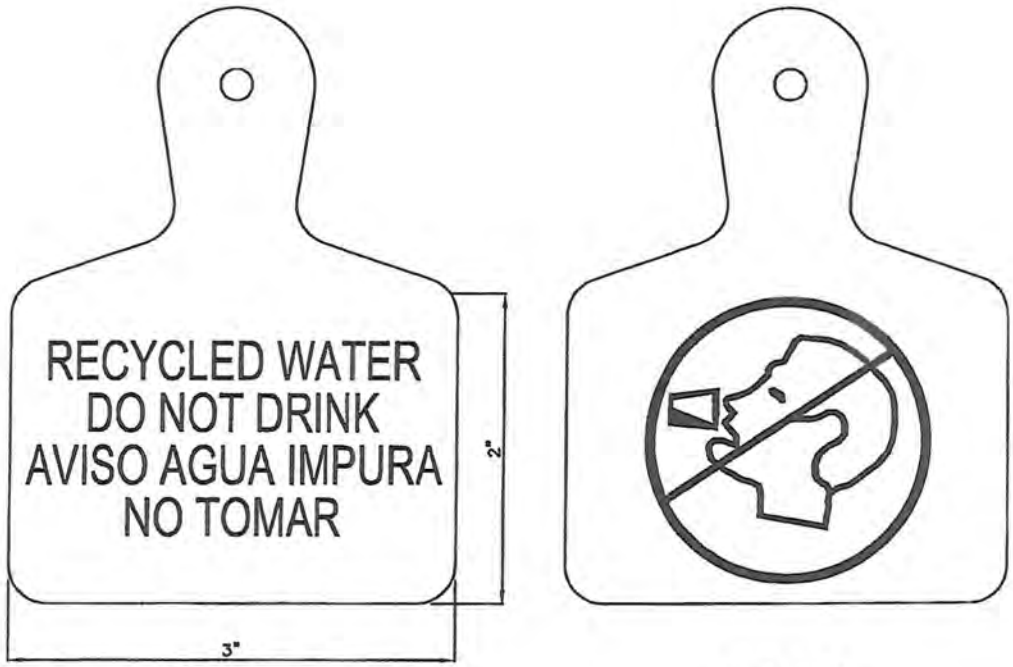
RECYCLED WATER IRRIGATION BOX COVER MARKINGS	REF. & REV. JUNE 2014	CITY OF FRESNO RW-16



NOTES:

1. ALL RECYCLED WATER IRRIGATION CONTROL ENCLOSURES SHALL BE IDENTIFIED WITH A MARKING DECAL.
2. MARKING DECAL SHALL BE BACKED WITH A PERMANENT ACRYLIC ADHESIVE.
3. MARKING DECAL SHALL BE CHRISTY STYLE 4100, OR APPROVED EQUAL.

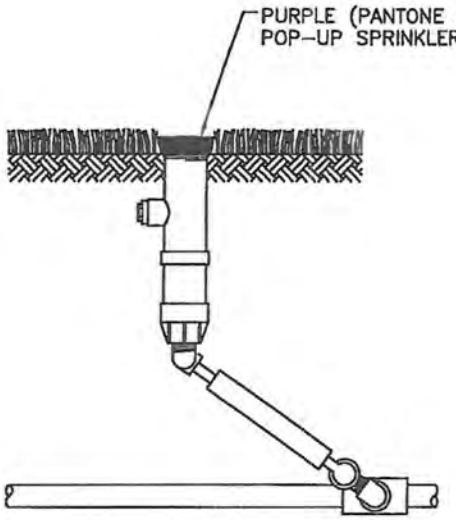
RECYCLED WATER IRRIGATION SYSTEM CLOCK MARKING	REF. & REV. JUNE 2014	CITY OF FRESNO RW-17



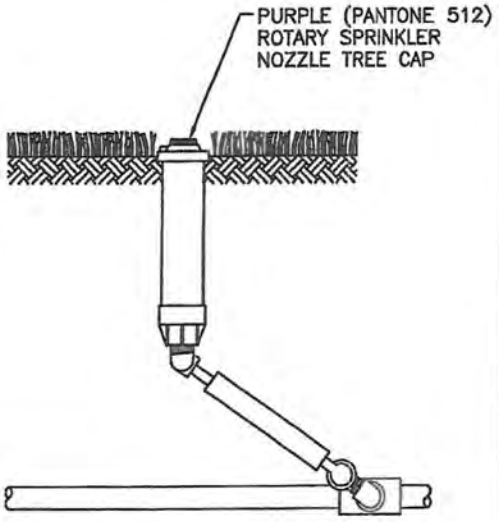
NOTES:

1. IDENTIFICATION TAGS SHALL INCORPORATE AN INTEGRAL ATTACHMENT NECK AND REINFORCED ATTACHMENT HOLE AND SHALL BE CAPABLE OF WITHSTANDING 180 LBS. OF PULL OUT RESISTANCE.
2. ALL LETTERING SHALL BE HOT-STAMPED IN BLACK AND APPROPRIATE FOR OUTDOOR USAGE.
3. IDENTIFICATION TAG COLOR SHALL BE PURPLE.
4. IDENTIFICATION TAG SHALL BE CHRISTY STYLE #007, OR APPROVED EQUAL.
5. IDENTIFICATION TAGS SHALL BE ATTACHED TO GATE VALVES, BALL VALVES, ANGLE STOPS, AND ALL OTHER VALVES IN RECYCLED WATER SERVICE.
6. ATTACH WITH UV RESISTANT ZIP TIES WITH A MINIMUM PULL STRENGTH OF 50 POUNDS.

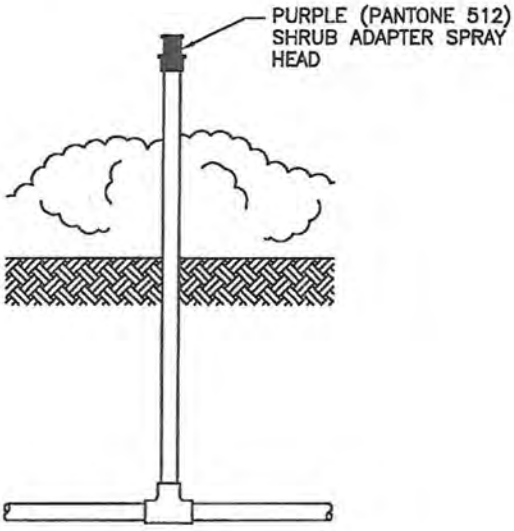
GENERAL RECYCLED WATER IDENTIFICATION TAG	REF. & REV. JUNE 2014	CITY OF FRESNO RW-18



POP-UP SPRINKLER

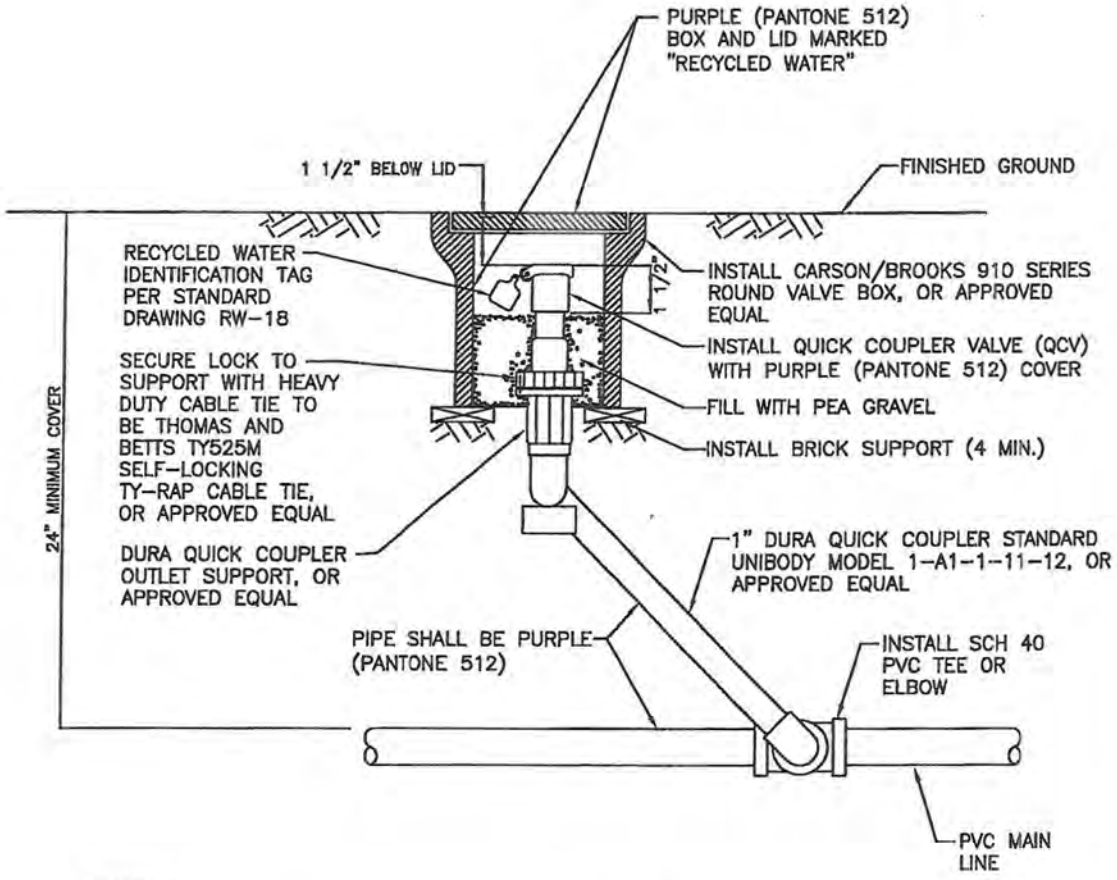


ROTARY SPRINKLER



SHRUB RISER SPRINKLER

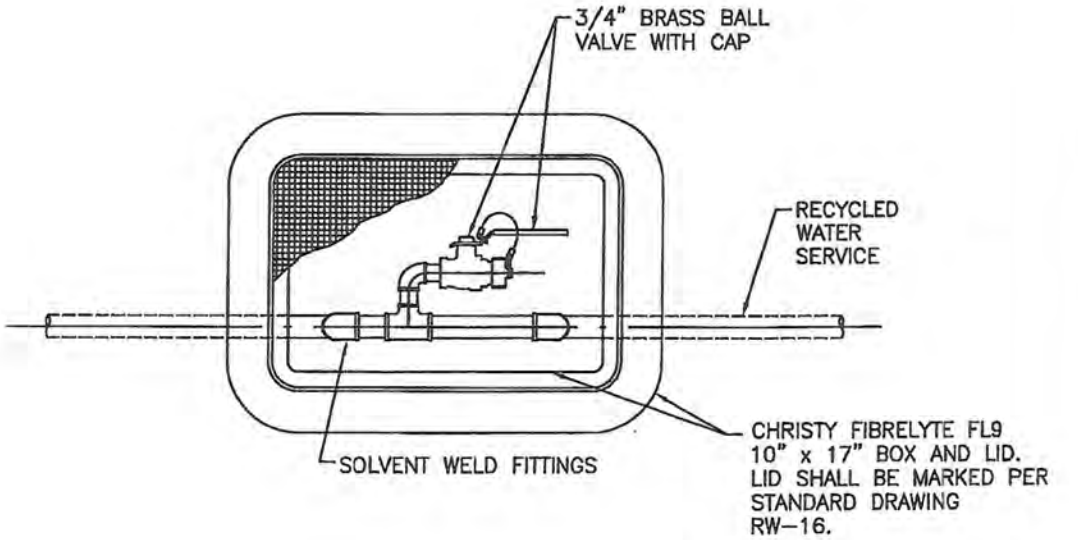
RECYCLED WATER LANDSCAPE IRRIGATION HEAD IDENTIFICATION	REF. & REV. JUNE 2014	CITY OF FRESNO RW-19

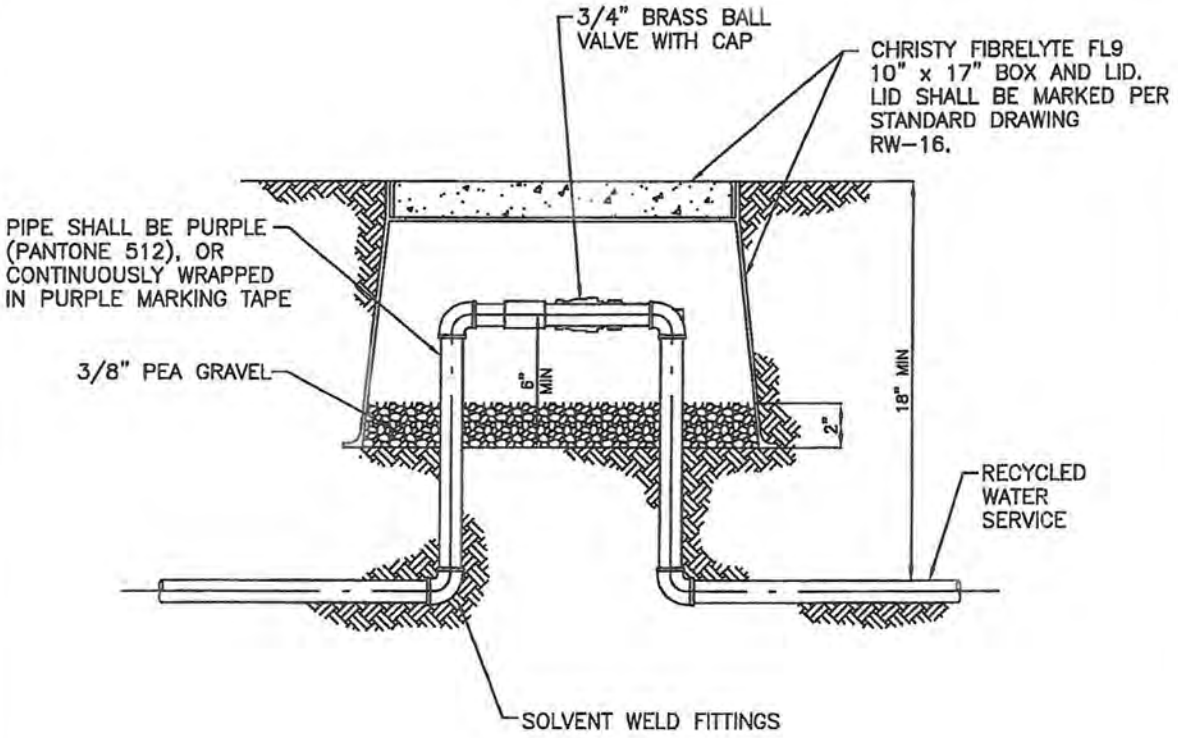


NOTES:

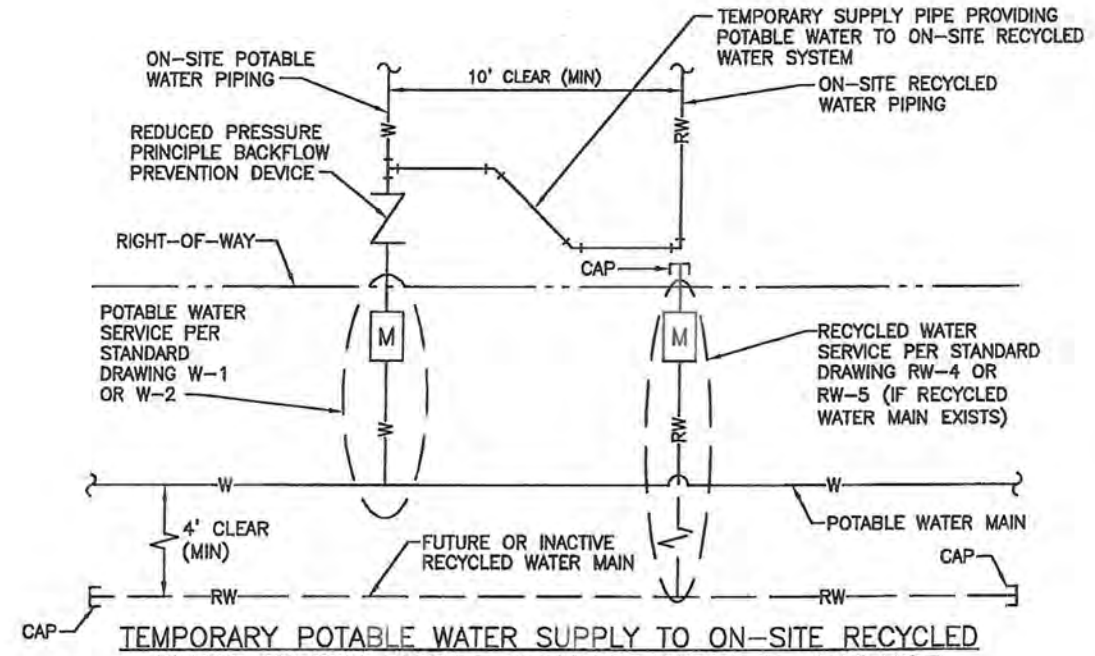
1. NEW-CONSTRUCTION - ALL QUICK COUPLING VALVES MUST HAVE NON-POTABLE LOCKING PURPLE THERMOPLASTIC RUBBER COVERS.
2. RETROFITS - REPLACE ALL EXISTING QUICK COUPLING VALVES WITH NON-POTABLE LOCKING PURPLE THERMOPLASTIC RUBBER COVERS.

QUICK COUPLING VALVE	REF. & REV. JUNE 2014	CITY OF FRESNO RW-20





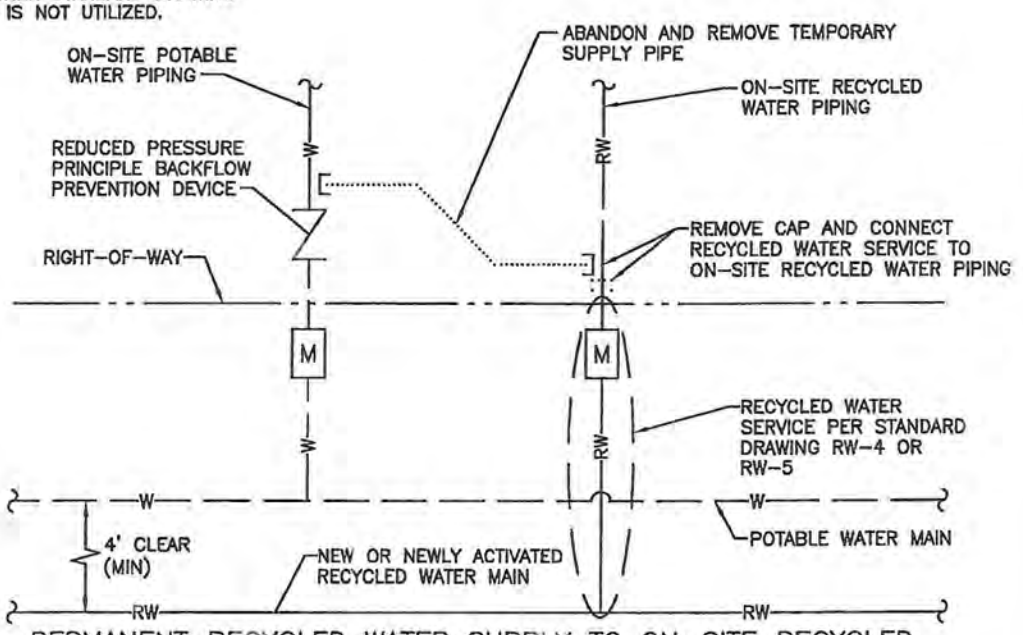
CROSS CONNECTION CONTROL TEST STATION	REF. & REV. JUNE 2014	CITY OF FRESNO RW-21



TEMPORARY POTABLE WATER SUPPLY TO ON-SITE RECYCLED WATER SYSTEM BEFORE RECYCLED WATER IS AVAILABLE

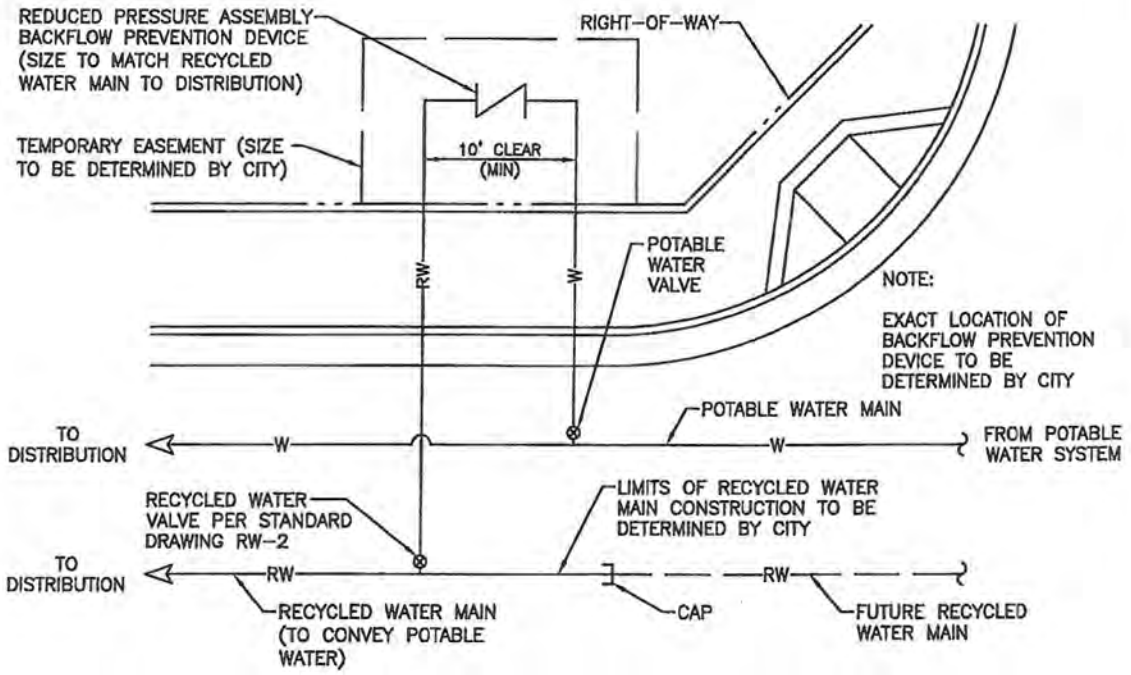
NOTE:

THIS STANDARD DRAWING IS ONLY USED WHEN STANDARD DRAWING RW-23 IS NOT UTILIZED.

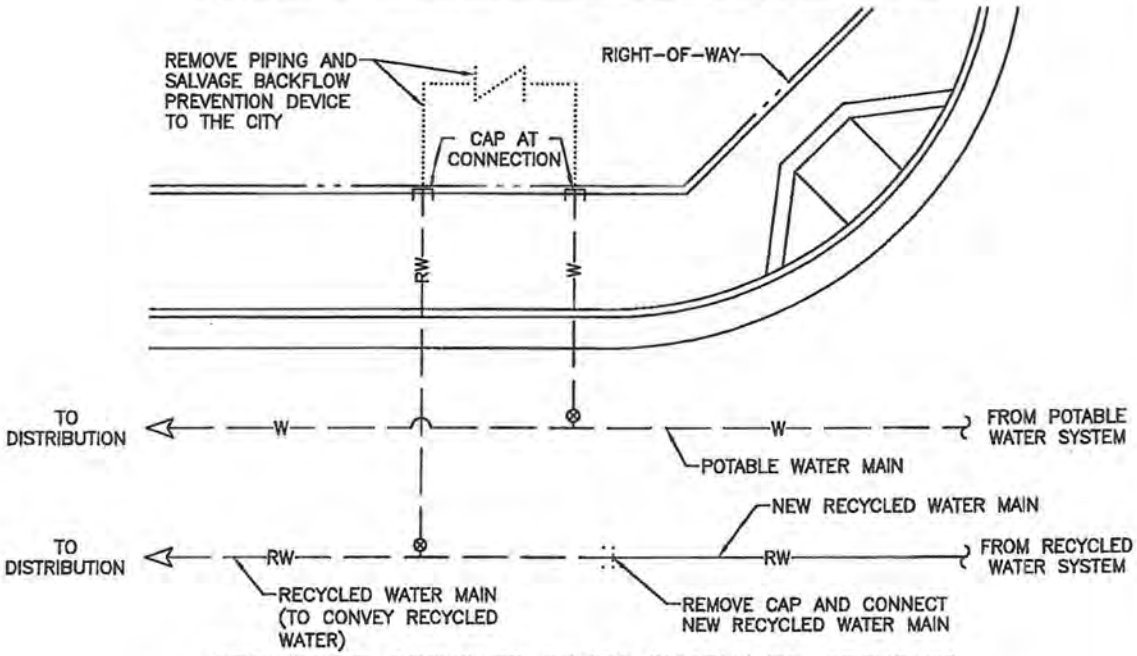


PERMANENT RECYCLED WATER SUPPLY TO ON-SITE RECYCLED WATER SYSTEM AFTER RECYCLED WATER IS AVAILABLE

TEMPORARY POTABLE WATER SUPPLY TO ON-SITE RECYCLED WATER SYSTEM	REF. & REV. JUNE 2014	CITY OF FRESNO RW-22



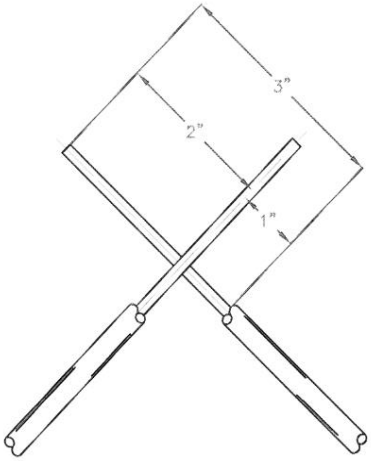
TEMPORARY POTABLE WATER SUPPLY TO RECYCLED WATER SYSTEM BEFORE RECYCLED WATER IS AVAILABLE



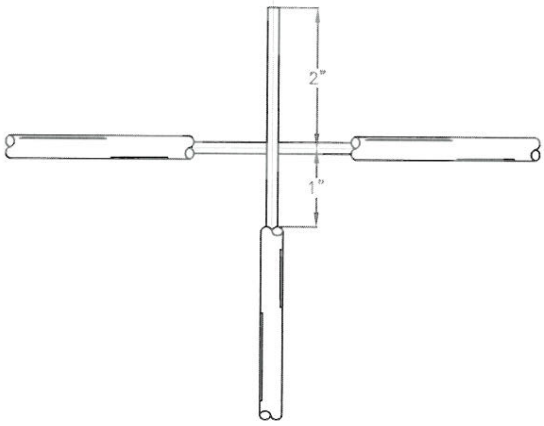
PERMANENT RECYCLED WATER SUPPLY TO RECYCLED WATER SYSTEM AFTER RECYCLED WATER IS AVAILABLE

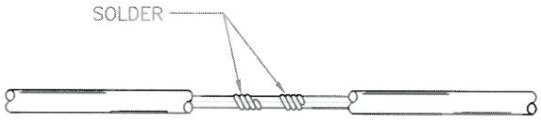
TEMPORARY POTABLE WATER SUPPLY TO RECYCLED WATER SYSTEM	REF. & REV. JUNE 2014	CITY OF FRESNO RW-23

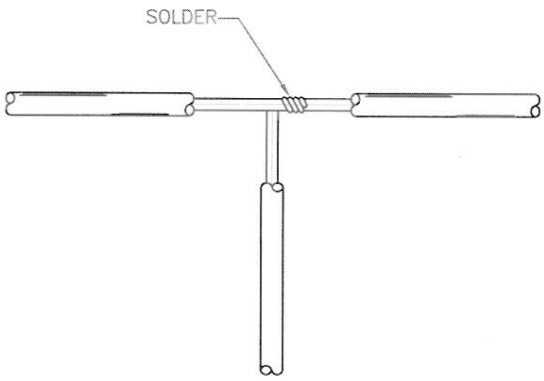
IN–LINE CONNECTION



BRANCH CONNECTION







NOTES:

1. STRIP THE INSULATION FROM THE WIRE AS SHOWN IN THE DRAWING, BUT DO NOT CUT THE COPPER WIRE.
2. LOOP THE WIRE ENDS A MINIMUM OF (4) TIMES FOR EACH WIRE OF THE CONNECTION.
3. USING A PROPANE TORCH, APPLY THE FLAME DIRECTLY TO THE JOINT (LOOPS) TO BE SOLDERED.
4. APPLY 62SN OR EQUIVALENT ROSIN CORE SOLDER TO THE SPLICE. SOLDER SHOULD FLOW INTO THE JOINT.
5. COVER ALL BARE COPPER WIRE WITH A WATERPROOF WRAP THAT IS APPROVED FOR UNDERGROUND CONNECTIONS. THE WRAP MUST EXTEND A MINIMUM OF TWO INCHES (2") BEYOND THE END OF THE STRIPPED WIRE.
6. ALL WIRE MUST BE 12 GAUGE COPPER WIRE.

TRACER WIRE SPLICE CONNECTION DETAIL

REF. & REV.
AUGUST 2015

CITY OF FRESNO

RW–24

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SECTION 33 – RECYCLED WATER FACILITIES DESIGN CRITERIA

PART I - INTRODUCTION

33-1 DEFINITIONS

Unless the particular provision or context otherwise requires, the definitions and provisions contained in this Section 34 shall govern the construction, meaning and application of words and phrases used in the conditions in this Section 34. The definition of each word or phrase shall constitute, to the extent applicable, the definition of each word or phrase which is derivative from it, or from which it-is a derivative, as the case may be.

"Compression Joint"
A push-on joint that seals by means of the compression of a rubber ring or gasket between the pipe and a bell or coupling.

"Confined" In areas were the hydraulic grade line is above the soffit of the Storm Drain pipe, only watertight joints are allowed and shall comply with Section 61 of the State Standard Specifications.

"Easement" A recorded document in which the land owner gives the City permanent rights to construct and maintain recycled water mains and/or facilities across private property.

"Health Agency"
The State Department of Health Services, or the local health officer with respect to a small water system.

"Mechanical Joint"
A joint comprised of pipe spigot, a follower gland (ring), a mechanical joint gasket and the bell of an adjoining pipe, fitting or valve wherein the joint seal is accomplished by tightening a series of bolts and nuts that compress the gasket against the bell recess and the pipe spigot outside diameter.

"Non-potable Water"
Non-potable water is water that may contain objectionable pollution, contamination, minerals, or bacterial agents and is considered unsafe and/or unpalatable for drinking.

"Pantone" A color standard system referenced in the American Water Works Association California-Nevada Section Guidelines for Distribution of Nonpotable Water

"Pressure Class"

See definition for "Rated Working Water Pressure" below.

"Rated Working Water Pressure"
A pipe classification system based upon internal working pressure of fluid in the pipe, type of pipe material, and the thickness of the pipe wall.

"Recycled Water" and "Reclaimed Water"
Non-potable water that is the treated effluent from a wastewater treatment facility. The terms are identical and any reference to reclaimed water refers to recycled water and vice versa.

"Restrained Joints"
A non-standard or modified push-on or Mechanical Joint that is capable of preventing internal pressures or external forces from causing the joint to separate without the use of thrust blocks.

"Sleeve" A protective tube of steel with a wall thickness of not less than one fourth inch into which a pipe is inserted.

"Vertical Separation"
The difference in elevation between the outside bottom of the higher pipe and the outside top of the lower pipe.

"Water Supplier"
Any person who owns or operates a public water system.

33-2 OTHER REQUIREMENTS

Ordinances, requirements, and applicable standards of governmental agencies having jurisdiction within the area served by the Department of Public Utilities shall be observed in the design and construction of recycled water mains and facilities.

Such requirements include, but are not limited to, current revision of the following:

33-2.1 Standard Specifications for Public Works Construction, "latest edition, including all applicable supplements, prepared and promulgated by the California Chapter of the American Public Works Assn. and the Associated General Contractors of America."

33-2.2 State Health laws and regulations regulating the separation between water supply, recycled water and sewerage facilities.

33-2.3 State Uniform Plumbing code as adopted by the City of Fresno.

33-2.4 Road encroachment regulations of the City of Fresno, County, State of California, Fresno Irrigation District, and railroad permits where applicable.

33-2.5 American Water Works Association Standards

33-2.6 Titles 17 and 22 of the State Health and Safety Code regulating cross connection control and back-flow prevention and Chapter 6 of the City of Fresno Municipal Code, regulating cross connections for the City water system.

PART II – GENERAL PROVISIONS

33-3 OTHER REQUIREMENTS

Ordinances, requirements, and applicable standards of governmental agencies having jurisdiction within the area served by the Department of Public Utilities shall be observed in the design and construction of recycled water mains and facilities.

Such requirements include, but are not limited to, current revision of the following:

33-3.1 Scope

The design and construction of recycled water mains, facilities and other appurtenances for the City shall comply with these City Standard Specifications, or permit requirements of various governing bodies, except where specific modifications have been approved by the Engineer, in writing. A tentative plan must be submitted for comment prior to final design. All final Plans submitted by the Developer shall be signed by a registered civil engineer and all Work shall be in accordance with good engineering practice.

33-3.2 Standard Criteria

The City Standard Specifications set forth the procedure for designing and preparing Plans and Specifications for recycled water mains, facilities and appurtenances to be built within the City's recycled water service area. These standards shall include the Specifications on design and installation of ductile iron pipe and polyvinyl chloride (PVC) pressure pipe.

Whenever potable water, recycled water and sanitary sewer plans are to be designed and installed under one project, said work shall be shown on the same construction plans. In this case the Developer's engineer shall supply the City the original vellum or mylar for the final record.

33-4 ENFORCEMENTS

Provisions of these design and construction standards shall be enforced by the Engineer.

PART III – DESIGN CRITERIA

33-5 RECYCLED WATER MAIN PRESSURES, CAPACITIES, AND SIZES

33-5.1 Quantity of Recycled Water Flow

Recycled water needs shall be determined from maximum potential population and land use of the area to be served. For design purposes, the design recycled water flow shall equal the peak hour demand. In order to determine the design recycled water flow, the following criteria shall be used, unless otherwise approved by the Engineer.

33-5.2 Pressure

Recycled water mains shall be designed so that service pressures range between 45 and 60 psi.

33-5.3 Velocity

Recycled water mains shall be designed such that the mean velocity does not exceed five (5) feet per second under Maximum Daily Demand flow conditions.

33-5.4 Head Loss

Recycled water mains shall be designed to provide a mean head loss of not more than five (5) feet per thousand feet of pipe under Maximum Daily Demand flow.

33-5.5 Hazen-Williams "C"

Pipe analysis shall be performed by assuming a value of 110 for Hazen-Williams co-efficient "C".

33-5.6 Minimum Recycled Water Main Size

Recycled water mains shall have an inside diameter of six (6) inches or more. Four (4) inch mains may be permitted by the Engineer for cul-de-sacs that are 150 feet and shorter when the main serves less than five services.

33-6 LOCATION OF AIR RELEASE VALVE ASSEMBLIES

Air release valve assemblies shall be located at all points where air pockets may form and at locations shown and/or established by the Engineer.

33-7 LOCATION OF BLOW-OFF ASSEMBLIES

Blow-off assemblies shall be located at low points and dead ends, where sediment may collect. Design class shall be compatible with the pipeline working pressure.

33-8 RECYCLED WATER MAIN LOCATIONS

33-8.1 Recycled Water Main Location in Roads or Streets

The centerline of recycled water mains shall be located in public Streets in accordance with Drawing P-41, P-42 and RW-12 of City Standard Drawings. A minimum of four (4) feet of clearance must be maintained between parallel sewer and recycled water lines. Recycled water line locations shall be dimensioned from property line and centerline or section line of the street.

33-8.2 Curved Recycled Water Main Requirements

In curved streets the recycled water main shall not cross the center line, but shall follow the street curvature using join deflections or fittings or as shown on the drawings. Bending of PVC pipe barrels to accomplish horizontal and vertical curves is not permitted.

33-8.3 Joint Deflection for Curved Recycled Water Main

Deflection in joints of pipe shall be as limited by manufacturers recommendation.

33-8.4 Elbows

Elbow shall be placed at locations where coupling deflection would exceed the allowable, as limited by manufacturer's recommendation.

33-8.5 Recycled Water-Water-Sewer Separation

The provisions of State Health Codes shall be met in locating recycled water mains.

33-9 CRITERIA FOR THE SEPARATION

33-9.1 Basic Separation Standards

The "California Waterworks Standards" set forth the minimum separation requirements for recycled water and water main lines. These Standards, contained in Title 22 California Code of Regulations 64572 specify:

a) Parallel Construction:
The horizontal distance between pressure water mains, recycled water lines and sewer lines shall be at least 4 feet.

b) Perpendicular Construction (crossing):
Pressure water mains shall be at least one foot above sanitary sewer and recycled water lines where these lines must cross.

c) Separation distances specified in a) shall be measured from the nearest edges of the facilities.

d) Common Trench:
Water mains and recycled water lines must not be installed in the same trench. When water and recycled water mains are not adequately separated, the potential for contamination of the water main supply increases. Therefore, when adequate physical separation cannot be attained, an increase in the factor of safety shall be provided by increasing the structural integrity of both the pipe materials and joints.

33-9.2 Basic Separation Standards

Local conditions such as available space, limited slope, existing structure, etc., may create a situation where there is no alternative but to install water mains or recycled water lines at a distance less than required by the Basic Separation Standards. In such cases, alternative construction criteria may be allowed in very special circumstances. Detail shall be submitted to City Engineer and Health Agency for approval prior to construction.

Water mains and supply lines of 24" diameter or greater may create special hazards because of the large volumes of flow. Therefore, installations of water mains and supply lines 24 inches diameter or larger shall be reviewed and approved by the Health Agency and City Engineer prior to construction.

33-9.3 Special Provisions

The Basic Separation Standards are applicable under normal conditions for recycled lines and water distribution mains. More stringent requirements may be necessary if conditions, such as, high groundwater exist.

New recycled water mains and sewers shall be pressure tested where the conduits are located ten feet apart or less.

In the installation of recycled water or water mains, measures shall be taken to prevent or minimize disturbances of the existing line. Disturbance of the supporting base of this line could eventually result in failure of this existing pipe.

Special consideration shall be given to the selection of pipe materials if corrosive conditions are likely to exist. These conditions may be due to soil type and/or the nature of the fluid conveyed in the conduit.

33-10 ALTERNATE CRITERIA FOR CONSTRUCTION

When new water mains, new sanitary sewer mains, or other non-potable fluid-carrying pipeline are being installed in existing developed areas, local conditions (e.g., available space, limited slope, existing structures) may create a situation in which there is no alternative but to install water mains, sanitary sewer mains, or other non-potable pipelines at a distance less than that is required by the regulations (Section 64572). In such cases, through permit action, the Engineering Department may approve alternate construction criteria. The alternate approval is allowed under Title 22 California Code of Regulations, Section 64551(c).

33-11 PROCEDURE FOR WATER, RECYCLED WATER AND SEWER SYSTEM INSTALLATIONS IN SUBDIVISIONS

a. Installation of all sewer mains, laterals and manholes and backfill.

b. Installation of all recycled water mains, services and backfill.

c. Installation of all water mains, services and backfill

d. Compact all Sewer trenches.
   - d1. Make preliminary pressure test. (Optional)
   - d2. Locate and repair leaks, if any.
   - d3. Recompact if necessary.

e. Compact all recycled water trenches.
   - e1. Make preliminary pressure test. (Optional)
   - e2. Locate and repair leaks, if any.
   - e3. Recompact if necessary.

f. Compact all water trenches.
   - f1. Make preliminary pressure test. (Optional)
   - f2. Locate and repair leaks, if any.

f3. Recompact if necessary.

g. Items (d), (e) and (f) may be done simultaneously if conditions permit.

h. All trenches shall be identified. Contractor shall also locate and mark Sewer, Water and Recycled water service laterals on curb face when constructed.

i. Compaction tests on sewer, water and recycled water taken by City.

j. Final air test for sewer and pressure test for water and recycled water, providing all leaks are repaired all compaction tests have been approved.

k. Any failure of final tests would require Contractor to reinitiate sequence of work starting with Item (i).

l. The Department of Public Utilities will construct the wet tie to connect to the City's system. This will allow the Contractor to sterilize and flush the newly constructed system. There is often an associated charge for the construction of these wet ties.

m. Flushing recycled water mains shall not be allowed in Street area if it conflicts with sewer and water installations. Often done after compaction tests have passed. Water seeps into trenches and holds up Developer's paving while Street dries out.

n. If storm sewers are to be installed, they shall be constructed first, unless otherwise directed.

33-12 EASEMENTS

Non-metallic pipes may be allowed in Easements which are neither confined or interior Easements.

33-12.1 Easements

The minimum width of a recycled water facility Easement shall be approved by the Engineer.

33-12.2 Recycled Water Main Location in Easement

The recycled water main shall be located 5 feet north or west of the center line of the Easement except where otherwise approved by the Engineer.

33-12.3 Where Easements Follow Common Lot Lines

The full Easement width shall be on one lot, in such a manner that access to lines will not be obstructed by walls, trees, or permanent improvements. Where this requirement cannot be met without interfering with existing buildings, easements may straddle lot lines, but the recycled water line shall not be located on the lot lines.

33-12.4 Deeds for Easements

Deeds for Easements shall provide for restrictions of permanent construction within the Easement to provide ingress and egress for maintenance. A recent title report will be required prior to acceptance of the Easement.

33-12.5 Dedications

Dedications shall be in accordance with City standard practice.

(A) For subdivision tracts the owners of land included within the subdivision shall provide a bill of sale on a form provided by the City. This bill of sale shall be a part of the acceptance of the subdivision.

(B) For other than subdivision tracts, the following shall be conveyed to the City:

(1) A deed of Easement satisfactory to the City for the operation maintenance of the recycled water facilities shall be prepared by a registered engineer or land surveyor, on City Easement forms properly executed by the owners;

(2) A bill of sale to the City for the recycled water mains and appurtenances.

33-13 DEPTH OF RECYCLED WATER MAINS

33-13.1 Basic Requirements

Recycled water mains shall be installed at a depth which shall be in accordance with the applicable ordinances, regulating the separation between water supply and sewerage facilities.

33-13.2 Standard Depths

Minimum depth shall be 42 inches to top of pipe measured from Street or surface above the pipe. Where the natural ground above the pipeline trench

has been over-excavated and/or the pipeline is to be placed in the new embankment, embankment material shall be placed and compacted to an elevation of not less than 3 feet above the top of pipe prior to the trench excavation. Where 42 inches from top of curb cannot be maintained, pipe shall be installed with selected or imported bedding as approved by the Engineer or metallic pipe material shall be used.

33-13.3 Exceptions

Designs not in accordance with City Standard Drawing No. RW-12 shall be submitted to the Engineer for approval together with evidence that it complies with City Standard Drawing No. RW-12.

33-14 STRUCTURAL REQUIREMENTS

33-14.1 Buried Facilities

All structures and pipe placed underground shall be of sufficient strength to support with an adequate factor of safety the following applicable loads: the backfill, road surfacing, H-20 truck loading with impact, high loading to be specified by the Engineer or as required by permits for crossing State highways, railroad tracks, canals, and streams. Calculations showing factor of safety may be required by the Engineer.

33-14.2 Other Pipes and Structures

Recycled water lines designed to cross under other pipes or structures shall be protected from damage and shall be constructed in order not to endanger the other pipe or structure. Minimum clearance between outside of pipes or between pipes and other structures is 12 inches unless otherwise approved by the Engineer.

33-14.3 Flexible Joints

Flexible joints which will allow for differential settlements or other movement of recycled water pipe, facilities, adjacent pipe and adjacent structures shall be provided where recycled water lines enter encasements or other structures. Flexible joints shall be within three feet of such structures. Any deviations from these requirements shall require approval from the Engineer.

33-14.4 Thrust Blocks

The use of concrete thrust blocks may be required but will only be allowed when specifically approved in writing by the Engineer.

33-14.5 Mechanical Restrained Joints

Restrained Joint fittings shall be provided at all tees, crosses, reducers, bends, caps, plugs and valves such that the pipe is fully restrained in any one given direction.

These shall meet Uni-B-13 and ASTM F 1674-96 for PVC and be UL/FM approved through 12" for both ductile iron and PVC. The restraint mechanism shall consist of individually activated gripping surfaces to maximize restraint capability. Twist-off nuts, sized the same as the tee-head bolts, shall be used to ensure proper activating of restraining devices. The gland shall be manufactured of ductile iron conforming to ASTM A536-80. The retainer-gland shall have a pressure rating equal to that of the pipe on which it is used through 14" with a minimum safety factor of 2:1. See City Standard Drawings W-31, W-32, W-33, W-34, W-35, W-36 and W-37. Gland shall be Megalug by EBAA Iron, Inc., Uni-Flange by Ford Meter Box Co. Inc., or approved equal.

Push-on Restraint: When it is necessary to restrain push-on joints adjacent to restrained fittings, a harness restraint device shall be used. All harnesses shall have a pressure rating equal to that of the pipe on which it is used through 14". Harness assemblies including tie bolts shall be manufactured of ductile iron conforming to ASTM A536-80. Harness shall be manufactured by EBAA Iron, Inc., Ford Meter Box Co. Inc., or approved equal.

33-15 DESIGN CRITERIA FOR RECYCLED WATER METERS

The City shall determine the appropriate meter sizes and types, based on the building plumbing plans and the landscape sprinkler plans furnished by the Developer.

PART IV – MATERIALS

33-16 REQUIREMENTS

Materials shall be chosen for their strength, durability and ease of maintenance, with due consideration for dead and live loads, beam strength and resistance to corrosion. Pipe joints shall be selected to provide sufficient flexibility to adjust to the residual conditions during and after construction.

33-17 PIPE MATERIALS

The following are acceptable materials for recycled water line construction:

33-17.1 Ductile Iron Pipe and Ductile Iron Fittings

Ductile iron pipe and associated fittings shall conform to the applicable sections of the City Standard Specifications.

(a) Fabrication

Ductile iron pipe shall be Pressure Class 350 ductile iron for sizes up to and including 12 inch and Pressure Class 250 ductile iron from 14 inch to 20 inch; complete with all accessories and conforming to ANSI/AWWA C151/A21.51, unless otherwise indicated on the construction plans. Ductile iron pipe shall be eighteen (18) foot laying lengths.

(b) Joints

Joining of ductile iron pipe shall be with elastomeric-gasket bell ends or couplings. The joints and rubber gaskets shall be in conformance with ANSI/AWWA C111/A21.11.

(c) Inspection and Testing

City at its discretion may inspect the plant facilities, materials, manufacture and testing of the pipe to be furnished by Contractor. Testing of the pipe to ensure compliance with these Specifications shall be made in accordance with applicable AWWA Standards latest edition. All cost incurred by City for witnessing the manufacture of the pipe and in obtaining test results shall be borne by Contractor furnishing the pipe.

(d) Affidavit of Compliance

City may elect to waive any of the above testing and inspection requirements in which event the Engineer may require the manufacturer to submit affidavits stating that all pipe has been manufactured and tested in accordance with this Specification.

(e) Fittings

All fittings for use with ductile iron pipe shall be ductile iron manufactured in accordance with ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. All Mechanical Joint or push-on joint fittings shall be rated for 350 psi working pressure in sizes 4" through 24". Flange fittings shall be rated for 250 psi working pressure. Flange drilling pattern shall be in accordance with ANSI/AWWA C110/A21.10, or commonly referred to as a 125# drilling pattern.

In accordance with Section 4.3 of ANSI/AWWA C153/A21.53, fittings may be provided with a cement-mortar lining and asphalt

coating or fusion bonded epoxy inside and outside. Fusion bonded epoxy shall be in accordance with ANSI/AWWA C116/A21.16 and shall be applied to interior and exterior surfaces.

All tees and crosses shall have all flanged ends with the exception of blowoff, and pumping connections, which shall have flange by Mechanical Joint or push-on joint ends; reducers shall have flange by Mechanical Joint ends; elbows maybe either Mechanical Joint or flanged ends.

(f) Appurtenances

All appurtenances used in conjunction with the ductile iron pipe shall meet the City Standard Specifications.

(g) Lining and Coating

Unless otherwise approved, the internal surface shall be lined with a uniform thickness of cement mortar and then sealed with a thin asphaltic coating in accordance to AWWA C104.

(h) Encasement

The outside surface shall be protected with purple polyethylene encasement furnished and installed in accordance with AWWA C105.

(i) Marking/Identification

Ductile iron pipe shall be identified and marked in accordance to City Standard Drawing RW-1.

33-17.1.1 Confined Easements

All confined easement construction shall be ductile iron.

33-17.2 Polyvinyl Chloride (PVC) Pressure Pipe

Polyvinyl chloride (PVC) pressure pipe shall conform to the applicable sections of the City Standard Specifications.

(a) Fabrication

Polyvinyl chloride pressure pipe shall be purple in color, or be installed in a purple sleeve marked "RECLAIMED WATER –DO

NOT DRINK" the entire length of the pipeline, shall conform to AWWA C-900 latest edition for 12" and smaller and AWWA C905 latest edition for 14" and larger, unless otherwise indicated on the construction Plans.

(b) Joints

Joining of PVC pipe shall be with elastomeric-gasket bell ends or couplings. The bell ends shall be an integral thickened bell end (IB) or an integral Sleeve-reinforced bell end. The bell end joints shall have a minimum wall thickness of the bell or Sleeve-reinforced bell equal, at all points, to the DR Requirements for the pipe. The minimum wall thickness in the ring groove and bell-entry sections shall equal or exceed the minimum wall thickness of the pipe barrel.

If bell ends are not part of the pipe, one PVC coupling, manufactured of the same material and by the same manufacturer as the pipe, shall be furnished with each length of pipe together with two (2) rubber rings. The coupling shall be designed to ensure a water-tight joint with the pipe. The coupling body and socket shall have a wall thickness equal to the pipe barrel thickness with which the coupling is to be used.

All rubber rings shall be furnished by the pipe manufacturer. These rubber rings (Elastomeric Gaskets) shall be manufactured to conform with the requirements of ASTM F-477.

(c) Hydrostatic Proof-test

Each length of pipe shall be proof-tested at two (2) times its rated Pressure Class for a minimum dwell of five (5) seconds, in accordance with AWWA C900 and C905.

(d) Inspection and Testing

The City, at its discretion, may inspect the plant facilities, materials, manufacture and testing of the pipe to be furnished by Contractor.

Testing of the pipe to ensure compliance with these Specifications shall be made in accordance with applicable AWWA Standards latest edition. All cost incurred by City for witnessing the manufacture of the pipe and in obtaining test results shall be borne by Contractor furnishing the pipe.

(e) Affidavit of Compliance

City may elect to waive any of the above testing and inspection requirements in which event the Engineer may require the manufacturer to submit affidavits stating that all pipe has been manufactured and tested in accordance with this Specification.

(f) Fittings

All fittings for use with Polyvinyl chloride pipe shall be ductile iron manufactured in accordance with ANSI/AWWA C110/A21.10 or ANSI/AWWA C153/A21.53. All Mechanical Joint or push-on joint fittings shall be rated for 350 psi working pressure in sizes 4" through 24". Flange fittings shall be rated for 250 psi working pressure. Flange drilling pattern shall be in accordance with ANSI/AWWA C110/A21.10, or commonly referred to as a 125# drilling pattern. In accordance with Section 4.3 of ANSI/AWWA C153/A21.53, fittings may be provided with a cement-mortar lining and asphalt coating or fusion bonded epoxy inside and outside. Fusion bonded epoxy shall be in accordance with ANSI/AWWA C116/A21.16 and shall be applied to interior and exterior surfaces.

All tees and crosses shall have all flanged ends with the exception of blow-off, and pumping connections, which shall have flange by Mechanical Joint or push-on joint ends; reducers shall have flange by Mechanical Joint ends; elbows maybe either Mechanical Joint or flanged ends. A/C to C.I.O.D. (PVC adapter rings may not be used).

(g) Appurtenances

All appurtenances used in conjunction with PVC shall meet the City Standard Specifications.

(h) Detachable Ribbon or Tapes

Because PVC is non-conductive and subject to more damage if struck with excavation equipment, an identification marking tape shall be installed in accordance to City Standard Drawing No. RW-1.

33-18 VALVES

33-18.1 Butterfly Valves

(a) General

These Specifications designate the requirements for the manufacture and installation of butterfly valves. The Contractor shall furnish all labor, materials, tools and equipment necessary to install, complete and ready for operation, the valves as shown on the Plans and herein specified.

(b) Materials and Workmanship

Butterfly valves shall be of the rubber-seated tight-closing type. They shall meet or exceed AWWA Standard C504 latest revision. All valves must use full AWWA C504 Class 150B valve shaft diameter, and full Class 150B underground-service-operator torque rating throughout entire travel. All valves shall be NSF approved. Valve body shall be high-strength cast iron ASTM A126 Class B with 18-8 Type 304 stainless steel body seat. Valve vane shall be high-strength cast iron ASTM A48 Class 40, having rubber seat mechanically secured with an integral 18-8 stainless steel clamp ring and 18-8 stainless steel self-locked screws.

Rubber seat shall be full-circle 360 degree seat not penetrated by the valve shaft. Valve shaft shall be one piece, extending full size through the entire valve. Valve shaft shall be 304 stainless steel. Packing shall be O-ring cartridge designed for permanent duty underground. All exposed cap screws and fasteners on the valve body and flanges shall be Ni-Cad steel or approved equal.

(c) Valve Operations

Valve operators shall be of the manual type. The operator shall be totally enclosed, self-locking worm gear or screw type, with adjustable stops to limit disc travel. The number of complete turns of the operator required to rotate this disc 90 degrees shall be approximately the same as an equivalent sized gate valve. All valve operators shall be fully gasketed, weather-proof and factory packed with grease. Operators shall be of the size required for opening and closing the valve against 150 psi water pressure, and shall have a torque rating of not less than shown in AWWA C-504, 1, Class 150-B. Operators for valves located above ground shall have disc-position indicators and a hand-wheel.

Should the difference between the operating nut and the valve cover exceed 50 inches, an extension mast shall be installed so that the operating nut will not exceed 50 inches from the valve cover or ground surface. Buried operators shall be worm gear or screw type and shall be threaded to accommodate a two inch operating nut, and shall include the operating nut, and a 3/4" hex head plated bolt for operating nut hold-down. All exposed fastenings shall be specifically designed and suitable for permanent buried service. Input shaft and thread for the operating nut shall be at a right angle to the operating shaft. The input shaft shall

extend vertically from the side when the valve is in the horizontal position.

Epoxy shall be applied to all surfaces of valve body and vane to an average minimum thickness of 5 mils, conforming to AWWA C 550 Standards. A primer shall be applied before the coating per the epoxy manufacturer's recommendations. The coating shall be applied to the entire valve body and vane before final assembly.

(d) Valve Ends

Valve ends shall be for Flanged Joint pipe and shall conform to ANSI CIII (AWWA A21.11-1972, Class 125) and drilled to ANSI B16.1 for cast iron flanges and flanged fittings, Class 125. Flanges shall be 125# ANSI. The butterfly valves shall be right closing Class 150-B designed for tight shut off with a maximum differential pressure across the disc of 200 psi. Valve shafts shall consist of a one-piece unit extending completely through the valve disc.

(e) Valve Boxes, Nuts and Bolts, Gaskets and Marker Posts shall conform to the provisions specified herein for gate valves.

(f) Marking/Identification

Install an identification tag in accordance to City Standard Drawing RW-18.

33-18.2 Gate Valves

(a) General

These Specifications designate the requirements for the manufacture and installation of gate valves. The Contractor shall furnish all labor, materials, tools and equipment necessary to install, complete and ready for operation, the valves as shown on the Plans and herein specified.

(b) Materials and Workmanship

Gate valves shall be non-rising stem resilient seated type. Valves shall conform to the latest version of AWWA C-509. Valve bodies shall be ductile iron and wedges shall be fully rubber encapsulated.

The stem shall have two O-rings above the collar and one O-ring below the collar. Stem seals must be replaceable with the valve under pressure. The stem material shall be stainless steel [ANSI-420], low zinc bronze or manganese bronze. The waterway shall be full size. No

cavities or depressions are permitted in the seat area. Valve body and bonnet shall be electrostatically applied, fusion bonded, epoxy coated both inside and out by the valve manufacturer. The coating shall meet the requirements of AWWA C-550 and NSF 61 approved. All valve body and bonnets bolts and nuts shall be type 304 stainless steel.

All valves must be tested by hydrostatic pressure equal to the requirements in the AWWA C-509 specifications prior to shipment.

Tapping gate valve assemblies shall be used only in conjunction with tapping Sleeves and shall be furnished and installed by the Department of Public Utilities.

Nuts and bolts used for bolting flanged-end gate valves to pipeline flanges above ground, shall be hexagonal head machine bolts and hexagonal nuts conforming to ASTM A307, Grade B. All buried flanged-end gate valves shall be bolted to the pipe line flanges with Ni-Cad nuts and bolts or approved equal.

(c) Gaskets

Gaskets for flanged-end gate valves shall be right face 1/8".

(d) Valve Ends

Valves may be provided with Mechanical Joint ends, push-on joint ends, flanged ends, Mechanical Joint by flange ends or push-on joint by flange ends.

(e) Marking/Identification

Install an identification tag in accordance to City Standard Drawing RW-18.

33-19 APPURTENANCES

33-19.1 Blow-off Assemblies for Recycled Water Mains

(a) General

Blow-off assemblies shall be furnished and installed by the Contractor at the locations shown on the Plans. The Contractor shall furnish all labor, materials, tools and equipment necessary to furnish and install, complete and ready for operation, the assemblies as shown on the plans and herein specified. See City Standard Drawings RW-7 and RW-8.

(b) Materials, Fabrication and Installation

(1) Materials Shall be ductile iron and sized as designated on the City Standard Drawings. RW-7 and RW-8 or on the Plans.

(2) Valves Gate valves or butterfly valves for blow-off assemblies shall be as specified herein.

(3) Pipes and Fittings Shall be 6 inch or 8 inch ductile iron and shall conform with the standard for ductile iron pipe water main and fittings. Joints on the recycled water main side of the gate valves shall be flanged. Properly restrained MJ fittings are allowed downstream of the gate valve.

(4) Pipe Sleeves and Lids Shall be used per City Standard Drawing RW-2.

(5) Boxes and Lids Shall be per City Standard Drawings RW-7 and RW-8 or Engineer approved equivalent and marked "Recycled Water". Covers shall be seated flush with the surface of the natural ground or paved surface, such that they may not be damaged by, nor present an obstruction or rough surface to traffic.

33-19.2 Air Release Valve Assemblies

(a) General

Air release valve assemblies shall be furnished and installed by the Contractor at all points where air pockets may form and at the locations shown and/or established in the field by the Engineer. The Contractor shall furnish all labor, materials, tools and equipment necessary to install, complete and ready for operation, the valve assemblies shown on the plans and herein specified. See City Standard Drawing No. RW-9, RW-10, and RW-11.

(b) Materials, Fabrication and Installation

Materials shall be in accordance with City Standard Drawings. The valve shall be a Vent-o-Mat RBX series, Vent- Tech or approved equal.

33-19.3 Recycled Water Service Assemblies (2 inches and smaller)

(a) General

Recycled water service assemblies shall be furnished and installed by the

Contractor at the locations shown on Plans or established in the field by the Developer. The Contractor shall furnish all labor, materials, tools and equipment necessary to install, complete and ready for operation, the assemblies as shown on the Plans and herein specified. The Contractor shall perform the installation of the lot services in accordance with the City Standard Drawing Nos. RW-4 and RW-5. The Developer shall provide the City with a Plan showing the "As Built" location of all services.

(b) Materials, Fabrication and Installation

(1) Materials Shall be those designated on the City Standard Drawings RW-4 and RW-5

Service Size	Corp. Stop	Service Pipe	Angle Meter Stop
1"	1"	1"	1"
1 ½"	1 ½"	1 ½"	
2"	2"	2"	

(2) Pipe and Fittings Service pipe shall be Type K soft copper tubing, or Polyethylene CTS 200 psi SDR-9 PE 3408. Solder fittings shall be soldered with 95% tin / 5% lead or silver solder (pure).

(3) Saddles Service saddles shall be used for all 1", 1-1/2", and 2" taps made on ductile iron and PVC pipe. A circumferential type stainless steel band or bands shaped to fit the actual O.D. of the pipe shall be used. Double strap bands shall provide a minimum bearing width of 1-1/2 inches per band along the axis of the pipe. Single strap bands shall provide a minimum bearing width of 3 inches per band along the axis of the pipe. Saddles shall not have lugs that will cut into the pipe when the saddle is tightened. Saddles are to be Jones, Ford, Mueller or approved equal.

Multiple O.D. range saddles shall not be used.

(4) Service Taps In no case shall a service tap be made in a main closer than 18 inches to a bell coupling joint, or fitting. Service taps shall not be less than two feet apart. Service taps shall be located opposite the service locations so that the service laterals will be perpendicular to the Street centerline. Service tap locations varying more than two feet from the perpendicular must be approved by the Engineer prior to installation. Service taps shall be in accordance with City Standard Drawing Nos. RW-4 and RW-5. Where dissimilar metals are joined, a dielectric connection, approved by the Engineer shall be provided. Hole

size drilled in the pipe shall be the same size as the corporation stop. The cutting tool shall be muller cutting type (hole) cutter which will retain the coupon.

Tapping Sleeves and corporation stop valves shall be used for service connections of 2 inches and smaller. For ductile iron recycled water mains, double strap ductile iron service saddles must be used.

(5) Service Boxes

Service casing and covers and meter boxes and covers shall be furnished and installed by the Contractor as shown of City Standard Drawings RW-4 and RW-5. All service casings shall be complete and in place at the time of acceptance of the subdivision. All services shall be marked by an "RW" clearly visible on the curb face. Minimum size 1 ½" X 1 ½ " maximum 3" X 3".

(6) Curb Stops in Driveway

No services in driveway approaches allowed.

(7) Encasement and Identification

Due to the corrosive nature of soils, a protective polyethylene sleeve shall be installed over the copper service line on all sizes from 1" to 2". It must be purple in color, to immediately identify it as non-potable service, and shall encase the service line from the corp stop to the angle meter stop in one continuous piece. It shall be attached to both the corp and the angle meter stop by using PVC tape, duct tape, or other suitable adhesive tape.

33-19.4 Valve Service Casing and Lid

Valve Service Casing and Lid Shall conform with City Standard Drawing RW-2. Covers shall be seated flush with the surface of the natural ground or paved surface such that they may not be damaged by, or present an obstruction or rough surface to traffic. Covers shall have a 9 inch wide and 6 inch thick stabilizing concrete ring constructed when the valve is outside the pavement area. Covers must be painted purple by using Pantone 512.

SECTION 34 – RECYCLED WATER FACILITIES

34-1 SCOPE

These City Standard Specifications are intended to describe the execution and workmanship to be used in construction of a recycled water system operated in the City of Fresno. It is presumed that the Developer or his/her engineer has prepared such general and special Specifications as are necessary to define the nature and location of the Work, contractual arrangements, payment for Work, and any other matters concerning the owner or his/her Contractor. All Street work permits shall be obtained and fees shall be paid by the Developer or Contractor.

34-2 GENERAL

34-2.1 Quality Control of Materials

The quality control of materials shall conform to the applicable sections of the City Standard Specifications as published by the City of Fresno.

34-2.2 Quality of Workmanship

All Work will be done by Persons experienced in the specific Work, under competent supervision and in a first class manner to the Engineer's complete satisfaction. Every precaution shall be taken to prevent foreign material from entering the pipe while it is being placed in the trench. If the pipe-laying crew cannot put the pipe into the trench and in place without getting earth into it, the Engineer may require that before lowering the pipe into the trench a heavy tightly woven burlap bag of suitable size shall be placed over each end and left there until the connection is to be made to the adjacent pipe. During laying operations, no debris, tools, clothing or other materials shall be placed in the pipe. After placing a length of pipe in the trench and completing the jointing operation, in a method approved by the pipe manufacturer, the pipe shall be secured in place with approved backfill material placed under it. At times when pipe laying is not in progress, the open ends of the pipe shall be closed by a watertight plug or other means approved by the Engineer. This provision shall apply during any Work stoppage.

34-2.3 Connections to Existing Facilities

Connections shall be performed by Wastewater Division personnel only. One week notice shall be given before any connection is to be made.

34-2.4 Defective Work

Any defective materials or workmanship which becomes evident within one year after the City assumes responsibility for the completed Work shall be

replaced or repaired without cost to the City. Refusal of the Contractor to correct defective Work which is his/her responsibility will be considered just cause for excluding him/her from performing future Work to be connected to the City's system. Such exclusion does not impair the City's right to bring legal action to correct the deficiencies.

34-2.5 Construction Staking and "Record-Drawings"

Construction stakes will be set parallel to the recycled water main alignment at an offset distance and direction agreed upon with the Contractor but in no case shall construction stakes be offset more than 10 feet. Stakes will be set at no greater interval than 100 feet on straight alignments. For horizontally or vertically curved recycled water mains, the stake intervals shall be 25 feet. For all Street recycled water mains, regardless of alignment or slope, the Developer's engineers shall determine "Record-Drawings" elevations at the top of pipe centerline at each change in pipe grade and shall provide a written record of such elevations to the inspector. The Developer's engineer shall also provide "Record-Drawings" of all main line valve locations and all service stop locations.

34-3 POLYVINYL CHLORIDE (PVC) PRESSURE PIPE AND FITTINGS INSTALLATION

34-3.1 Scope of Work

The Contractor performing the Work under this Specification shall furnish all labor tools and equipment, which are necessary to install, complete, and ready for operation, the PVC pressure pipe recycled water mains as herein specified and/or as indicated on the contract drawings.

34-3.2 Installation

Installation shall conform to Chapter 7, Installation, of AWWA Standard C605 and AWWA Manual M23. Bending of PVC pipe barrels to accomplish horizontal or vertical curves is not permitted.

34-3.3 Tracer Wire with Marking Tape

Tracer wire used with PVC **where called for on the Plans** shall be copper wire, Type TW, Size AWG #12 and shall be placed above the PVC recycled water main along with a recycled water marking tape, purple (pantone 512). The marking tape shall be a minimum of six inches wide and a minimum of 12" but no greater than 24" above the pipeline. See City Standard Drawing No.'s RW-1 and RW-24.

34-4 DUCTILE IRON PRESSURE PIPE AND FITTINGS INSTALLATION

34-4.1 Scope of Work

The Contractor performing the Work under this Specification shall furnish all labor tools and equipment, which are necessary to install, complete, and ready for operation, the ductile iron pressure pipe recycled water mains as herein specified and/or as indicated on the contract drawings.

34-4.2 Installation

Installation shall conform to AWWA C-600 and Installation of Ductile Iron Pipe and Fittings in AWWA Manual M41.

34-5 VALVE CASING AND LID INSTALLATION

When recycled water mains are installed, casings and lids in Street areas shall be installed in a lowered position below any sub-grade which may be removed or re-compacted.

When sub-grade is compacted and base material installed and completed, casing and lids shall be completed in accordance with City Standard Drawing Nos. RW-2, "Recycled Water Valve and Valve Box," and RW-16, " Recycled Water Irrigation Box Cover Markings".

Valves located in the sidewalk shall be marked with a 2" X 4" stake so that casings and lids may be brought to finished grade at the time concrete is poured.

Any excavation necessary for valve casing and lid work shall be thoroughly re-compacted to the satisfaction of the Engineer. All casings shall be installed in a vertical position. All valve operating nuts shall be free of any dirt or debris and all valves shall be checked to ensure that they are left in a wide open position.

It shall be the responsibility of the Contractor to do this Work exactly as specified.

34-6 EARTHWORK FOR DUCTILE IRON AND PVC PIPE INSTALLATION

34-6.1 Trench Excavation

The trench shall be constructed per City Standard Specifications, Section 16, City Standard Drawings P-48 and RW-1. Unless shown otherwise on the Plans a minimum cover of 3.5' is required for mains.

34-6.2 Trench Bottom

The trench bottom shall be true and even so that the barrel of the pipe will have soil support for its full length. Earth mounds can be used to support the pipe with the Engineer's approval and under his/her direction.

34-6.3 Bell Holes

Bell holes are required for push-on and mechanical joint pipe. While push-on joints require only a small depression beneath each bell to allow pipe to lay flat on the trench bottom, mechanical joints require additional space for operation of a ratchet wrench.

Minor excavations, which are necessary for removing the sling and for assembling the joints, shall be made in advance of the laying crew and filled after these operations are completed.

34-6.4 Trench Width

The trench must be wide enough to permit proper installation of the pipe with room for assembling joints and tamping backfill around the pipe. The trench must be at least 12 inches wider than the outside diameter of the pipe to allow for proper placement, tamping, and compaction of the initial backfill. Per the City Standard Specifications, Section 16, the width of the trench at the top of the pipe shall not be greater than 16 inches more than the outside diameter of the barrel of the pipe to be laid therein. These requirements may be modified by the Engineer or as shown on the Plans.

34-6.5 Rock or Hardpan Excavation

In rock or hardpan excavations it is necessary that the rock or hardpan be removed so that it will not be closer than 4 inches to the bottom and sides of the pipe for sizes up to 24 inches in diameter. This same practice shall be followed should the trench excavation pass through piles of abandoned masonry, large pieces of concrete or other debris. The pipe shall not be permitted to rest on masonry walls, piers, foundations or other unyielding, subterranean structures which may be encountered in the excavation.

34-6.6 Barricades and Safety

The Contractor shall follow all the requirements in Section 7-10.4 of the City Standard Specifications.

34-6.7 Shoring

In addition to, and consistent with public safety considerations, every precaution for safety must be provided for the workers at the Site. Shoring must comply with Cal-OSHA Standards.

34-7 BACKFILLING AND TAMPING

Backfilling usually follows pipe installation as closely as possible. This protects the pipe from falling materials, eliminates possibility of lifting the pipe due to flooding of open trench, and avoids shifting pipe out of line by cave-ins. The purpose of backfilling is not only to protect the pipe by covering it, but to provide firm, continuous support that will prevent the pipe from settling or resting on the couplings. The essentials of a first class backfilling job shall be as follows:

Provide continuous bedding or support by carefully consolidating approved material under pipe and couplings and between the run of pipe and the trench walls. Provide a cushion on top by hand - placing approved material to at least 12" over the pipe - the balance can then be backfilled by machine.

The first step in providing firm, continuous support for the pipeline is to tamp soil solidly under the pipe and couplings. Tamping can be done with tamping bars to consolidate the backfill material. Hand tamping is best accomplished with damp loamy earth or sand.

The initial backfill material used shall be slightly damp which will pack more solidly under the pipe. This initial backfill is always placed by hand. It shall be shoveled in evenly along both sides of the pipe, making a layer about 4" thick. Then the tamping bar is used to tamp this soil firmly under the pipe. If more than 4" of soil is shoveled in before tamping, the soil can bridge and fail to go under the pipe. Next, another 4" layer is shoveled in and tamped. This is repeated until the pipe is firmly bedded in compact soil up to the top of the pipe. Two 6 inch lifts are then used to achieve a 12 inch cover over the pipe. This completes what is called the "initial" backfill, the thoroughly tamped soil which provides a continuous supporting bed for the pipeline. Where clay soil or unstable soil is encountered, the pipe shall be enveloped in a minimum of four inches of sand - then the backfill completed to at least 12" above the pipe with selected material, then dry sand or other suitable materials shall be laid.

The balance of the backfill which is usually placed by machine, need not be as carefully selected as the initial material. Cleanup shall be in accordance with the City Standard Specifications.

34-8 TESTING AND STERILIZATION

34-8.1 General

The Specifications constituting this section designate the requirements for the procedure, materials, performance, and payment for testing and sterilization of recycled water mains and appurtenances intended for the conveyance of non-potable water under pressure.

Scope of Work The Contractor shall furnish all labor, material, tools, and equipment, including all chemicals, necessary to perform all operations required to complete the testing and sterilization as herein specified.

34-8.2 Field Testing

(a) Hydrostatic Pressure Test Hydrostatic Pressure test. After the pipe and all appurtenances have been laid and the backfill has been placed and compacted, a hydrostatic pressure test shall be conducted. A hydrostatic test shall be conducted on the entire pipeline for a period of 2 hours at a hydrostatic pressure of 200 psi for Class 200 pipe and 150 psi for Class 150 pipe. In locations where there is a combination of Class 200 and Class 150 pipe, the system testing pressure shall be 150 psi. All valves in the pipeline shall be in the open position during system testing.

(b) Preparation The line shall be filled with water at least 24 hours prior to testing. While filling and immediately prior to testing, all air shall be expelled from the pipeline. Where air valves or other suitable outlets are not available for introducing water or releasing air for test purposes, taps and fittings approved by the Engineer shall be installed and later securely plugged.

(c) Procedure The procedure shall follow those specified in the AWWA Standard C-600 Sec. 5.2 for ductile iron and C-605 Sec. 7.3 for PVC pipe. The pressure in the pipeline shall be pumped up to the specified test pressure. When the test pressure has been reached, the pumping shall be discontinued until the pressure in the line has dropped 5 psi, at which time the pressure shall again be pumped up to the specified test pressure. This procedure shall be repeated until the end of the test period. At the end of the test period, the

pressure shall be pumped up to the test pressure for the last time. The total quantity of water pumped to maintain pressure shall be measured and compared to the allowable.

(d) Leakage Shall not exceed the amount calculated, using AWWA Standard C-605 for PVC and C-600 for ductile iron.

34-8.3 Sterilization

Prior to pressure testing and prior to acceptance of Work, the entire pipeline including all valves, fitting, hydrants, service laterals, and other accessories shall be sterilized in accordance with AWWA C-601 latest revision. All mains shall be flushed with potable water after completion of construction and prior to disinfection. The Contractor shall provide a sufficient number of suitable outlets at the end(s) of the line(s) being sterilized in addition to those required by the Plans, to permit the main to be flushed with water at a velocity of at least 5.5 feet per second over its entire length. The outlets provided shall meet the requirements for fittings as specified for the type of main constructed. Temporary blow-offs may be installed during the sterilization and flushing to satisfy these requirements. Drainage facilities shall be constructed such that the water lines cannot be contaminated through the flushing outlet. After flushing, chlorine compound solution made with liquid chlorine, calcium hypochlorite in solution or sodium hypochlorite solution shall be water mixed and introduced into the mains to form a chlorine concentration of approximately 100 ppm or that which will provide a minimum residual of 50 ppm in all parts of the line after 24 hours have elapsed.

During the sterilization process all valves, hydrants and other accessories shall be operated. After chlorination, the water shall be flushed from the line at its extremities until the replacement water tests are equal chemically and bacteriologically to those of the permanent source of supply. The placing of chlorine capsules or tablets in pipe sections during the laying process will be considered as an acceptable method of sterilization. The chlorine water solutions shall be diluted to a chlorine concentration of not more than 100 ppm and not less than 50 ppm measured in the water lines. The Contractor shall keep adequate chlorine residual testing and indicating apparatus available on the site during the entire sterilization period.

After final flushing, the flushing fitting shall be plugged with devices intended for this purpose at the pressure class of the pipe. Where water main is coated, plugs and outlets shall be similarly coated. Bacteriologic samples of water for the specified bacteriologic test shall be taken from each end of the sterilized main (located downstream of the point of introduction of chlorine disinfectant and at other locations as determined necessary by the Engineer.) Additional samples shall be taken at intermediate points in such a manner that at least

one sample is taken for each 700 feet of main. Bacterial samples will be taken a minimum of 48 hours after the mains have been flushed of all chorine.

The Contractor shall dechlorinate disinfecting water and flushing water if required by the Plans

34-9 SIGNAGE

A sign reading "Recycled Water-Do Not Drink" in English and Spanish, shall be posted at all points where consumption of the water may be attractive to the public, in areas of public use that receive reclaimed water and at all valves, control boxes, and similar features in accordance with City Standard Drawing No RW-13 . This requirement may also apply to sprinkler heads when after-market clip-on purple rings are readily available in accordance with City Standard Drawing No RW-19.

34-10 ABANDONMENT

34-10.1 General

All existing non-potable waterlines or structures that are to be abandoned must be identified in the drawing. In general, abandoned lines that are in service will be replaced with a parallel line of equal or larger size, and the Engineer shall demonstrate in any case that the abandonment does not adversely affect the water system.

34-10.2 Recycled Water Lines

All non-potable water lines to be abandoned shall be entirely filled by pumping concrete into them. The pump mix shall be a mixture sufficiently workable for the purposes intended.

Southeast Development Area (SEDA)
Specific Plan
Wastewater Technical Study

April 26th, 2023

Prepared for:

City of FRESNO

City of Fresno, California

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CHAPTER 1
INTRODUCTION

1.1 Project Description and Background

The City of Fresno (City) is preparing a Specific Plan and Program Environmental Impact Report (PEIR) for the Southeast Development Area (SEDA). The SEDA Specific Plan Area (Plan Area), previously known as the Southeast Growth Area (SEGA), is an approximately 9,000-acre area in the southeast portion of the City of Fresno that is formally designated as a growth area in the City of Fresno General Plan (General Plan). The Plan Area is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jensen and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west; see Figure 1.1 for the Plan Area's location.

SEDA was approved for incorporation into the City by the Local Agency Formation Commission (LAFCo) in 2006, with a number of qualifying provisions, of which included the preparation of a Specific Plan and associated environmental documents before the land could be annexed to the City. Located in Growth Area II, SEDA was planned for development after other infill initiatives from the City's other planning efforts, and would be developed in phases. The General Plan established two levels of development – the General Plan Horizon and the General Plan Buildout. The General Plan Horizon is the level of development predicted to occur by the "Horizon Year," which was established as 2035, in accordance with the General Plan. General Plan Buildout is the level of development characterized by full occupancy of all developable sites in accordance with the General Plan; this was estimated to occur beyond 2035 (defined as past 2050).

As such, the General Plan defined development of SEDA under General Plan Horizon as a portion of the full buildout conditions – specifically, it assumed a residential development capacity of approximately 15,000 dwelling units, one third of the buildout capacity. Accordingly, the residential development capacity of SEDA under General Plan Buildout is approximately 45,000 dwelling units, and the General Plan assumed that the additional 30,000 dwelling units would not be developed until after 2035. However, though the General Plan was analyzed under the General Plan Horizon level, the associated MEIR (Master Environmental Impact Report) analyzed the environmental impacts of the General Plan under the buildout level for the Sphere of Influence (SOI), which encompasses other growth areas, including SEDA.

The Specific Plan for SEDA was developed for the buildout condition of the Plan Area of 45,000 dwelling units, and provides implementation mechanisms for development in the Plan Area that accommodate for increased density and accelerate housing production. As part of the City's General Plan, SEDA was designated with land use classifications as defined in the General Plan. The Specific Plan presents alternative land use classifications for SEDA, and seeks to propose how the Plan Area will develop over time to complete buildout conditions with these newly-defined land use categories.

As part of the Specific Plan process, a PEIR needs to be developed to evaluate the impacts associated with the proposed improvements to the Plan Area, and what, if any, mitigation measures are necessary to account for such impacts. This technical study will focus on the impacts of the SEDA Specific Plan on wastewater facilities and the wastewater collection and treatment system proposed for the Plan Area.

1.2 Summary of Analysis

The City's General Plan assigned land use classifications to areas located within the SEDA Specific Plan Area. Each land use classification has a set of characteristics assigned to it with respect to a specific utility demand that have been determined and/or calculated by various contributing parties. The SEDA Specific Plan proposes new land use classifications for the Plan Area that may change the area's characteristics as it relates to utilities, e.g., water demand, wastewater generation, or storm water runoff, when compared to the General Plan. Additionally, some land uses have revised areas, which further alters those characteristics.

Changes in land use can affect a wastewater collection system's ability to collect, convey, and treat wastewater generated by a city's residents. New development will require the construction of new wastewater collection facilities including sewer mains, manholes, pump stations, and treatment plants. The City of Fresno's Wastewater Collection System Master Plan Update (Wastewater Master Plan)[1] includes a number of proposed capital improvements to account for increased development based on the General Plan buildout conditions. The Wastewater Master Plan includes wastewater flow factors that were developed for each land use classification defined in the General Plan.

This technical study will focus on the analysis of wastewater production in the Plan Area, and how it may change based on Specific Plan development. The analysis to determine the change in wastewater flows involved comparing the total wastewater flow determined for the Plan Area under both the General Plan and Specific Plan land use cases.

At the time of preparation of this study, the City was developing wastewater flow factors for the new SEDA land use classifications. These factors were not available when completing the above stated analysis. Thus, a number of reasonable assumptions were made to correlate Specific Plan land uses with General Plan land uses in order to use the wastewater flow factors established in the Wastewater Master Plan for General Plan land uses.

This technical study focuses on specifically analyzing the change in wastewater generation between the General Plan and the Specific Plan for SEDA in order to assist with the development of mitigation measures as needed.

[1] City of Fresno, "Wastewater Collection System Master Plan Update," September 2015.

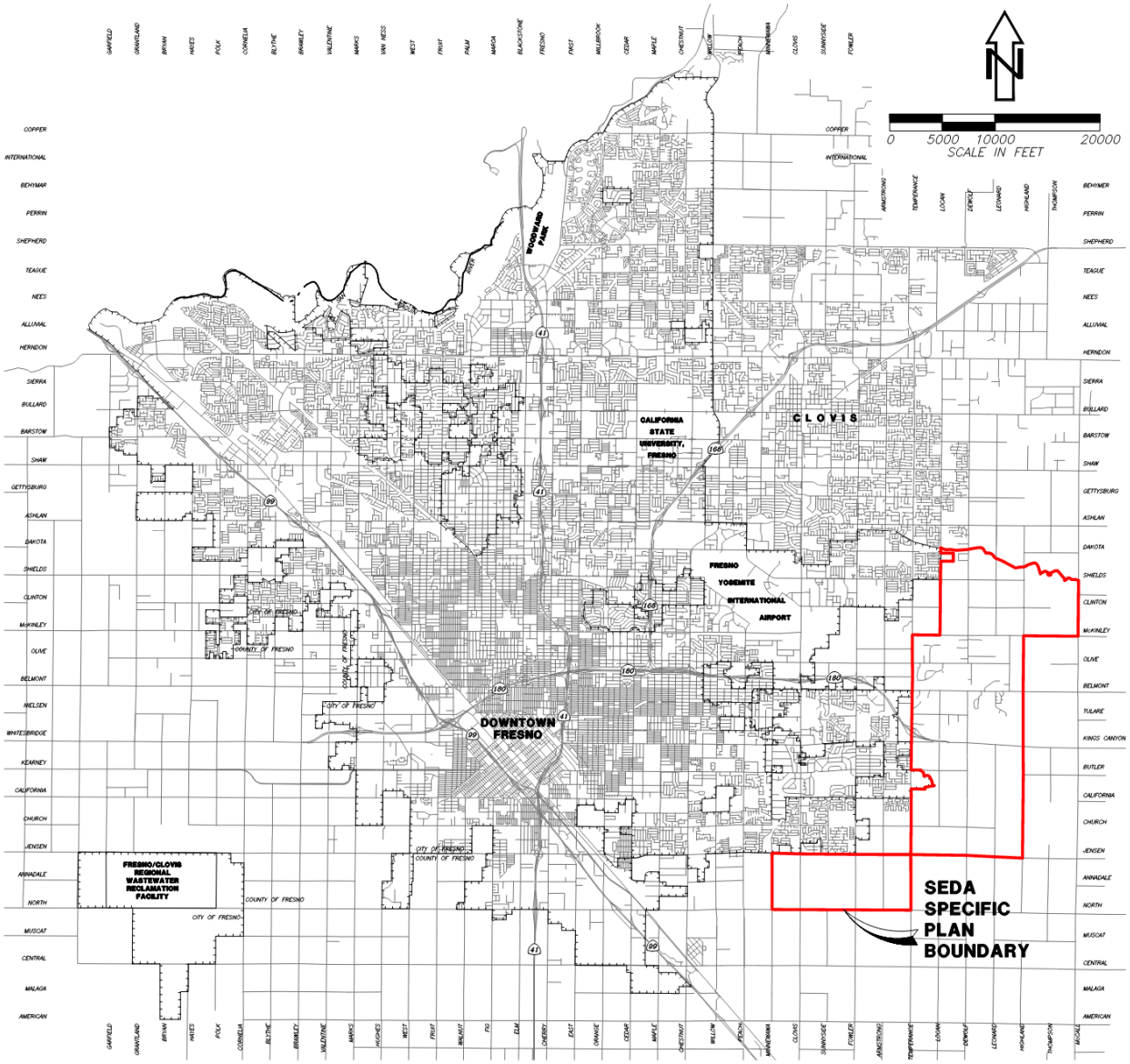


Figure 1.1 SEDA Specific Plan Location

CHAPTER 2
REGULATORY FRAMEWORK

2.1 General

The City of Fresno owns and operates the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) as well as the North Fresno Wastewater Reclamation Facility (NFWRF), and owns and maintains the wastewater collection system that serves Fresno and other participating agencies, including the County of Fresno, the City of Clovis, the Pinedale Public Utility District, and the Pinedale Water District. The area served by the City's wastewater collection system includes residential, commercial, and industrial uses. A majority of the City's wastewater is collected and conveyed to the RWRF for treatment, with a small portion being treated by the NFWRF. Wastewater service for Clovis is also provided by Fresno facilities and the RWRF, however a small portion of Clovis is served by their own wastewater treatment facility. The Wastewater Management Division (WMD) of the City's Department of Public Utilities is responsible for the collection, conveyance, treatment, and reclamation of wastewater generated by users in the Fresno-Clovis metropolitan area.

There are a number of federal, state, and local regulations that must be adhered to when planning wastewater facilities, many of which provide guidance and requirements for the handling and management of wastewater flows; several are discussed in the following sections.

2.2 Federal Regulations

Clean Water Act[2]

The Federal Water Pollution Control Act of 1972, commonly referred to as the Clean Water Act (CWA), regulates the discharge of pollutants into watersheds throughout the United States. It is the primary federal law regulating and governing water pollution, with the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA establishes the basic structure for regulating discharges of pollutants in waters of the United States and regulating quality standards for surface waters. Under the CWA, the EPA has implemented pollution control programs, such as setting wastewater standards for industry, and developed national water quality criteria recommendations for pollutants in surface waters. The CWA provides assistance to publicly owned treatment works for the improvement of wastewater treatment and maintenance of wetlands.

National Pollutant Discharge Elimination System[3]

The National Pollutant Discharge Elimination System (NPDES) was established in the CWA to regulate industrial and municipal discharge into waters of the United States; this includes point-source municipal waste discharges and nonpoint-source storm water runoff. NPDES permits typically identify effluent and receiving water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge, prohibitions on discharges not specifically allowed under the permit, and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring, and other activities. The NPDES permitting program delegates authority to state governments for implementation through State Water Boards. Wastewater discharge is regulated under the NPDES permit program for

[2] Clean Water Act, 33 U.S.C. §1251 et seq. (1972).
[3] Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES), 1972.

direct discharges into receiving waters and by the National Pretreatment Program for indirect discharges to a sewage treatment plant.

2.3 State Regulations

State Water Resources Control Board

The State Water Resources Control Board (SWRCB) adopted a General Waste Discharge Requirement (Order No. 2006-0003) in 2006 for all publicly owned sanitary sewer collection systems in California with more than one mile of sewer pipe.[4] The order provides a statewide approach to managing and reducing sanitary sewer overflows (SSOs) by requiring public sewer system operators to take all feasible steps to control the volume of waste discharged into the system, and to develop a Sewer System Management Plan (SSMP). The General Waste Discharge Requirement also requires storm sewer overflows to be reported to the SWRCB.

The SWRCB delegates the authority to enforce these requirements to nine Regional Water Quality Control Boards (RWQCB) within their own regions. The Central Valley RWQCB issues and enforces NPDES permits in Fresno. Such permits allow the RWQCB to regulate where and how waste is disposed, including the discharge volume and effluent limits of the waste, and monitoring and reporting. Inspections of permitted discharges and monitoring permit compliance is also the responsibility of each RWQCB.

Sanitary District Act of 1923[5]

The Sanitary District Act of 1923 (California Health and Safety Code §6400 et seq.) authorized the formation of sanitation districts and enforces the districts to construct, operate, and maintain facilities for the collection, treatment, and disposal of wastewater. The act was amended in 1949 to allow the districts to also provide solid waste management and disposal services, including refuse transfer and resource recovery.

2.4 Local Regulations

Wastewater management in Fresno is mainly regulated by the Central Valley RWQCB. There are other local authorities, including the City's WMD, and various regulations and planning documents that assist the City in overseeing wastewater infrastructure management and planning.

Fresno General Plan[6]

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of wastewater service and facilities (Table 2.1):

Table 2.1 City of Fresno General Plan Objectives and Policies Relevant to Wastewater Facilities

Objective/Policy Number	Objective/Policy Text
Objective PU-4	Ensure provision of adequate trunk sewer and collector main capacities to serve existing and planned urban development, consistent with the Wastewater Master Plan.

[4] State Water Resources Control Board, "Statewide General Waste Discharge Requirements for Sanitary Sewer Systems," Order No. 2006-0003-DWQ, May 2006.
[5] California Health and Safety Code, §6400 et seq. (1923).
[6] City of Fresno, "Fresno General Plan," December 18, 2014.

Objective/Policy Number	Objective/Policy Text
Policy PU-4-b	**New Trunk Facilities.** Pursue construction of new or replacement sewer trunk facilities or other alternatives consistent with the Wastewater Master Plan to accommodate the uses as envisioned in this General Plan.
Policy NS-4-c	**System Extension and Cost Recovery.** Pursue enlargement or extension of the sewage collection system where necessary to serve planned urban development, with the capital costs and benefits allocated equitably and fairly between the existing users and new users.
Objective PU-5	Preserve groundwater quality and ensure that the health and safety of the entire Fresno community is not impaired by use of private, on-site disposal systems.
Policy PU-5-b	**Non-Regional Treatment.** Discourage, and when determined appropriate, oppose the use of private wastewater (septic) disposal systems, community wastewater disposal systems, or other non-regional sewage treatment and disposal systems within or adjacent to the Metropolitan Area if these types of wastewater treatment facilities would cause discharges that could result in groundwater degradation.
Policy PU-5-c	**Satellite Facilities.** Work with the Regional Water Quality Control Board to ensure that approval of any satellite treatment and reclamation facility proposal is consistent with governing statutes and regulations.
Objective PU-6	Ensure the provision of adequate sewage treatment and disposal by utilizing the Fresno-Clovis Regional Wastewater Reclamation Facility as the primary facility, when economically feasible, for all existing and new development within the Metropolitan Area.
Policy PU-6-a	**Treatment Capacity and Cost Recovery.** Prepare for and consider the implementation of increased wastewater treatment and reclamation facility capacity in a timely manner to facilitate planned urban development within the Metropolitan Area consistent with this General Plan. Accommodate increase in flows and loadings from the existing community with the capital costs and benefits allocated equitably and fairly between existing users and new users, as authorized by law.
Policy PU-6-b	**Consider Capacity in Plan Amendments.** Monitor wastewater treatment plant flows and loadings to the extent feasible. Consider the effects on wastewater treatment capacity and availability of potable water when evaluating proposed General Plan amendment proposals, community plans, Specific Plans, neighborhood plans, and Concept Plans.
Objective PU-7	Promote reduction in wastewater flows and develop facilities for beneficial reuse of reclaimed water and biosolids for management and distribution of treated wastewater.
Policy PU-7-a	**Reduce Wastewater.** Identify and consider implementing water conservation standards and other programs and policies to reduce wastewater flows.
Policy PU-7-b	**Reduce Stormwater Leakage.** Reduce storm water infiltration into the sewer collection system, where feasible, through a program of replacing old and deteriorated sewer collection pipeline; eliminating existing stormwater sewer cut-ins to the sanitary sewer system; and avoiding any new sewer cut-ins except when required to protect health and safety.
Policy PU-7-c	**Biosolid Disposal.** Investigate and consider implementing economically effective and environmentally beneficial methods of biosolids handling and disposal.

Objective/Policy Number	Objective/Policy Text
Policy PU-7-d	**Wastewater Recycling.** Pursue the development of a recycled water system and the expansion of beneficial wastewater recycling opportunities, including a timely technical, practicable, and institutional evaluation of treatment, facility siting, and water exchange elements.
Policy PU-7-e	**Infiltration Basins.** Continue to rehabilitate existing infiltration basins, and if determined appropriate, pursue acquiring additional sites for infiltration basins, as needed.
Policy PU-7-f	**Food and Drink Industry.** Ensure adequate provision of facilities for the appropriate management of wastewater from wineries and food processing and beverage facilities, including conformance with Waste Discharge Requirements issued by the Regional Water Quality Control Board.

City of Fresno Municipal Code[7]

Article 3, "Sewage and Water Disposal," of Chapter 6, "Municipal Services and Utilities," of the City of Fresno Municipal Code includes provisions regarding wastewater collection and discharge for the City. The purpose of the Sewage and Water Disposal Ordinance is to ensure the health, safety, and general welfare of citizens, and protect the water quality of water courses, water bodies, and groundwater in accordance with the CWA and the NPDES permitting program, and providing requirements for wastewater collection, conveyance, treatment, and disposal/recycling.

Sewer System Management Plan[8]

Under the Statewide General Wastewater Discharge Requirements for Sanitary Sewer Systems, the City was required to develop and maintain a Sewer System Management Plan (SSMP) to provide a mechanism to properly manage, operate, and maintain all parts of the sanitary sewer system with the goal of reducing and preventing SSOs, which include releases of untreated or partially treated wastewater resulting in public exposure, regardless of whether the wastewater reaches waters of the United States or not, or wastewater backups into buildings and onto private property that are caused by blockages in the City's portion of the sanitary sewer system. The City's first SSMP was approved in 2009, and several revisions have been issued since; the latest revision was approved in 2019.

The City's SSMP must:

- Establish the legal authority to prevent illicit discharges into its sanitary sewer system;
- Require that sewers and connections be properly designed and constructed;
- Ensure access for maintenance, inspection, or repairs for those portions of the lateral owned or maintained by the City;
- Limit the discharge of fats, oils, and grease and other debris that may cause blockages; and
- Enforce any violation of its sewer ordinances.

City of Fresno Standard Specifications and Plans

The City maintains its own set of standard Specifications and Plans to be followed when designing and constructing City projects. Those related to the collection and conveyance of wastewater include, but are not limited to:

[7] City of Fresno Municipal Code, Chapter 6, "Municipal Services and Utilities, Article 3, "Sewage and Water Disposal."
[8] City of Fresno, "Sewer System Management Plan," 2019.

- Standard Specifications
    - Section 17 – Sanitary Sewer Pipe and Appurtenances
- Standard Plans
    - Plans S-1 through S-13B

CHAPTER 3
EXISTING CONDITIONS

3.1 Wastewater Collection Infrastructure

3.1.1 General

The City of Fresno's wastewater collection system consists of approximately 1,500 miles of gravity sewer lines ranging from 8 inches to 84 inches in diameter, 15 active lift stations, 1.7 miles of force mains, 23,000+ manholes, and 54 junction structures. The area serviced by the City system includes residential, commercial, and industrial users.

3.1.2 Wastewater Collection

The wastewater collection system primarily conveys wastewater via gravity flow from the northeast to the southwest, ultimately to the Fresno-Clovis RWRF. The system consists of pipe of varying materials, with the majority being composed of either vitrified clay pipe (VCP) (56.2% of system piping) or polyvinyl chloride (PVC) pipe (30.8% of system piping).[9]

Wastewater collection begins at each user/land type, in which a house branch/service connects the user to the wastewater collection system. The house branches/services (typically 4 to 12 inches in size) will connect to a sewer lateral (collection pipelines, typically 13 to 33 inches in size), which conveys wastewater to a main or trunk sewer (typically 34 inches or larger in size). Main or trunk sewers collect wastewater from a number of services as they head toward the treatment plant. Manholes are placed within runs of sewer mains at regular intervals to facilitate access for maintenance of the mains, as well as at changes in direction of the sewer main. Lift stations may be located strategically throughout the system to provide the necessary lift when the natural alignment of a gravity pipeline becomes inefficient (e.g., too deep or insufficient slope).

The City has a number of monitoring stations that actively collect and log flow data for the wastewater system. Additionally, the City has many junction structures/special structures that can be used to control flow distribution between downstream sewers. See Figure 3.1 for an overview of the existing wastewater collection system.

3.1.3 Wastewater Treatment

In partnership with the City of Clovis, the City of Fresno owns and operates the Fresno-Clovis RWRF located near the intersection of Jensen and Cornelia Avenues in southwest Fresno. The RWRF receives and treats the majority of domestic, commercial, and industrial wastewater generated within the Cities of Fresno and Clovis, as well as some unincorporated areas of Fresno County. The RWRF is currently operated by the City, who holds responsibility for ensuring regulatory compliance with Waste Discharge Requirements (WDRs), and the Central Valley RWQCB Order No. 5-01-254, "Waste Discharge Requirements for Cities of Fresno and Clovis Wastewater Treatment Facility, Fresno County."

The RWRF has a rated capacity of 88 million gallons per day (MGD), but the average annual flow is approximately 80 MGD.[10] The RWRF produces undisinfected secondary-treated wastewater and disinfected tertiary-treated wastewater. The undisinfected secondary-treated wastewater is

[9] City of Fresno, "Wastewater Collection System Master Plan Update," September 2015.
[10] "Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF)." https://www.fresno.gov/publicutilities/facilities-infrastructure/fresno-clovis-regional-wastewater-reclamation-facility-rwrf/.

disposed into on-site disposal ponds and conveyed to farmers for restricted irrigation of non-food crops on agricultural land on surrounding properties. The disinfected tertiary-treated wastewater is delivered through a network of pipelines to various recycled water use areas around the City, mainly to be used for irrigation of landscaping at sites including but not limited to parks, median landscape strips, and cemeteries. The RWRF also owns and operates a number of reclamation wells that extract water from on-site percolation ponds, and discharge into Fresno Irrigation District (FID) canals for irrigation use of farmlands downstream of the RWRF.

The City also owns and operates the NFWRF located in northeast Fresno on the north side of Copper Avenue between Cedar and Maple Avenues. This facility receives and treats wastewater generated within a small area of the City generally bound by Copper, Friant, and Willow Avenues, including wastewater generated from Copper River Ranch. The NFWRF is a tertiary level treatment facility, and the treated wastewater is mainly used for irrigation of the Copper River Country Club and Golf Course. The permitted capacity of the plant is 0.71 MGD average monthly flow and 1.07 MGD maximum daily flow.[11]

The City treats wastewater via primary (removal of materials that will float or settle) and secondary (biological processes to remove suspended and dissolved solids) treatment, after which it is deposited into infiltration ponds to allow percolation through the soil, serving as another level of treatment. The City operates federally mandated industrial pretreatment programs to prevent the introduction of pollutants into publicly owned treatment works that could impact the collection infrastructure and pass through to receiving waters. Industries are also billed for sewer service depending on the amount of water used or effluent discharged and the strength of their wastewater measured as pounds of biochemical oxygen demand (BOD) and pounds of total suspended solids (TSS). Reducing the strength of their wastewater to reduce sewerage costs becomes an incentive for industries to improve the water quality of their wastewater effluent.

3.1.4 Wastewater Flow

Generally, wastewater consists of base wastewater flow and wet weather flow. Base wastewater flow is generated by routine water usage in the residential, commercial, business, and industrial sectors of the collection system. Wet weather flow includes storm water inflow, trench infiltration, and wet weather ground water infiltration. Base wastewater flow also includes dry weather groundwater infiltration, which is groundwater that enters the sewer system when the relative depth of the groundwater table is higher than the depth of the pipeline and defects exist in the pipe, such as cracks, misaligned joints, or breaks allowing infiltration into the system. In Fresno, the depth to groundwater table is significant, and therefore dry weather groundwater infiltration has little to no influence on the collection system. For wet weather flow, storm water inflow and trench infiltration comprise the term “Infiltration and Inflow,” also known as I/I. Wet weather flow can also be affected by groundwater infiltration in that the groundwater table elevation may rise during storm events. Though as mentioned, the depth to groundwater level is very large in Fresno, and thus has no noticeable effect on wastewater flow.

Base wastewater flows are diurnal in nature, taking on patterns of generation that depend on the type of use and hours of use. Commercial and industrial patterns typically have higher flows during business hours and lower flows at night, and weekend flow patterns may vary significantly when compared to weekday flows.

I/I affects all sewer systems. Infiltration occurs when storm water slowly seeps into the sewer system by percolating through the soil and entering through defects in the pipes, manholes, and

[11] “North Fresno Wastewater Treatment Facility (NFWTF).” https://www.fresno.gov/publicutilities/facilities-infrastructure/north-fresno-wastewater-treatment-facility-nfwtf/.

joints. Inflow occurs when storm water rapidly flows into the sewer system through more readily available entrances, such as storm drain cross connections, leaky manhole covers, illegal storm drain connections, and sewer cleanouts. I/I increases the flow volume and peak flows, and can cause overflows if the sewer system is operating at capacity at the time of I/I occurrence. Per the Wastewater Master Plan, though some areas experience higher rates of I/I, the City's wastewater collection system generally exhibits relatively low I/I as a whole.

3.1.5 Plan Area

Per the Wastewater Master Plan, the Plan Area is currently outside of the City's sewer service area, and there are little to no existing City wastewater facilities within the area. The City does not provide wastewater collection service to the Plan Area, except in small portions of developed areas; there are a few existing sewer mains that border the Plan Area. It is assumed that most of the Plan Area is unsewered and/or served by septic tank systems. In accordance with Section 6-303, "Sewer Connection Required," of the Fresno Municipal Code, all properties within the City's service area shall be connected to the City's sanitary sewer system if it is available, and all septic tank/cesspool systems shall be abandoned.[12]

A sewer system is considered "available" if a sewer main has been constructed and is available for use in a public street, alley, or right-of-way within 100 feet for the first unit plus 50 feet for each additional unit, to be measured along the public street, alley, or right-of-way from the nearest property line to the sewer main. Any existing development within the Plan Area currently served by a septic tank system will be required to connect to the future sewer mains constructed to serve the area within three years after the sewer system becomes available, and pay all associated fees.

[12] City of Fresno Municipal Code Chapter 6, "Municipal Services and Utilities," Article 3, "Sewage and Water Disposal," §6-303, "Sewer Connection Required."

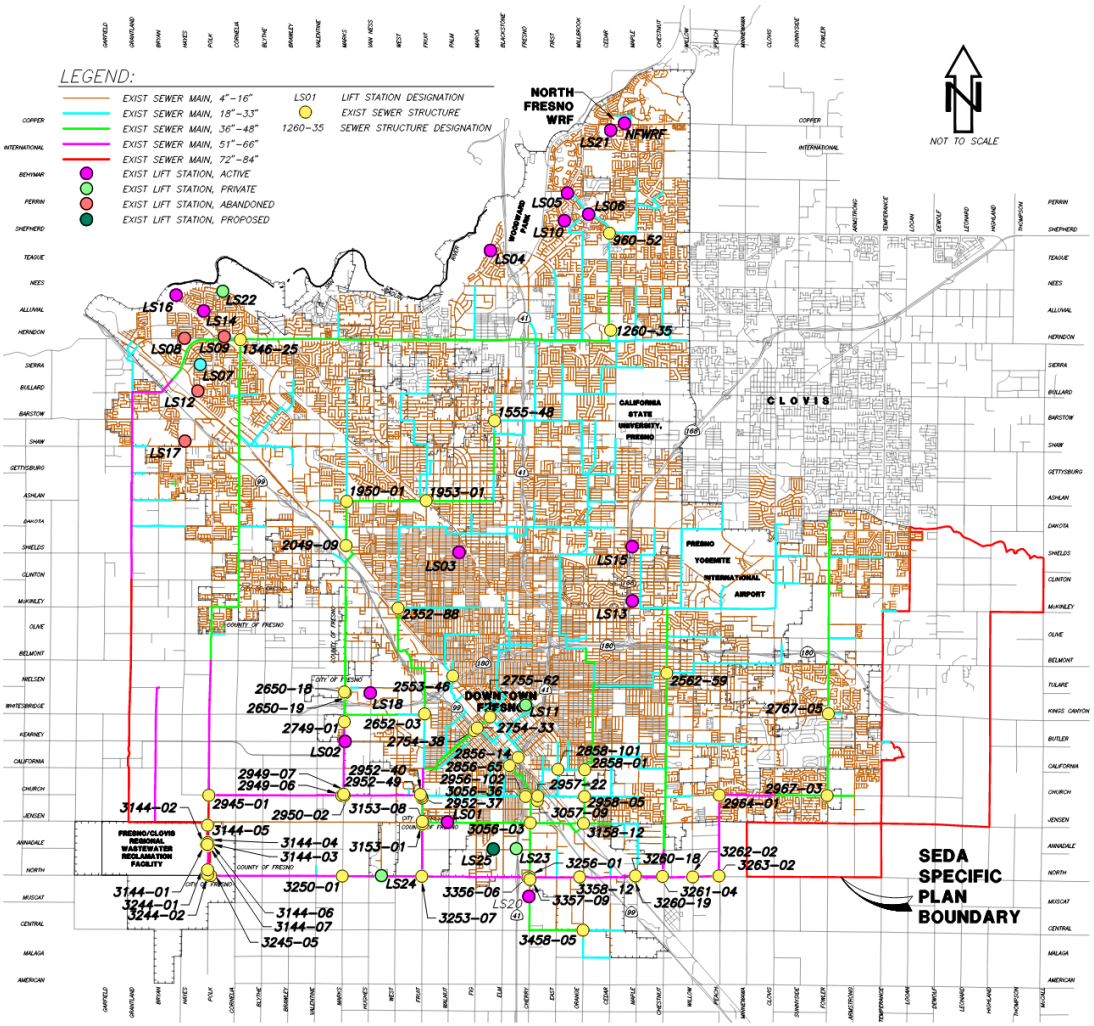


Figure 3.1 Existing Fresno Wastewater Collection Facilities

CHAPTER 4
FUTURE WASTEWATER INFRASTRUCTURE

4.1 General

Future wastewater facilities are included in the City's Wastewater Collection System Master Plan Update. The City's General Plan includes developmental policies for wastewater facilities for the City of Fresno, including growth areas such as SEDA.

4.2 General Plan Policies

The General Plan discusses aspects of the wastewater collection system as they pertain to development in Fresno. The City is designated as the Regional Sewer Agency for the Fresno-Clovis Metropolitan Area, and as mentioned, owns, operates, and maintains the wastewater collection system that serves Fresno and other participating agencies, as well as the Fresno-Clovis RWRF and the NFWRF. The wastewater treatment and reclamation system includes the collection and conveyance of wastewater, treatment of raw wastewater, and management of reclaimed water and biosolids. Aging infrastructure and the need to pursue more advanced levels of reclamation and reuse are factors in long term development/improvements in new growth areas and existing developments. See Table 2.1 for a summary of objectives and policies for wastewater included in the General Plan.

4.3 Master Plan Improvements

The most recent version of the Wastewater Master Plan is the Wastewater Collection System Master Plan Update (Wastewater Master Plan), completed in September 2015. The Wastewater Master Plan is intended to be the guiding document in planning and implementing sewer system improvements to accommodate future growth to buildout of the General Plan. The SEDA Plan Area is referred to as an "Area of Change" in the Wastewater Master Plan (specifically as a "New Growth Area"), and is characterized as a growth area that will contribute to an expansion of the service area and increased wastewater flows.[13]

The Wastewater Master Plan includes in depth analysis of the existing and projected wastewater flows of the City based on the General Plan development buildout conditions, and includes a number of proposed facilities to accommodate future development, including those for the Plan Area.

Per the Wastewater Master Plan, the peak wet weather flow (PWWF) is the highest observed hourly flow that occurs following the design storm event, and that the City's sewer and lift stations were evaluated based on their capacity to convey this flow, referred to synonymously as the "design flow." Analysis was also completed for the base wastewater flow. The Wastewater Master Plan indicates that the buildout base wastewater flow will be 129.9 MGD (million gallons per day), and that the PWWF will be 202.4 MGD. The peak dry weather flow (PDWF) was also calculated as 164.7 MGD at buildout. The base wastewater flow, also known as the average dry wastewater flow, will be used for analysis of the General Plan and Specific Plan wastewater capacities presented in this report. The RWRF has a buildout capacity of 88 MGD.

As mentioned, several new sewer pipelines were proposed to accommodate the projected wastewater flows. These consist of a number of proposed sewer mains and related facilities for

[13] City of Fresno, "Wastewater Collection System Master Plan Update," September 2015.

the Plan Area, including new trunk sewers, sewer mains, and sewer laterals throughout the SEDA Specific Plan Area, and a satellite treatment/scalping plant with a connection to existing sewer mains to convey wastewater solids to the Fresno-Clovis RWRF. See the Wastewater Master Plan for details on the proposed wastewater improvements within the Plan Area.

The proposed improvements for the Plan Area included in the Wastewater Master Plan were determined based on wastewater modeling and analysis of the General Plan buildout condition, which assumed full development of all developable sites within the General Plan boundary. The Wastewater Master Plan defined its study area boundary as the City's SOI as defined in the General Plan, which includes all land within the City limits (excluding the RWRF), County islands (unincorporated land surrounded by the city), and lands that are expected to be annexed by the City, which includes the land beyond the outer City limits on all sides. The Wastewater Master Plan study area was intended to include the existing City limits and development that could occur through buildout of the City's General Plan. The proposed improvements in the Plan Area were developed to accommodate future growth as identified by the hydraulic analysis completed as part of the Wastewater Master Plan.

The land use assumptions in the Wastewater Master Plan were based on the General Plan and projected future developments within the City's proposed growth boundary. The Wastewater Master Plan includes wastewater flow factors that were established based on the average wastewater flow generated for each existing land use type in Fresno, and calculated from the General Plan land use classifications in gpd/ac (gallons per day per acre). These factors were used to project the estimated wastewater flow through buildout of the City's General Plan boundary, and were used in the analysis of the Plan Area wastewater generation that will be covered in Chapter 5.

CHAPTER 5
SPECIFIC PLAN WASTEWATER ANALYSIS

5.1 General

The SEDA Specific Plan revised the General Plan buildout land use classifications to new SEDA-specific land use classifications – see Figure 5.1 for the General Plan Land Use Map of the Plan Area, and Figure 5.2 for the SEDA Specific Plan Land Use Map for the chosen alternative for the Plan Area. With changes in land use classifications, the Plan Area will need to be evaluated for impacts to the proposed wastewater collection system due to changes in wastewater generation.

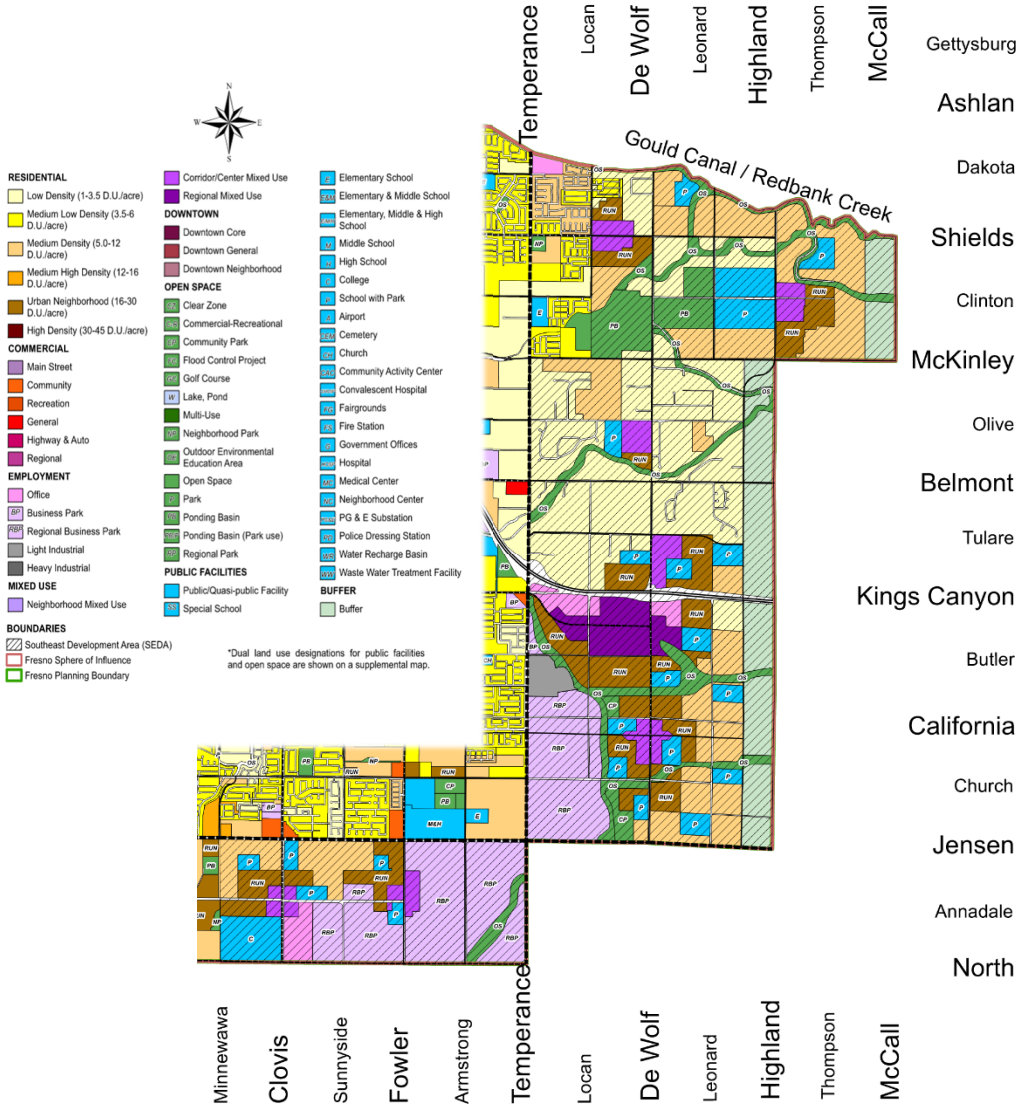
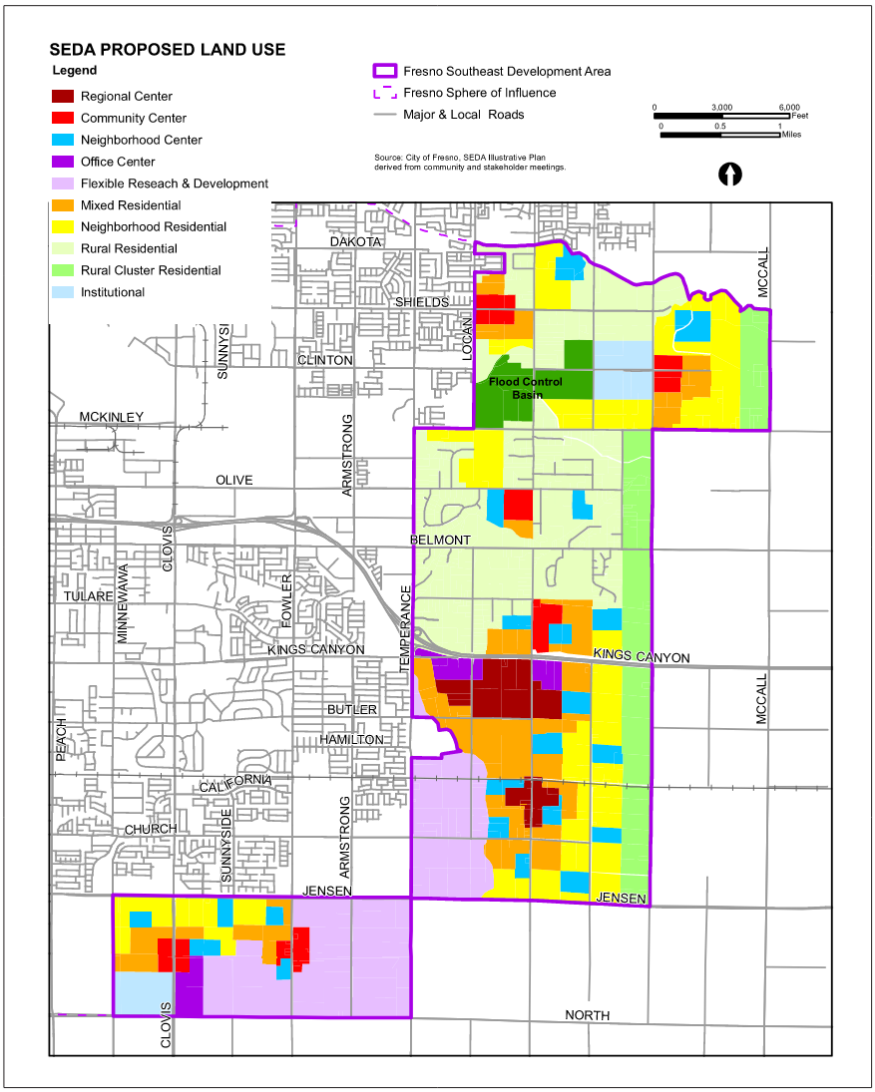


Figure 5.1 General Plan Land Use Map for SEDA Plan Area
Source: City of Fresno General Plan, Figure LU-1, December 2014, Figure Updated 3/2/2021



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

Figure 5.2 SEDA Proposed Land Use
Source: Southeast Development Area Specific Plan Notice of Preparation,
First Carbon Solutions, 02/2022

5.2 Analysis Methodology

The technical analysis of the land use changes in the Plan Area was focused on comparing the change in wastewater flow generation from the General Plan Land Use case to the Specific Plan Land Use case to determine potential impacts to the wastewater collection system and to assist in the development of mitigation measures if necessary. General Plan land use classifications and Specific Plan land use classifications were provided by the City of Fresno Planning and Development Department in the form of GIS (Geographic Information System) and Shape files. GIS and Shape files were also obtained from the City of Fresno Department of Public Utilities for the existing sewer facilities in Fresno. The GIS and Shape files were georeferenced to the

California State Plane Coordinate System, Zone 4, Foot, NAD83 Datum for analysis. This allowed mapping of the land uses to pull information necessary to complete the analysis, including the area of each land use.

The SEDA Specific Plan does not use the same land use classifications as defined in the General Plan, and instead utilizes SEDA-specific land use classifications developed as part of the Specific Plan. At the time of the preparation of this technical study, the City was developing wastewater flow factors for the SEDA-specific land uses as was done for the General Plan land uses; these factors were unavailable during the completion of the analysis for this technical study. However, the SEDA-specific land uses are similar in nature to many of the General Plan land uses, and similarities can be drawn between the two land use categories. Thus, a number of reasonable assumptions were made to determine equivalent General Plan land uses for each SEDA-specific land use in order to utilize the wastewater flow factors for General Plan land uses previously established in the Wastewater Master Plan. See Table 5.1 for the equivalent General Plan land uses established for the SEDA-specific land uses.

The wastewater flow factors taken from the Wastewater Master Plan for each General Plan land use that were used in the analysis have been included in Table 5.2. The GIS files for the General and Specific Plan land uses were used to determine the total areas of each land use classification. The wastewater flow factors were then multiplied by the area of the corresponding land use classification to determine a total wastewater flow for the Plan Area based on the General Plan and the Specific Plan developments. The total wastewater produced by the Plan Area based on the General Plan case was compared to that of the Specific Plan case, resulting in the total change in wastewater generation for the Plan Area.

Table 5.1 General Plan–SEDA Equivalent Land Use Classifications for Determination of Wastewater Flow Factors

SEDA Specific Plan Land Use Classifications[14]	Equivalent General Plan Land Use Classification[15]
Residential – Mixed Residential	Residential – Urban Neighborhood
Residential – Neighborhood Residential	Residential – Medium Density
Residential – Rural Residential	Residential – Low Density
Residential – Rural Cluster Residential	Residential – Low Density
Employment – Office Center	Employment – Office
Employment – Flexible Research & Development	Employment – Business Park/ Regional Business Park
Employment – Institutional	Public Facilities – College/School with Park
Mixed Use – Regional Center	Mixed Use – Regional Mixed Use
Mixed Use – Community Center	Mixed Use – Corridor/Center Mixed Use
Mixed Use – Neighborhood Center	Public Facilities – Neighborhood Center
Open Space – Flood Control Basin	Open Space – Ponding Basin
Other	Streets/Railroad/Canals/Etc.

[14] City of Fresno, "Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California," February 22, 2022.
[15] City of Fresno, "Fresno General Plan," December 18, 2014.

Table 5.2 Wastewater Master Plan Wastewater Flow Coefficients[16]

Land Use Classification	Wastewater Flow Coefficient (gpd/ac)
Residential	
Low Density (1-3 DU/acre)	600
Medium Density (5-12 DU/acre)	1,700
Urban Neighborhood (16-30 DU/acre)	3,500
Employment	
Office	1,000
Business Park	800
Regional Business Park	800
Mixed Use	
Corridor/Center Mixed Use	2,800
Regional Mixed Use	3,300
Open Space	
Open Space	0
Community Park	0
Ponding Basin	0
Public Facilities	
Neighborhood Center	1,000
College	700
School with Park	700
Buffer	
Buffer (Ag)	50
Other	
Street, Rail, Canal, Etc.	0

5.3 Analysis Results

The base wastewater flow for all land uses in the Plan Area was found for both the General Plan and the Specific Plan conditions. The total General Plan base wastewater flow was found to be 9.86 MGD, and the Specific Plan base wastewater flow was found to be 11.32 MGD, resulting in an increase of wastewater flow of approximately 1.46 MGD, or 15%. See Table 5.3 and Table 5.4 for the results of the analysis and a direct comparison of the General Plan and Specific Plan wastewater flows. See Appendix A for a more detailed version of the analysis.

There may be a number of reasons as to why the wastewater flow increased from the General Plan to the Specific Plan. One reason may be that the SEDA boundary increased from that shown in the General Plan, indicated by the increased area of total land uses. As shown in Table 5.4, the total area of the General Plan land uses is 8,253.76 acres, while the total area of the Specific Plan land uses is 8,325.57 acres – an increase of approximately 72 acres. This increase will lend itself to an increase in wastewater generation based on which land uses increased in area.

[16] City of Fresno, "Wastewater Collection System Master Plan Update," Table 5.5, "Future BWF Projections," September 2015.

Another contributor to increased wastewater flows is changes in land use classifications. For the most part, the land use classifications remained fairly similar in nature and category when transitioning from the General Plan to the Specific Plan. However, a few areas of land uses changed to different land uses that have larger wastewater flow factors; these include "Public Facilities – School with Park," "Buffer," and some low density residential areas. Per the SEDA Specific Plan land use map, all but one area defined as "School with Park" in the General Plan land use map changed to the SEDA "Neighborhood Center" land use. Similarly, the areas denoted as "Buffer" land use in the General Plan changed to "Rural Cluster Residential" in the SEDA Specific Plan. To a lesser extent, some of the "Low Density" residential areas in the General Plan were changed to residential land uses with higher densities in the Specific Plan. Each of these SEDA land uses have higher wastewater generation rates compared to the General Plan. These combined changes lead to cumulative increases in the wastewater generation of the Plan Area.

Finally, many SEDA land uses increased in area from their General Plan counterparts seemingly due to the elimination of the "Open Space" land uses included in the General Plan for the Plan Area, which totaled approximately 617 acres. As shown in Figure 5.1 and Table 5.3, "Open Space," and "Community Park," were removed from the Plan Area, and those areas were absorbed by adjacent land uses, including various residential, mixed use, and employment land uses. Open Space land uses have a wastewater flow factor of 0 gpd/ac per the Wastewater Master Plan; consequently, this means that 617 acres were added to other land uses with larger wastewater flow factors, thereby increasing the total wastewater production of the SEDA Plan Area when compared to the General Plan buildout condition.

Table 5.3 Comparison of General Plan (GP) and Specific Plan (SP) Anticipated Wastewater Use per Land Use Classification

GP Land Use Classification	Wastewater Flow Factor (GPD/ac)	GP Area (ac)	GP Base Wastewater (MGD)	SP Equivalent Land Use Classification	Wastewater Flow Factor[1,2] (GPD/ac)	SP Area (ac)	SP Base Wastewater (MGD)
Residential - Low Density	600	1,700.92	1.02	Residential - Rural Residential	600	2,037.69	1.22
Residential - Medium Density	1,700	1,473.32	2.50	Residential - Neighborhood Residential	1,700	1,434.91	2.44
Residential - Urban Neighborhood	3,500	891.47	3.12	Residential - Mixed Residential	3,500	1,026.26	3.59
Employment - Office	1,000	144.37	0.14	Employment - Office Center	1,000	154.47	0.15
Employment - Business Park	800	12.78	0.01	Employment - Flexible Research and Development	800	1,304.07	1.04
Employment - Regional Business Park	800	1,219.71	0.98				
Mixed Use - Corridor/Center Mixed Use	2,800	315.41	0.88	Mixed Used - Community Center	2,800	273.88	0.77
Mixed Use - Regional Mixed Use	3,300	209.77	0.69	Mixed Use - Regional Center	3,300	291.71	0.96
Open Space - Open Space	0	569.53	0.00	N/A	0	0	0.00
Open Space - Community Park	0	47.46	0.00	N/A	0	0	0.00
Open Space - Ponding Basin	0	263.32	0.00	Other - Flood Control Basin	0	265.78	0.00
Public Facilities - College	700	116.26	0.08	Employment - Institutional	700	266.02	0.19
Public Facilities - School with Park	700	149.77	0.10				
Public Facilities - School with Park	700	413.45	0.29	Mixed Use - Neighborhood Center	1,000[3]	491.38	0.49
Buffer - Buffer	50	715.04	0.04	Residential - Rural Cluster Residential	600[4]	766.47	0.46
Other - Street/Rail/ Canal, etc.	0	11.21	0.00	Other	0	12.94	0.00
Totals	-	8,253.76	9.86	-	-	8,325.57	11.32

[1] Wastewater flow factors obtained from Wastewater Master Plan, Table 5.5, "Future BWF Projections."

[2] See Table 5.1 for equivalent GP land use and associated wastewater flow factor used for SP analysis.

[3] Wastewater flow factor used for SP Neighborhood Center = GP Public Facilities – Neighborhood Center from Wastewater Master Plan

[4] Wastewater flow factor used for SP Rural Cluster Residential = GP Low Density Residential from Wastewater Master Plan

Table 5.4 Summary of Difference between General Plan (GP) and Specific Plan (SP) Anticipated Wastewater Use

GP Land Use Classification	SP Equivalent Land Use Classification	Usage Δ (MGD)	Usage Δ (%)
Residential - Low Density	Residential - Rural Residential	0.20	19.8%
Residential - Medium Density	Residential - Neighborhood Residential	-0.07	-2.6%
Residential - Urban Neighborhood	Residential - Mixed Residential	0.47	15.1%
Employment - Office	Employment - Office Center	0.01	7.0%
Employment - Business Park	Employment - Flexible Research and Development	0.06	5.8%
Employment - Regional Business Park			
Mixed Use -Corridor/Center Mixed Use	Mixed Used - Community Center	-0.12	-13.2%
Mixed Use - Regional Mixed Use	Mixed Use - Regional Center	0.27	39.1%
Open Space - Open Space	N/A	0.00	0.0%
Open Space - Community Park	N/A	0.00	0.0%
Open Space - Ponding Basin	Other - Flood Control Basin	0.00	0.0%
Public Facilities - College	Employment - Institutional	0.00	0.00%
Public Facilities - School with Park			
Public Facilities - School with Park	Mixed Use - Neighborhood Center	0.20	69.8%
Buffer - Buffer	Residential - Rural Cluster Residential	0.42	1,186.3%
Other - Street/Rail/ Canal, etc.	Other	0.00	0.0%
Totals	-	1.46	15%

CHAPTER 6
IMPACTS AND MITIGATION

6.1 SEDA Planning

Improvements within the Plan Area will require modifications to master planned wastewater facilities and infrastructure to account for the increased wastewater flows resulting from the new development as part of the Specific Plan. A draft policy document has been completed for the SEDA Specific Plan (March 2022), which includes updated policies for the Plan Area, and proposed improvements to meet the chosen alternative for development of the area. Included among these are policies directly related to wastewater in the Plan Area[17]. Refer to the SEDA Specific Plan policy document for details on policies related to recycled water.

6.2 Impacts of Significance

The proposed Specific Plan would result in a significant impact if it would:

1. Exceed wastewater treatment requirements of the applicable RWQCB.

   The Specific Plan proposes a transfer of density from the General Plan conditions to the Specific Plan conditions which will modify the distribution of wastewater generation in the Plan Area from that originally planned. Generally, wastewater generation is predicted to increase as growth occurs, both in the General Plan and this Specific Plan. For the purposes of this analysis, it was assumed that development of the Plan Area would proceed as described in this study – from the General Plan to the Specific Plan land conditions. As described in the Draft EIR, this will result in new or reoccupied dwelling units and new or repurposed commercial/mixed use space within the Plan Area. Per the proposed Specific Plan, the Plan Area has capacity for 45,000 dwelling units and 5,580 acres of residential space, 1,120 acres of commercial/mixed use space, and 1,820 acres of office/employment space.[18]

   As shown in Table 5.3, there would be an increase in baseline wastewater generation of 1.46 MGD, or 15% when compared to the buildout General Plan conditions. The Plan Area is projected to produce an estimated 11.32 MGD at buildout with Specific Plan land uses compared to 9.86 MGD under the General Plan land uses. Given that the Wastewater Master Plan utilities were designed based on General Plan buildout conditions, a 15% increase would impact associated wastewater treatment requirements and waste discharge requirements, and the impacts would be significant without mitigation.

   The City would be required to increase wastewater treatment capacity and obtain revised and/or new waste discharge permits. The polices included in the General Plan and the Wastewater Master Plan would reduce the potential impacts associated with increased wastewater generation and treatment requirements, however these improvements will need to be reevaluated given the projected increase in wastewater generation in the Plan Area. The City shall evaluate the wastewater system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would contribute wastewater to the wastewater treatment system that would exceed

[17] City of Fresno, "Southeast Development Area Specific Plan Policy Draft," March 2022.

[18] City of Fresno, "Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California," February 22, 2022.

capacity until additional capacity is provided. The City shall evaluate proposed wastewater treatment improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan.

2. Require or result in the relocation or construction of new or expanded wastewater treatment facilities, the construction of which could cause significant environmental effects.

   As discussed in Impact 1 above, the implementation of the proposed Specific Plan will result in the need for expansion of the existing wastewater treatment facilities, and new wastewater collection and treatment facilities to serve future land uses in the Plan Area. Thus, development of the Plan Area could result in significant impacts to the existing wastewater collection and treatment system.

   Master planned wastewater treatment facilities and collection infrastructure that may accommodate future development associated with the Specific Plan include[19]:

   - Trunk sewers, sewer mains, sewer laterals, and a satellite treatment/scalping plant.
   - Expansion of Fresno-Clovis RWRF wastewater treatment capacity.
   - Increased size of planned wastewater collection facilities.

   As stated, the City will need to increase wastewater treatment capacity and obtain revised and/or new waste discharge permits to accommodate the impacts of the development of the Plan Area. Potential environmental impacts associated with construction of such improvements include but are not limited to: traffic, air emissions, noise, water quality, aesthetics, agricultural resources, biological resources, and cultural resources. The Specific Plan establishes mitigation measures for impacts in these areas associated with construction of expanded or new wastewater collection and treatment facilities. These may include traffic control/management plans to address traffic impacts during construction, various wastewater improvement/rehabilitation plans within the City to improve overall wastewater collection and treatment system conditions, and the reevaluation of wastewater master plan documents.

   The City shall evaluate the wastewater system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would contribute wastewater to the wastewater treatment system that would exceed capacity until additional capacity is provided. The City shall evaluate proposed wastewater treatment improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan. Additionally, consistent with the Sewer System Management Plan, the City shall evaluate the wastewater collection system at the time that discretionary projects are submitted for approval by the City, and the City shall not approve development that would generate additional wastewater and exceed the capacity of a facility until additional capacity is provided. The City shall evaluate proposed wastewater collection improvements provided in the City Wastewater Master Plan and General Plan for potential environmental impacts, and shall construct such improvements prior to exceedance of capacity to accommodate full buildout of the Specific Plan. Without mitigation, the impacts would be significant.

[19] City of Fresno, "Wastewater Collection System Master Plan Update," September 2015.

3. Result in a determination by the wastewater treatment provider which serves or may serve the project that it has inadequate capacity to serve the project's projected demand in addition to the provider's existing commitments.

   The potential long-term impacts related to wastewater collection, treatment, and disposal requirements of the General Plan versus the Specific Plan differ by 15%, and would result in the need for additional wastewater collection and treatment facilities with significant impacts on the existing wastewater collection and treatment system. As mentioned in Impact 2, impacts would be less than significant if mitigation measures are enacted in the form of construction of master planned utilities, and a reevaluation of said planned facilities to ensure sufficient collection and treatment capacities exist.

6.3 Conclusions

City planning documents, including but not limited to the General Plan and the Wastewater Master Plan, will need to be updated to account for the development of the SEDA, and account for the policies and revisions present in the Specific Plan.

Mitigations for SEDA from the General Plan to the SEDA Specific Plan include:

a) Develop an update to the General Plan
b) Develop an update to the Wastewater Master Plan
c) Construct new wastewater collection infrastructure in the Plan Area
d) Expand existing wastewater treatment facilities
e) Construct new wastewater treatment facilities in the Plan Area
f) Obtain revised discharge permits from appropriate authorities

Appendix A

Supporting Calculations

GP Land Use Classification	Abbrv.	Wastewater Flow Factor (GPD/ac)	GP Area (ac)	GP Base Wastewater (MGD)	SP Equivalent Land Use	Abbrv.	Wastewater Flow Factor (GPD/ac)	SP Area (ac)	SP Base Wastewater (MGD)	Usage Δ (MGD)	Usage Δ (%)
Residential - Low Density	RL	600	1,700.92	1.02	Residential - Rural Residential	RR	600	2,037.69	1.22	0.20	19.8%
Residential - Medium Density	RM	1,700	1,473.32	2.50	Residential - Neighborhood Residential	NR	1,700	1,434.91	2.44	-0.07	-2.6%
Residential - Urban Neighborhood	RUN	3,500	891.47	3.12	Residential - Mixed Residential	MR	3,500	1,026.26	3.59	0.47	15.1%
Employment - Office	O	1,000	144.37	0.14	Employment - Office Center	OC	1,000	154.47	0.15	0.01	7.0%
Employment - Business Park	BP	800	12.78	0.01	Employment - Flexible Research and Development	F	800	1,304.07	1.04	0.06	5.8%
Employment - Regional Business Park	RBP	800	1,219.71	0.98							
Mixed Use - Corridor/Center Mixed Use	CMX	2,800	315.41	0.88	Mixed Used - Community Center	CC	2,800	273.88	0.77	-0.12	-13.2%
Mixed Use - Regional Mixed Use	RMX	3,300	209.77	0.69	Mixed Use - Regional Center	RC	3,300	291.71	0.96	0.27	39.1%
Open Space - Open Space	OS	0	569.53	0.00	N/A	N/A	0	0	0.00	0.00	0.0%
Open Space - Community Park	CP	0	47.46	0.00	N/A	N/A	0	0	0.00	0.00	0.0%
Open Space - Ponding Basin	PB	0	263.32	0.00	Other - Flood Control Basin	POF	0	265.78	0.00	0.00	0.0%
Public Facilities - College	C	7,00	116.26	0.08	Employment - Institutional	I	700	266.02	0.19	0.00	0.0%
Public Facilities - School with Park	P	7,00	149.77	0.10							
Public Facilities - School with Park	P	7,00	413.45	0.29	Mixed Use - Neighborhood Center	NC	1,000	491.38	0.49	0.20	69.8%
Buffer - Buffer	BUFFER	50	715.04	0.04	Residential - Rural Cluster Residential	RCR	600	766.47	0.46	0.42	1,186.3%
Other - Street/Rail/ Canal, etc.	N/A	0	11.21	0.00	Other	N/A	0	12.94	0.00	0.00	0.0%
Totals			8,253.76	9.86				8,325.57	11.32	1.46	15%

Appendix B

City of Fresno Wastewater Collection System Master Plan Update



WASTEWATER COLLECTION SYSTEM
MASTER PLAN UPDATE

Final • September 2015

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WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

City of Fresno

September 2015

FINAL

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WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

This executive summary presents a brief background of the City of Fresno (City) wastewater collection system, the need for this master plan update, proposed improvements to mitigate existing system deficiencies, and proposed expansion projects. A summary of capital improvement project costs is included at the end of this chapter.

ES.1 INTRODUCTION

The City was founded in 1872 by the Central Pacific Railroad Company and incorporated in 1885. The City has since grown to over 112 square miles with a population of just under a half million people in the incorporated area. Today, Fresno is the fifth largest city in the state of California. Centrally located, Fresno is the financial, industrial, trade, and commercial capital in the Central San Joaquin Valley. Figure ES.1 presents a location map of the City. The City is the hub of a region rich in heritage, resources, and people.

The City owns and operates the Fresno/Clovis Regional Wastewater Reclamation Facility (RWRF), as well as the smaller North Fresno Wastewater Reclamation Facility (NFWRF). The City owns and maintains a wastewater collection system that serves the City and the other participating agencies: the County of Fresno, the majority of the City of Clovis, the Pinedale Public Utility District, and the Pinedale County Water District.

ES.2 STUDY AREA

The area served by the City is characterized by residential, commercial, and industrial uses within the City limits. While the City has a diverse economy, Fresno County is the nations' top-ranked agriculture-producing county. There are some agricultural lands within the metropolitan area that are interspersed on larger parcels along the fringe of urbanized area and in between parcels.

There are many open space areas within the City, including Woodward Park and Roeding Park which is home of the Fresno Chaffee Zoo. The main water bodies near the City are located on the outskirts of town. The San Joaquin River runs east and west just to the North of the City limits. The Kings River is about 12 miles east of the City limits and the City diverts water from the river for part of their water supply. The Sierra Nevada Mountains are located about 25 miles east of the City.

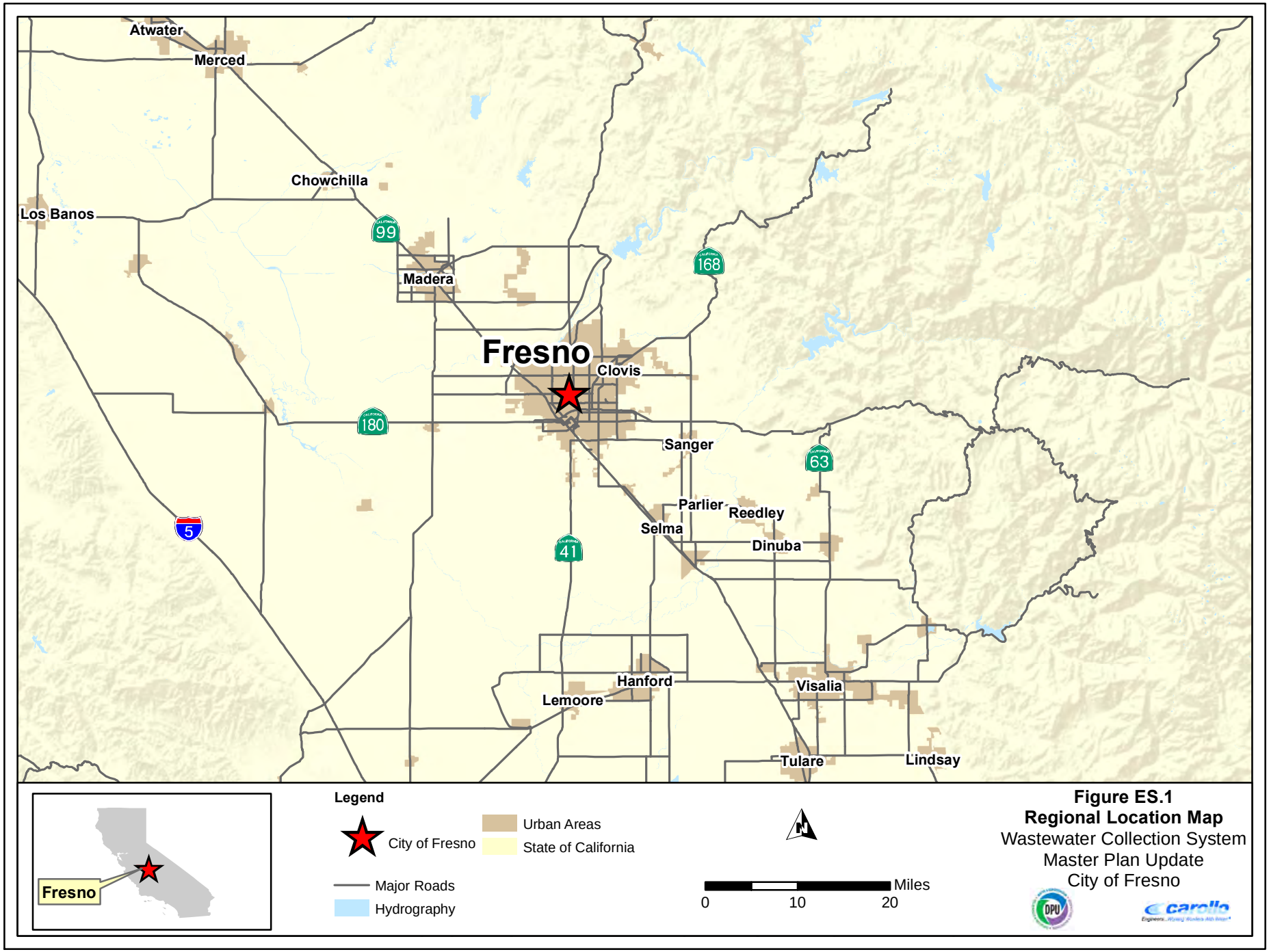


Figure ES.1
Regional Location Map
Wastewater Collection System
Master Plan Update
City of Fresno

There are four major highways that run through the City which include State Route 99, State Route 168, State Route 41, and State Route 180. State Route 99 connects the major cities in the central valley and runs north and south. State Route 168 heads east out of the City through Clovis and heads to the Sierras to the east. State Route 41 runs north and south which connects to Atascadero in the South and to Yosemite to the north. State Route 180 runs east and west which connects to Mendota to the west and to Kings Canyon National Park to the east.

The City's proposed Sphere of Influence (SOI), as defined in Fresno General Plan (General Plan) is the study area boundary for this Wastewater Collection System Master Plan Update (Master Plan). The Master Plan study area boundary and the SOI are synonymous and will be used interchangeably throughout this report. The Master Plan study area is intended to include the existing City limits and development that could occur through build out of the City's General Plan. The General Plan Buildout (Buildout) is defined as all developable sites will be fully occupied according to the General Plan.

ES.3 SEWER SERVICE AREA

Figure ES.2 illustrates the City's current wastewater service area. The City manages and maintains more than 1,500 miles of gravity sewer lines up to 84-inches in diameter, 15 active lift stations, and associated force mains. Nearly all of the wastewater generated within the sewer service area is conveyed to the City's RWRF for treatment, with the exception of a small amount of flow that is treated at the City's NFWRF. In addition, the City of Clovis recently constructed its own wastewater treatment facility on the eastern edge of the Clovis City limits (near the intersection of Ashlan Avenue and McCall Avenue), which provides wastewater service for a portion of the City of Clovis. However, most of the flow generated within the City of Clovis is treated at the RWRF.

The land use assumptions in this Master Plan were based on the Fresno General Plan and projected future developments within the City's proposed growth boundary. Should future planning conditions change from the assumptions stated in this Master Plan (i.e., accelerated growth, more intense developments, etc.), revisions and adjustments to the Master Plan recommendations would be necessary.

ES.4 WASTEWATER FLOWS

In general, wastewater consists of base wastewater flow (BWF) and wet weather flow (WWF). BWF is flow generated by routine water usage in the residential, commercial, business and industrial sectors of the collection system. WWF includes storm water inflow, trench infiltration, and wet weather ground water infiltration.

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave

Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave

NFWRF
LS16
LS14
LS12
LS04
LS05
LS06
LS10
LS03
LS15
LS13
LS18
LS02
LS01
LS20
RWRF

99
41
168
180

Legend

Existing Wastewater Collection System

- Lift Stations
- Special Structures

Pipelines

- 8" and Smaller
- 10" - 18"
- 20" - 36"
- Greater than 36"
- Streets
- Existing Sewer Service Area
- City Limits

N

0 10,000 20,000 Feet

Figure ES.2
Wastewater Service Area
Wastewater Collection System
Master Plan Update
City of Fresno

DPU

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Peak wet weather flow (PWWF) is the highest observed hourly flow that occurs following the design storm event. The City's sewers and lift stations were evaluated based on their capacity to convey the "design flow ("design flow" is synonymous to PWWF in this study).

A summary of the existing and build-out BWF and the PWWF is presented in Table ES.1. The City's BWF is projected to roughly double from 64.1 million gallons per day (mgd) to 129.9 mgd by build out, whereas the PWWF is projected to increase from 123.9 mgd to about 202.4 mgd by build out (an increase of approximately 63-percent). Therefore, the City's PWWF to BWF peaking factor is projected to decrease from roughly 1.93 to 1.56, which is relatively low for sanitary sewer collection systems.

Table ES.1 Current and Projected Wastewater Flows
Wastewater Collection System Master Plan Update
City of Fresno

Year	BWF[1] (mgd)	PDWF[2] (mgd)	PDWF Peaking Factor	PWWF[3] (mgd)	PWWF Peaking Factor
Existing	64.1	88.5	1.38	123.9	1.93
Build Out	129.9	164.7	1.27	202.4	1.56

Notes:
(1) BWF = Base Wastewater Flow.
(2) PDWF = Peak Dry Weather Flow.
(3) PWWF = Peak Wet Weather Flow.

ES.5 CAPACITY EVALUATION AND PROPOSED IMPROVEMENTS

The capacity analysis identified areas in the sewer system where flow restrictions occur or where pipe capacity is insufficient to convey design flows. Sewers that lack sufficient capacity to convey design flows create bottlenecks in the collection system that can potentially cause sanitary sewer overflows (SSOs).

For the existing sewer collection system, the Peak Dry Weather Flow (PDWF) and PWWF were routed through the hydraulic model. In accordance with the established flow depth criteria for sewers during PDWF, pipelines where the maximum depth to full flow depth (d/D) ratio that exceeded 1.0 were flagged. Each pipeline with a maximum d/D in excess of 1.0 was reviewed on a case-by-case basis to determine if a capacity improvement project was warranted. Similarly, in accordance with the established flow depth criteria for sewers during PWWF, manholes where the maximum flow to full flow (q/Q) ratio that exceeded 1.15 were flagged. Each pipeline with a maximum q/Q in excess of 1.15 was reviewed on a case-by-case basis to determine if a capacity improvement project was warranted.

In general, the City's collection system has sufficient capacity to convey current PWWFs without exceeding the established flow depth criterion. However, there are a few areas

where capacity restrictions lead to flow depths that exceed allowable levels. Following the completion of the existing system analysis, improvement projects and alternatives were identified in order to mitigate existing system pipeline capacity deficiencies.

The build out system analysis was performed in a manner similar to the existing system analysis. The purpose of the build out system evaluation is to verify that the existing system improvements were appropriately sized to convey build out PWWFs, and to identify the locations of sewers that are adequately sized to convey existing PWWFs, but cannot convey build out PWWFs. Additionally, new trunk sewers were added to the hydraulic model and sized to service major growth areas beyond the current City sewer service area.

Figure ES.3 illustrates the improvements recommended to mitigate capacity deficiencies in the existing and future sewer collection system and improvements to accommodate future growth as identified by the hydraulic analysis. Details of each improvement are also provided in Table ES.2.

ES.5.1 Project Prioritization

The majority of improvements listed in Table ES.2 are driven by future development, which consist of new sewers that serve future growth or improvements to existing facilities that are needed to serve future growth. When fully implemented, the capital projects will allow the conveyance of PWWFs to the RWRF during build out conditions.

Prioritizing the required capital improvements for the City's sewer system is an important aspect of this study. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies and to serve future users
- Building the new trunks necessary to serve future users

Improvements to existing facilities will provide sufficient capacity to mitigate existing issues and to convey increased flows resulting from future growth. Future development will require the construction of sewers to serve new users. The projects were grouped into the following phases:

- Phase 1: Years 2014 through 2015
- Phase 2: Years 2016 through 2020
- Phase 3: Years 2021 through 2025
- Phase 4: Years 2026 through 2030

Dickenson Ave
West Lawn Ave
Chateau Fresno Ave
Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave
Del Rey Ave
Bethel Ave
Academy Ave
Madsen Ave

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave
Central Ave
American Ave

NFWRF
RWRF
LS01
LS02
LS03
LS04
LS05
LS06
LS10
LS12
LS13
LS14
LS15
LS16
LS18
LS20
GALLO
Direct Storm Drain Connections to be Removed

Legend

Existing Wastewater Collection System

- Lift Stations

Pipelines

- 8" and Smaller
- 10" and Larger

Proposed Improvements

- Existing System
- Future System
- Development
- Gallo Winery I/I Reduction Program
- Streets
- Sphere of Influence
- City Limits
- Existing Sewer Service Area

N

0 12,500 25,000 Feet

Figure ES.3
Proposed Collection System Capacity Improvements
Wastewater Collection System Master Plan Update
City of Fresno

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Table ES.2 Capital Improvement Projects
Wastewater Collection System Master Plan
City of Fresno

Job No.	Project Type	Description / Limits	Existing Diameter (in)	New Diameter (in)	Rehab, Replace, or New	Length (ft)	Improvement Cost ($)	Capital Improvement Phasing				Future User Benefit (%)	Reimbursement Category	
								Phase 1 2015-2020 ($)	Phase 2 2021-2025 ($)	Phase 3 2026-2030 ($)	Phase 4 2031-2035 ($)		Existing Improvements	Future Improvements
Existing Improvements														
C1	ravit	a o ve e et ee lacto e ve. a St.	20	**24**	Replace	30	412000	412000				7	383160	28840
C1	ravit	Street ro a o ve. to a Salle ve.	20	**24**	Replace	1322	868000	868000				7	807240	60760
C2	ravit	le ve e ro re er ve. to o a ve.	24	**27**	Replace	31	430000	430000				7	399900	30100
C2	ravit	le ve e ro 180 to oor a ve.	24	**27**	Replace	2580	1580000		1580000			14	1358800	221200
C3	ravit	le ve e Street ro oor a ve. to ol e St.	27	**30**	Replace	1530	1148000			1148000		1	2297880	218120
C4	ravit	Mo tere Street ro lto Street to Street	6	**10**	Replace	1812	683000			683000		0	683000	
C5	ravit	t Street ro e t ra St. to oo ar ve.	36	**42**	Replace	4717	3825000			3825000		17	3174750	650250
C5	ravit	oo ar ve e ro t St. to Ora e ve.	36	**42**	Replace	62	733000			733000		17	608390	124610
C5C	ravit	Ora e ve e ro oo ar ve. to Cali or ia ve.	36	**42**	Replace	693	778000			778000		17	645740	132260
C6	ravit	Sa or ve e ro Pro cer air to Street	6	**8**	Replace	30	32000		32000			0	32000	
							Existing Improvement Totals	**$ 1,710,000**	**$ 1,909,000**	**$ 7,167,000**	**$ -**		**$ 9,319,860**	**$ 1,466,140**
Build-Out Improvements														
C7	ravit	ol e Street a e ve e ro Street to Merce St.	27	**30**	Replace	1567	1228000				1228000	100		1228000
C8	ravit	ort ve e ro Pol ve. li e t to ri it ve.		**60**	e	20857	1615000				1615000	100		1615000
C	ravit	ort ve e ro ri it ve. to Ora e ve.	60	**60**	Rea	15514	1376000				1376000	100		1376000
1	ravit	e era ce ve e ro ort ve. to e e ve.		**48**	e	5875	4805000				4805000	100		4805000
2	ravit	e era ce ve e ro e e ve. to lare St.		**42**	e	1352	1224000				1224000	100		1224000
3	ravit	e era ce ve e ro lare St. to Olive ve.		**36**	e	487	508000				508000	100		508000
4	ravit	e era ce Mc i le e ol ro Olive ve. to Siel ve.		**30**	e	1300	7170000				7170000	100		7170000
5	ravit	Siel ve. eo ar ve. ro e ol ve. to a ota ve.		**27**	e	4575	2827000				2827000	100		2827000
6	ravit	e e e ve e ro e era ce ve. to e ol ve.		**15**	e	5228	2053000				2053000	100		2053000
6	ravit	e e e ve e ro e ol ve. to eo ar ve.		**12**	e	2732	643000				643000	100		643000
7	ravit	C rc ve e ro e era ce ve. to oca ve.		**15**	e	2552	1016000				1016000	100		1016000
7	ravit	C rc ve e ro oca ve. to e ol ve.		**12**	e	2772	630000				630000	100		630000
7C	ravit	C rc ve e ro e ol ve. to eo ar ve.		**8**	e	2673	82000				82000	100		82000
8	ravit	Cali or ia ve e ro e era ce ve to oca ve.		**18**	e	2676	1137000				1137000	100		1137000
8	ravit	Cali or ia ve e ro oca ve. to e ol ve.		**15**	e	2670	1058000				1058000	100		1058000
8C	ravit	Cali or ia ve e ro e ol ve. to eo ar ve.		**10**	e	2617	870000				870000	100		870000
	ravit	tler ve e ro e e era ce ve to oca ve.		**18**	e	2617	1115000				1115000	100		1115000
	ravit	tler ve e ro oca ve. to e ol ve.		**15**	e	2611	1037000				1037000	100		1037000
C	ravit	tler ve e ro e ol ve. to eo ar ve.		**8**	e	2778	862000				862000	100		862000
10	ravit	lare Street ro e e era ce ve. to oca ve.		**21**	e	2730	1237000				1237000	100		1237000
10	ravit	lare Street e ol ve e ro oca ve. to a rel ve. li e t		**15**	e	4035	1586000				1586000	100		1586000
10C	ravit	a rel ve e e li e t ro e ol ve. to eo ar ve.		**8**	e	2772	845000				845000	100		845000
10	ravit	oca ve el o t ve. ro lare St. to e ol ve.		**12**	e	4726	1738000				1738000	100		1738000
10	ravit	el o t ve e ro e ol ve. to eo ar ve.		**10**	e	2554	851000				851000	100		851000
11	ravit	Olive ve e ro e e era ce ve. to oca ve.		**15**	e	2671	1058000				1058000	100		1058000
11	ravit	Olive ve e ro oca ve. to e ol ve.		**12**	e	2613	266000				266000	100		266000
11C	ravit	Olive ve e ro e ol ve. to eo ar ve.		**8**	e	2617	813000				813000	100		813000
12	ravit	Mc i le ve e ro e ol ve. to eo ar ve.		**21**	e	2772	1237000				1237000	100		1237000
12	ravit	Mc i le ve e ro eo ar ve. to o o ve.		**18**	e	5103	2157000				2157000	100		2157000
12C	ravit	o o ve e ro Mc i le ve. to Cli to ve.		**15**	e	2730	1807000				1807000	100		1807000
13	ravit	Cli to ve e ro e ol ve. to eo ar ve.		**10**	e	2492	832000				832000	100		832000
14	ravit	ort ve e ro Peac ve. to e era ce ve.		**36**	e	15787	11051000				11051000	100		11051000

Table ES.2 Capital Improvement Projects
Wastewater Collection System Master Plan
City of Fresno

Job No.	Project Type	Description / Limits		Existing Diameter (in)	New Diameter (in)	Rehab, Replace, or New	Length (ft)	Improvement Cost ($)	Capital Improvement Phasing				Future User Benefit (%)	Reimbursement Category	
									Phase 1 2015-2020 ($)	Phase 2 2021-2025 ($)	Phase 3 2026-2030 ($)	Phase 4 2031-2035 ($)		Existing Improvements	Future Improvements
??15	?ravit?	Mi??e? a? a ?ve??e	?ro? ?ort? ?ve. to ???a?ale ?ve.	?	12	?e?	2?730	? ?64?000				? ?64?000	100?	? ?	? ?64?000
??16	?ravit?	S?????e ?ve??e	?ro? ?ort? ?ve. to ???a?ale ?ve.	?	15	?e?	2?611	? 10?037?000				? 10?037?000	100?	? ?	? 10?037?000
??17	?ravit?	?o? ler ?ve??e	?ro? ?ort? ?ve. to ???a?ale ?ve.	?	10	?e?	2?78?	? ??22?000				? ??22?000	100?	? ?	? ??22?000
??18	?ravit?	?r? ?tro?? ?ve??e	?ro? ?ort? ?ve. to ???a?ale ?ve.	?	8	?e?	2?671	? 828?000				? 828?000	100?	? ?	? 828?000
??1??	?ravit?	?ale?ti?e ?ve??e	?ro? C??rc? ?ve. to ?ear?e? ?ro?ta?e	?	12	?e?	3??45	? 1?38?000				? 1?38?000	100?	? ?	? 1?38?000
??1??	?ravit?	?ale?ti?e ?ve??e	?ro? ?ear?e? ?ro?ta?e to Ma?i?o? ?ve.	?	10	?e?	1?312	? 444?000				? 444?000	100?	? ?	? 444?000
??20	?ravit?	?ra? le? ?ve??e	?ro? C??rc? ?ve. to Ma?i?o? ?ve.	?	8	?e?	5?303	? 1?630?000				? 1?630?000	100?	? ?	? 1?630?000
??21?	?ravit?	? ?ite??ri??e ?ve??e	?ro? Pol??ve. to ?l?t?e ?ve.	?	12	?e?	5?271	? 1?851?000				? 1?851?000	100?	? ?	? 1?851?000
??21?	?ravit?	? ?ite??ri??e??ra? le??ve??e	?ro? ?l?t?e ?ve. to ?iel?e? ?ve.	?	10	?e?	5?3?2	? 1?773?000				? 1?773?000	100?	? ?	? 1?773?000
??22?	?ravit?	?el? o?t ?ve??e	?ro? Pol??ve. to Cor?elia ?ve.	?	12	?e?	2?716	? ?5?000				? ?5?000	100?	? ?	? ?5?000
??22?	?ravit?	?el? o?t ?ve??e	?ro? Cor?elia ?ve. to ?l?t?e ?ve.	?	10	?e?	2?675	? 887?000				? 887?000	100?	? ?	? 887?000
??22C	?ravit?	?el? o?t ?ve??e	?ro? ?l?t?e ?ve. to ?ra? le??ve.	?	8	?e?	2?640	? 81?000				? 81?000	100?	? ?	? 81?000
??23?	?ravit?	Olive ?ve??e	?ro? Pol??ve. to ?l?t?e ?ve.	?	12	?e?	5?260	? 1?847?000				? 1?847?000	100?	? ?	? 1?847?000
??23?	?ravit?	Olive ?ve??e	?ro? ?l?t?e ?ve. to ?ra? le??ve.	?	8	?e?	2?675	? 82?000				? 82?000	100?	? ?	? 82?000
??24?	?ravit?	Olive ?ve??e	?ro? ?ra?tla?? ?ve. to ?r?a? ?ve.	?	12	?e?	2?64?	? ?37?000				? ?37?000	100?	? ?	? ?37?000
??24?	?ravit?	Olive ?ve??e	?ro? ?r?a? ?ve. to ?a?e??ve.	?	10	?e?	1?73	? 65?000				? 65?000	100?	? ?	? 65?000
??25	?ravit?	Mc?i?le? ?ve??e	?ro? ?ra?tla?? ?ve. to Ri??? ?ve.	?	10	?e?	3?603	? 1?1??000				? 1?1??000	100?	? ?	? 1?1??000
??26?	?ravit?	Cli?to? ?ve??e	?ro? ?ra?tla?? ?ve. to ?r?a? ?ve.	?	12	?e?	2?645	? ?36?000				? ?36?000	100?	? ?	? ?36?000
??26?	?ravit?	Cli?to? ?ve??e	?ro? ?r?a? ?ve. to ?a?e??ve.	?	10	?e?	2?5?2	? 862?000				? 862?000	100?	? ?	? 862?000
??27?	?ravit?	S?iel???ve??e	?ro? ?ra?tla?? ?ve. to ?r?a? ?ve.	?	15	?e?	2?627	? 1?042?000				? 1?042?000	100?	? ?	? 1?042?000
??27?	?ravit?	S?iel???ve??e	?ro? ?r?a? ?ve. to ?a?e??ve.	?	12	?e?	2?5?2	? ?1?000				? ?1?000	100?	? ?	? ?1?000
							Build-Out Improvement Totals	**$ 125,170,000**	$ -	$ -	$ -	**$ 125,170,000**		$ -	**$ 125,170,000**
New Facilities															
?C?? R??1	?reat? e?t	Ce?ar??a?ota?Scal?i?? Pla?t at ?aca?t ?iel? ?e?i?? ?ra?ite Par?	?	6 mgd	?e?	?	? 51?106?000		? 51?106?000				0?	? 51?106?000	? ?
?C?? R??2	?ravit?	?a?ota??ro? ?reat? e?t ?acilit? to Mill?roo? ?ve.	?	36	?e?	4?042	? 2?833?000		? 2?833?000				0?	? 2?833?000	? ?
S???	?reat? e?t	?e? ?era?ce?Scal?i?? Pla?t O? Cor?er o??e? ?era?ce a?? ?ort? ?ve.	?	15 mgd	?e?	?	? 77?760?000					? 77?760?000	100?	? ?	? 77?760?000
							New Facilities Totals	**$ 131,699,000**	$ -	**$ 53,939,000**	$ -	**$ 77,760,000**		**$ 53,939,000**	**$ 77,760,000**
Lift Stations															
?SF1	?i?t Statio?	? e?t o??e???e? a?? ? al??t ?ve???e?	?	?	?	?	? 15?000	? 15?000						? 15?000	? ?
?SF2	?i?t Statio?	?ear?e? ?o?levar? a?? Mar???ve???e	?	?	?	?	? 3??000	? 3??000						? 3??000	? ?
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?SF11	?i?t Statio?	?a?t o?Ce?ar a?? Co??er ?ve???e?	?	?	?	?	? 160?000	? 160?000						? 160?000	? ?
?SF12	?i?t Statio?	Car?e?ie a?? ??llar? ?ve???e?	?	?	?	?	? ?	? ?						? ?	? ?
?SF13	?i?t Statio?	?ort? o??ac??o? a?? ??iver?it? ?ve???e?	?	?	?	?	? 5??000	? 5??000						? 5??000	? ?
?SF14	?i?t Statio?	?a?t o?Car?e?ie a?? ?ll?vial ?ve???e?	?	?	?	?	? 70?000	? 70?000						? 70?000	? ?
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?SF18	?i?t Statio?	So?t? o??ielle? a?? ????e??ve???e?	?	?	?	?	? 82?000	? 82?000						? 82?000	? ?
?SF20	?i?t Statio?	?ort? o?C?err? a?? M???cat ?ve???e?	?	?	?	?	? 15?000	? 15?000						? 15?000	? ?
							Lift Station Totals	**$ 1,114,000**	**$ 1,114,000**	$ -	$ -	$ -		**$ 1,114,000**	$ -
Point Repairs															
?PPR?1	Poi?t Re?air	250 Priorit? Poi?t Re?air?a??eter? i?e? ??? Cit? o???re??o ?er?o??el	?arie?	?arie?	Re?lace	?arie?	? 5?800?000	? 5?800?000						? 5?800?000	? ?

Table ES.2 Capital Improvement Projects
Wastewater Collection System Master Plan
City of Fresno

Job No.	Project Type	Description / Limits	Existing Diameter (in)	New Diameter (in)	Rehab, Replace, or New	Length (ft)	Improvement Cost ($)	Capital Improvement Phasing				Future User Benefit (%)	Reimbursement Category	
								Phase 1 2015-2020 ($)	Phase 2 2021-2025 ($)	Phase 3 2026-2030 ($)	Phase 4 2031-2035 ($)		Existing Improvements	Future Improvements
PPR2	Point Repair	250 Priority Point Repair at Meter in Alley in City of Fresno Sewer Model	Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -
PPR3	Point Repair	250 Priority Point Repair at Meter in Alley in City of Fresno Sewer Model	Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -
PPR4	Point Repair	250 Priority Point Repair at Meter in Alley in City of Fresno Sewer Model	Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -
PPR5	Point Repair	249 Priority Point Repair at Meter in Alley in City of Fresno Sewer Model	Varies	Varies	Replace	Varies	$ 5,777,000	$ 5,777,000					$ 5,777,000	$ -
						Point Repair Totals	$ 28,977,000	$ 28,977,000	$ -	$ -	$ -		$ 28,977,000	$ -
Pipe Rehabilitation														
R1A	Rehabilitation	16 inch MOSR Pipe Cost	Varies	Varies	Rehab	Varies	$ 2,488,000	$ 2,488,000					$ 2,488,000	$ -
R1B	Rehabilitation	18 inch MOSR Pipe Cost	Varies	Varies	Rehab	Varies	$ 2,571,000	$ 2,571,000					$ 2,571,000	$ -
R1C	Rehabilitation	23 inch MOSR Pipe Cost	Varies	Varies	Rehab	Varies	$ 2,631,000	$ 2,631,000					$ 2,631,000	$ -
R2	Rehabilitation	2006 Master Plan Project RS03	24	24	Rehab	37,118	$ 11,126,000	$ 11,126,000					$ 11,126,000	$ -
R3	Rehabilitation	2006 Master Plan Project RS06	15	15	Rehab	300	$ 23,000	$ 23,000					$ 23,000	$ -
R4	Rehabilitation	2006 Master Plan Project R02	48	48	Rehab	25,644	$ 21,101,000	$ 21,101,000					$ 21,101,000	$ -
R5	Rehabilitation	2006 Master Plan Project R11	54	54	Rehab	37,772	$ 35,561,000	$ 35,561,000					$ 35,561,000	$ -
						Pipe Rehabilitation Totals	$ 14,570,000	$ 14,570,000	$ -	$ -	$ -		$ 14,570,000	$ -
						Capitol Improvement Projects Totals	$ 312,316,000	$ 46,371,000	$ 55,848,000	$ 7,167,000	$ 202,930,000		$ 107,919,860	$ 204,396,140

The projects were phased based on the best available information for how the City will develop moving forward. The actual implementation of the improvements serving future users ultimately depends on growth. The priorities presented below are estimates, and changes in the City's planning assumptions or growth projections could increase or decrease the priority of each improvement.

ES.6 REHABILITATION AND REPAIR PLAN

The purpose of the rehabilitation and repair (R&R) plan is to identify sewer infrastructure conditions that pose a current or future threat to regular sewer operations and restore the affected facilities to an acceptable state. Sewer system conditions change over time and require periodic examination to monitor deterioration and determine when rehabilitation efforts are warranted. When sewer condition assessment activities yield signs of significant deterioration, rehabilitation is recommended to prevent operational system failures.

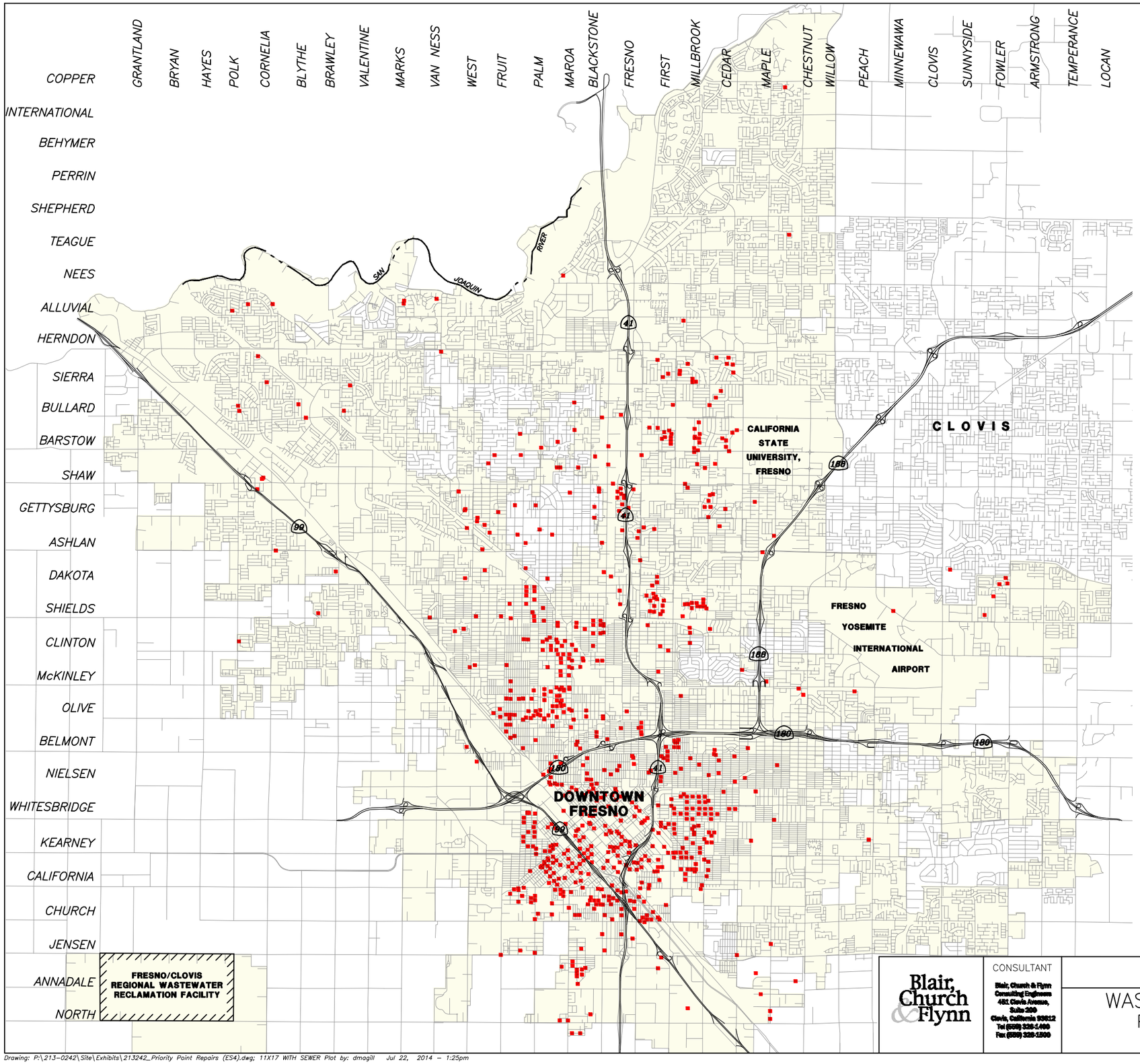
The City has developed and actively maintains a Geographic Information System (GIS) database of their sewer system. This GIS database includes detailed information that was used in the development of this R&R plan. City owned and operated truck mounted closed circuit television (CCTV) units have been used to collect video and condition assessment data for approximately 43 percent (690.5 miles) of the City's gravity sewer system. The City uses the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP©) evaluation protocols to rate the condition of each CCTV inspected sewer main.

Rehabilitation recommendations have been provided for previously recommended rehabilitation projects, high priority point repairs, high Modified Overall Structural Rating (MDRS) sewers, and sewer lift stations. Figures ES.4 through ES.6 represent the recommended rehabilitation improvements.

ES.7 CAPITAL IMPROVEMENT PLAN

The cost estimates presented in the capital improvement plan (CIP) have been prepared for general master planning purposes and for guidance in project evaluation and implementation. Final costs of a project will depend on actual labor and material costs, competitive market conditions, final project scope, implementation schedule, and other variable factors such as preliminary alignment generation, investigation of alternative routings, and detailed utility and topography surveys.

The capital improvement project costs are based on City bid results for wastewater projects, previous cost studies, interviews with local contractors and our project experience with similar wastewater infrastructure projects throughout the Central Valley. The costs have been adjusted to the Engineering News Record Construction Cost Index (ENRCCI) 20 City Average of 9,800 for June 2014.



LEGEND

- PRIORITY POINT REPAIRS
- STREETS
- CITY LIMITS

Priority Point Repairs
Wastewater Master Plan Update
City of Fresno

Priority Code	Code Description	Occurrences
B	Broken	616
BSV	Broken Soil Visible	136
BVV	Broken Void Visible	139
CH3	Hinge Crack	3
CH4	Hinge Crack	2
D	Deformed	33
FH3	Hinge Fracture	2
FH4	Hinge Fracture	1
H	Hole	195
HSV	Hole Soil Visible	31
HVV	Hole Void Visible	28
SMW	Missing Wall	4
SMWZ	Missing Wall, Surface Damage Not Evident	6
SRC	Reinforcement Corroded	35
SRCZ	Reinforcement Corroded, Surface Damage Not Evident	1
SRV	Reinforcement Visible	6
SRVC	Reinforcement Visible, Surface Damage Chemical	1
XP	Pipe Collapse	10
	Priority Point Repair Total:	**1249**

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

Blair, Church & Flynn

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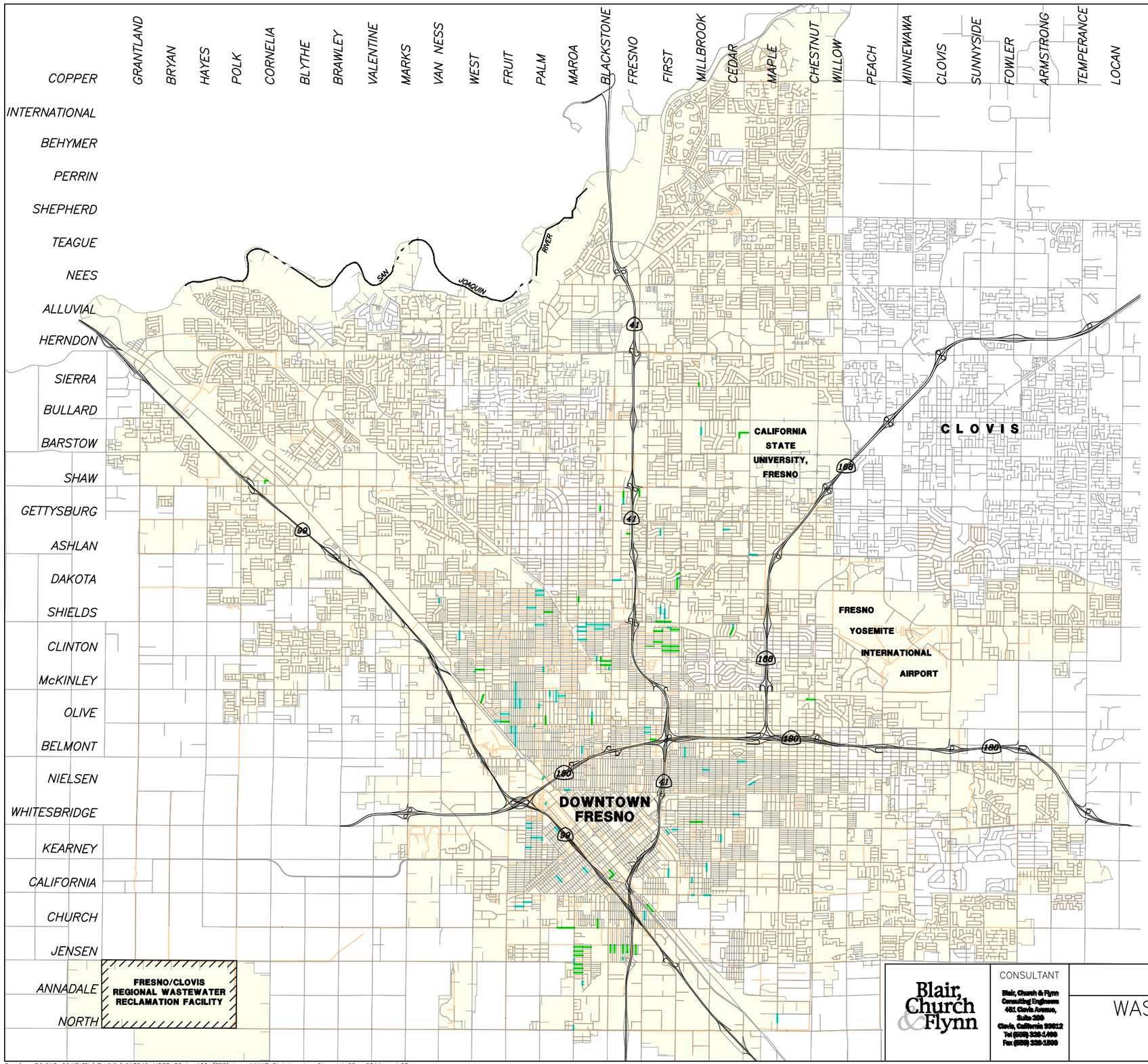
CITY OF FRESNO

WASTEWATER MASTER PLAN
PRIORITY POINT REPAIRS
FIGURE ES.4

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_Priority Point Repairs (ES4).dwg; 11X17 WITH SEWER Plot by: dmagill Jul 22, 2014 - 1:25pm



LEGEND

- SEVERE & CRITICAL MOSR SEWERS (MOSR ≥ 100)
- POOR MOSR SEWERS (50 ≤ MOSR < 100)
- OTHER EXISTING SEWERS
- STREETS
- CITY LIMITS

MOSR Overview
Wastewater Collection System Master Plan Update
City of Fresno

Sewer Condition	Range	Condition Occurrence	Percent of Inspected System
Severe	MOSR ≥ 200	53	0.43
Critical	100 ≤ MOSR < 200	33	0.27
Poor	50 ≤ MOSR < 100	84	0.68

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

Blair, Church & Flynn

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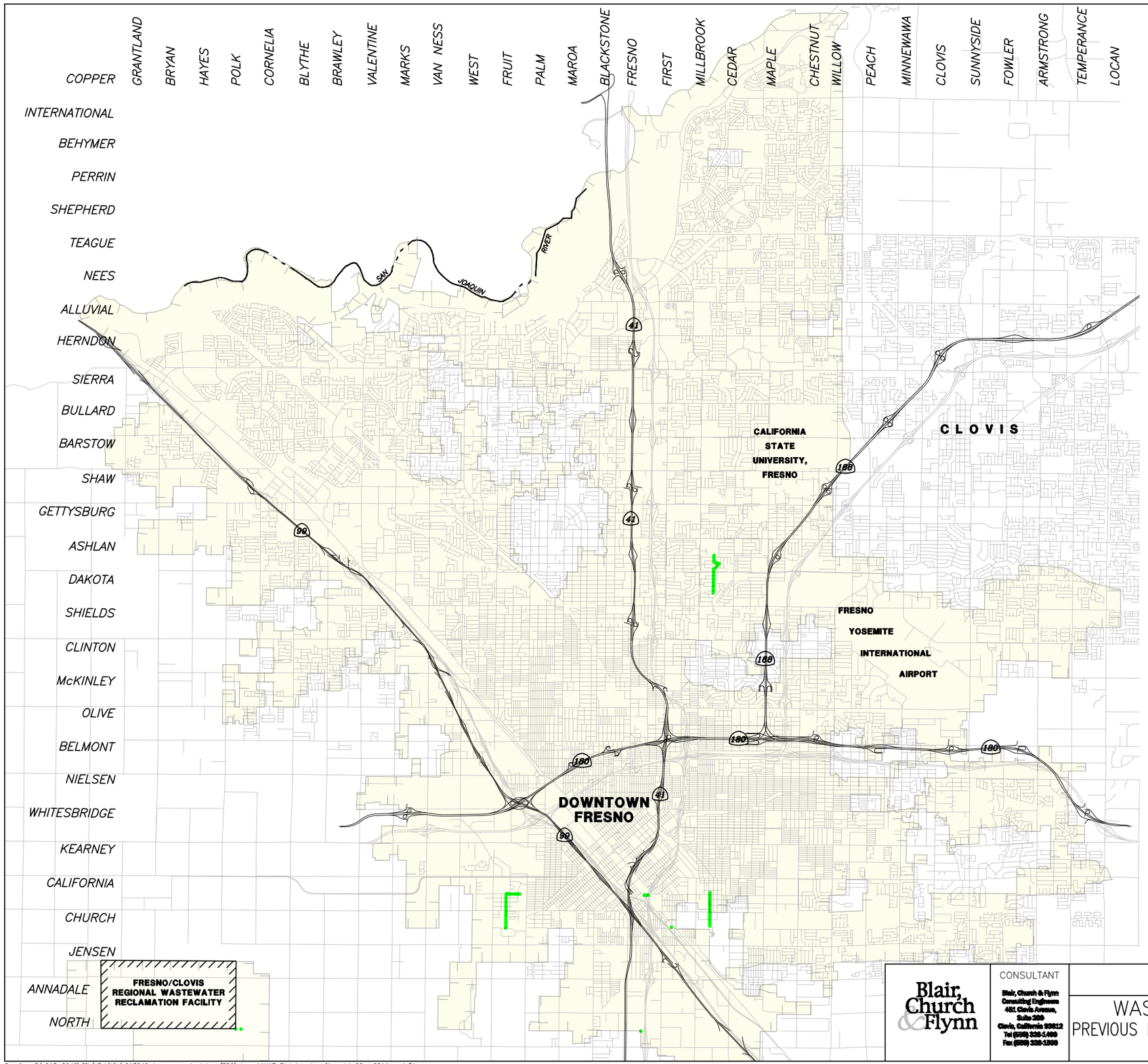
CITY OF FRESNO

WASTEWATER MASTER PLAN
HIGH MOSR SEWERS
FIGURE ES.5

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR 50 to 100 (ES5).dwg; 11X17 Plot by: dmagill Jul 22, 2014 - 1:28pm



LEGEND

- REHABILITATION PROJECTS
- STREETS
- CITY LIMITS

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

Blair, Church & Flynn

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Fax (559) 326-1500

CITY OF FRESNO

WASTEWATER MASTER PLAN
PREVIOUS REHABILITATION PROJECTS NOT COMPLETED
FIGURE ES.6

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_Improvement status (ES6).dwg; 11X17 Plot by: dmagill Jul 22, 2014 - 1:31pm

Cost estimates have been developed to help the City prepare budgeting and scheduling for these projects. The cost estimates included in this master plan are Class 5 estimates as defined by the Association for the Advancement of Cost Engineering (AACE) International publication entitled *Recommend Practice No. 56R-08*. Class 5 estimates are generally prepared on limited design information and subsequently have wide accuracy ranges. A typical Class 5 estimate for a civil engineering project may have an accuracy range as broad as -30 percent to +50 percent, or as narrow as -20 to +30 percent. Class 5 estimates are typically used for evaluation of resource needs, budgeting and capital planning.

The CIP scheduling assigns a fiscal year for each project as a target date for construction. The CIP scheduling was developed with consideration given to the following:

- Project Prioritization
- Anticipated City Growth Rates and Patterns
- Cost Distribution and Budgeting
- City of Fresno Direction

Short term projects are phased by year through the year 2020 and long-term projects are phased in five year increments beginning in 2020 through 2035.

Rehabilitation projects and capacity projects are given the highest priority needs are and are all scheduled as short term projects to be completed between 2015 and 2020. Each project is itemized by phase in Table ES.3.

The improvements proposed in this study either benefit existing users, or are required to service new development and future users. A summary of the existing and future user cost share for the proposed projects by phase is summarized in Table ES.3.

Table ES.3 Summary of Capital Improvement Costs
Wastewater Collection System Master Plan Update
City of Fresno

	Implementation Phase				
Reimbursement Category	**2015-20 ($, mill.)**	**2021-25 ($, mill.)**	**2026-30 ($, mill.)**	**2031-35 ($, mill.)**	**Total ($, mill.)**
Existing User	46.3	55.6	6.1	0	108.0
Future User	0.1	0.2	1.1	202.9	204.3
Total	**46.4**	**55.8**	**7.2**	**202.9**	**312.3**

Notes:
(1) Costs are based on ENR CCI 20-City Average of 9,800 (June 2014).

BACKGROUND

This chapter presents a brief summary of the sanitary sewer system service area, the need for this Wastewater Collection System Master Plan Update (Master Plan) and the objectives of the study. A list of abbreviations is also provided to assist the reader in understanding the information presented.

1.1 INTRODUCTION

The City of Fresno (City) was founded in 1872 by the Central Pacific Railroad Company and incorporated in 1885. The City has since grown to over 112 square miles with a population of just under a half million people in the incorporated area. Today, Fresno is the fifth largest city in the state of California. Centrally located, Fresno is the financial, industrial, trade, and commercial capital in the Central San Joaquin Valley. Figure 1.1 presents a location map of the City. The City is the hub of a region rich in heritage, resources, and people.

The City is the Regional Sewer Agency for the Fresno-Clovis Metropolitan Area (FCMA). The City owns and maintains a wastewater collection system that serves the City and the other participating agencies: the County of Fresno, the majority of the City of Clovis, the Pinedale Public Utility District, and the Pinedale County Water District. The City also owns and operates the Fresno/Clovis Regional Wastewater Reclamation Facility (RWRF), as well as the smaller North Fresno Wastewater Reclamation Facility (NFWRF) scalping plant.

1.2 SEWER SERVICE AREA

Figure 1.2 illustrates the City's current wastewater service area. The City manages and maintains more than 1,500 miles of gravity sewer lines up to 84-inches in diameter, 15 active lift stations, and associated force mains. Nearly all of the wastewater generated within the sewer service area is conveyed to the City's RWRF for treatment, with the exception of a small amount of flow that is treated at the City's NFWRF. In addition, the City of Clovis recently constructed its own wastewater treatment facility on the eastern edge of the Clovis City limits (near the intersection of Ashlan Avenue and McCall Avenue), which provides wastewater service for a portion of the City of Clovis. However, most of the flow generated within the City of Clovis is treated at the RWRF.

The land use assumptions in this Master Plan were based on the Fresno General Plan (General Plan) and projected future developments within the City's proposed growth boundary. Should future planning conditions change from the assumptions stated in this Master Plan (i.e., accelerated growth, more intense developments, etc.), revisions and adjustments to the Master Plan recommendations would be necessary.

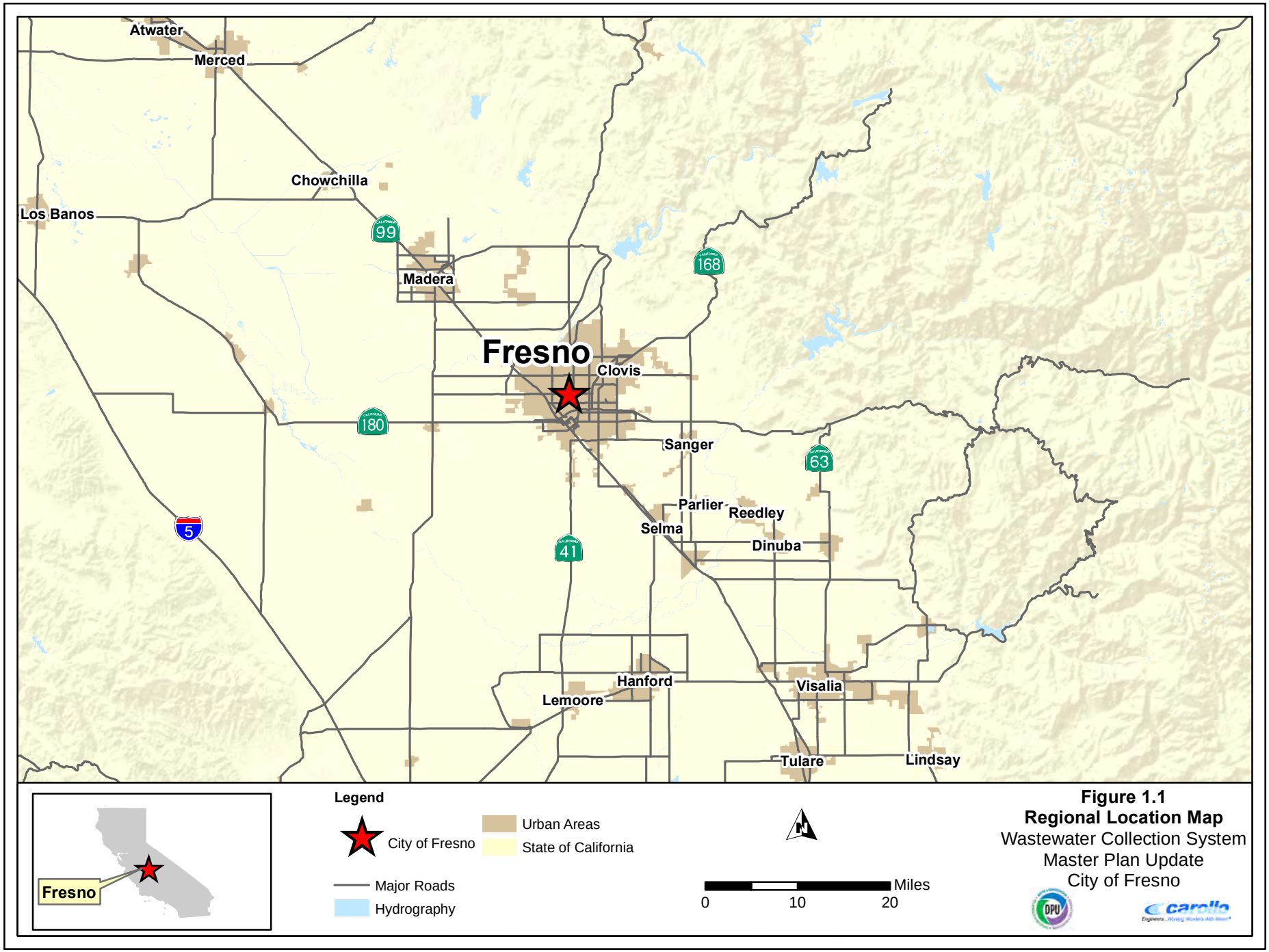


Figure 1.1
Regional Location Map
Wastewater Collection System
Master Plan Update
City of Fresno

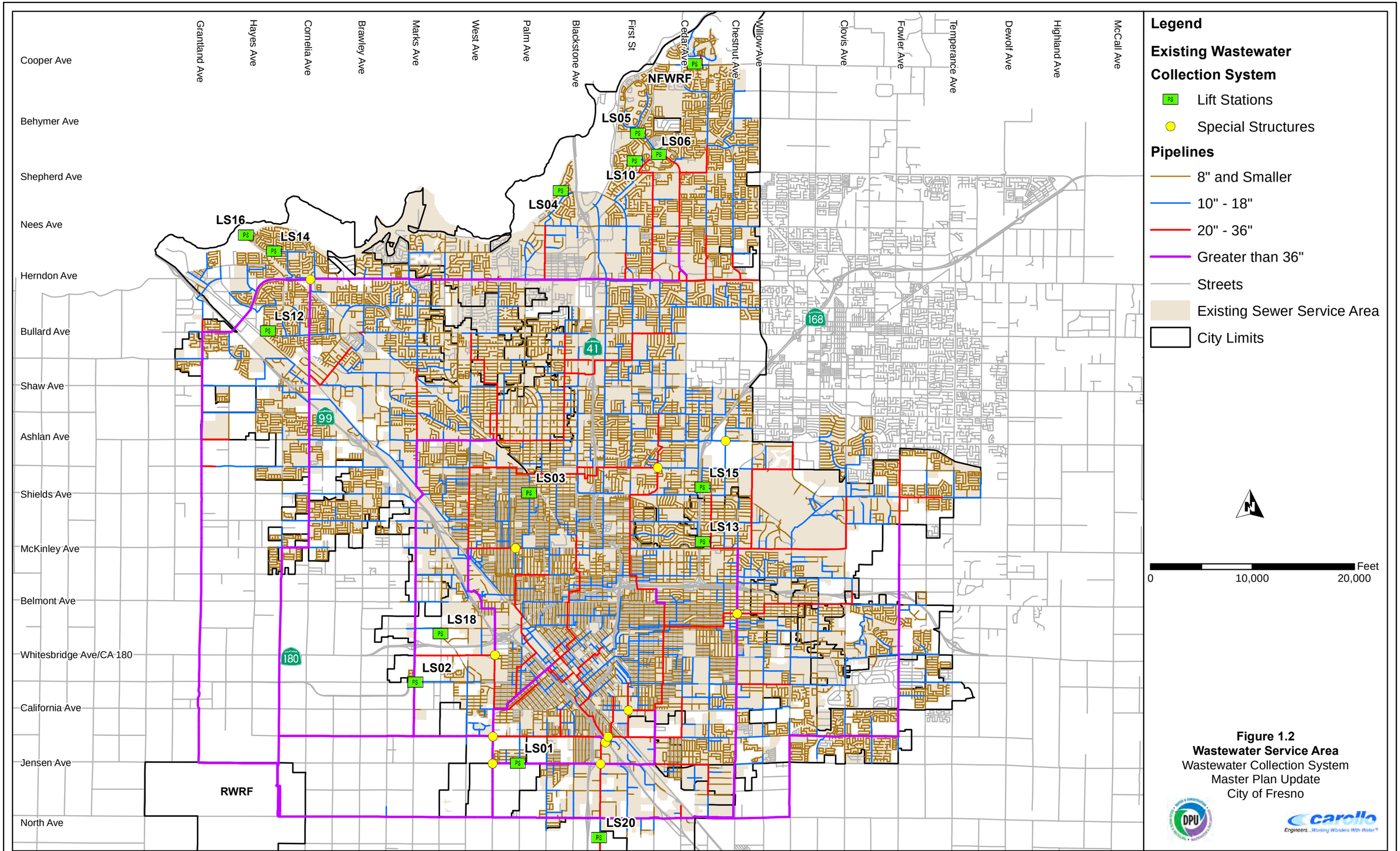


Figure 1.2
Wastewater Service Area
Wastewater Collection System
Master Plan Update
City of Fresno

1.3 PREVIOUS MASTER PLAN

The City's previous Wastewater Collection System Master Plan was completed in 2004 by Brown and Caldwell with the assistance of Blair, Church, and Flynn Consulting Engineers (BC&F). The objective of the 2004 Master Plan was to develop a long-range planning document that would assist the City's staff with managing the collection system capital improvement program and update the impact and connection fees.

One component in this project was the development of a hydraulic model of the collection system and performing a hydraulic assessment for current and future conditions. The model allowed for identification of hydraulic deficiencies in the current collection system and new pipelines to serve new developments as well as development of a capital improvement program that included collection system projects identified during the hydraulic analysis and other projects already identified by the city.

1.4 SCOPE AND AUTHORIZATION

The purpose of this Master Plan is to update the 2004 Master Plan and to identify capacity deficiencies in the sanitary sewer system, develop feasible alternatives to correct these deficiencies, plan the infrastructure that will serve future development projected by the Fresno General Plan, and to develop a rehabilitation and repair plan for the City's wastewater collection system.

In July 2013, the City approved a professional service agreement with Carollo Engineers, Inc. (Carollo), to prepare this Master Plan Update for the wastewater collection system. The professional services agreement included the following main tasks:

- Task 1 – Project Management and Meetings
- Task 2 – Data Collection and Review
- Task 3 – Wastewater Flow Projections
- Task 4 – Model Review, Evaluation, and Calibration
- Task 5 – Planning Criteria Development
- Task 6 – Rehabilitation/Repair Plan
- Task 7 – System Evaluation and Capital Improvement Plan
- Task 8 – Master Plan Report Preparation

Carollo entered into a Subconsultant Agreement with BC&F to assist with the development of certain aspects of this Master Plan, including field reconnaissance, development of the rehabilitation and repair plan, and development of capital cost estimates.

1.5 REPORT ORGANIZATION

The Master Plan report contains seven chapters, followed by appendices that provide supporting documentation for the information presented in the report. The chapters are briefly described below:

Chapter 1 - Introduction. This chapter presents the need for this Master Plan and the objectives of the study. Lists of abbreviations and reference materials are also provided to assist the reader in understanding the information presented.

Chapter 2 - Study Area Description. This chapter presents a description of the study area, defines the planning horizon for this study, and summarizes the land use classifications.

Chapter 3 - Flow Monitoring Program. This chapter defines the typical components of wastewater in a collection system as they pertain to this Master Plan. The flow monitoring data and results from the flow monitoring program are summarized and discussed.

Chapter 4 - Collection System Facilities and Hydraulic Model. This chapter describes the update and calibration of the City's collection system hydraulic model. A description of the City's wastewater collection system, the existing hydraulic model, and an outline of the steps used to update the model are provided. A detailed summary of the hydraulic model calibration steps, standards, and results for both base wastewater flow (BWF) and wet weather flow (WWF) conditions is also provided.

Chapter 5 - Planning Criteria and Design Flows. The capacity of the City's wastewater collection system was evaluated based on the planning criteria defined in this chapter. The planning criteria address the collection system capacity, gravity sewer pipe slopes, and maximum allowable depth of flow within a sewer. This chapter also summarizes the existing and build out design flows.

Chapter 6 - Capacity Evaluation and Proposed Improvements. This chapter discusses the hydraulic evaluation of the sewer collection system and the proposed projects that correct capacity deficiencies and serve future users.

Chapter 7 – Rehabilitation and Replacement Plan. This Chapter describes the proposed rehabilitation and repair (R&R) plan for the City's wastewater collection system, and includes the objectives of the plan, the data used to develop the plan, and the evaluation of the City's collection system assets.

Chapter 8 - Capital Improvement Plan. This chapter presents the capital improvement projects, a summary of the capital costs, and a basic assessment of the possible financial impacts on the City. This chapter presents the recommended capital improvement plan (CIP) for the City collection system and a summary of the capital costs.

1.6 ACKNOWLEDGMENTS

Carollo and BC&F wish to acknowledge and thank Mr. Steve Hogg, Assistant Director, Department of Public Utilities; Mr. Kevin Norgaard, Supervising Professional Engineer, Department of Public Utilities; and Mr. Orlando Gonzalez, Engineer, Department of Public Utilities. Their cooperation and courtesy in obtaining a variety of necessary information were valuable components in completing and producing this report.

1.7 ABBREVIATIONS AND DEFINITIONS

To conserve space and to improve readability, the following abbreviations are used in this report.

°F	Degrees Fahrenheit
General Plan	Fresno General Plan
AACE	Association for the Advancement of Cost Engineering
AAF	Average Annual Flow
ADWF	Average Dry Weather Flow
ADS	ADS Environmental Services
BCC	Baseline Construction Cost
BC&F	Flair, Church, and Flynn Consulting Engineers
BRT	Bus Rapid Transit
BWF	Base Wastewater Flow
Buildout	General Plan Buildout
Carollo	Carollo Engineers, Inc.
CCTV	Closed-Circuit Television
CIP	Capital Improvement Plan
CIPP	Cured-in-Place Pipe
City	City of Fresno
CSUF	California State University, Fresno
d/D	Flow Depth to Pipe Diameter Ratio

DWF	Dry Weather Flow
ENRCCI	Engineering News Record Construction Cost Index
EPS	Extended Period Simulation
FCMA	Fresno-Clovis Metropolitan Area
ft/s	Feet Per Second
ft^2	Square Feet
GIS	Geographic Information System
gpd	Gallons Per Day
gpd/ac	Gallons Per Day Per Acre
gpm	Gallons Per Minute
GWI	Groundwater Infiltration
HDPE	High-Density Polyethylene
HGL	Hydraulic Grade Line
I/I	Infiltration and Inflow
JPA	Fresno-Clovis Regional Sewerage System Joint Powers Agreement
Master Plan	Wastewater Collection System Master Plan Update
mgd	Million Gallons Per Day
MGP	Master Group Polygons
MOSR	Modified Overall Structural Rating
MPG	Master Group Polygons
MSL	Mean Sea Level
n	Manning Friction Coefficient
NASSCO	National Association of Sewer Service Companies
NCFWRF	North Central Fresno Wastewater Reclamation Facility
NFWRF	North Fresno Wastewater Reclamation Facility
NOAA	National Oceanic and Atmospheric Administration

NRCS	Natural Resources Conservation Service
OSR	Overall Structural Rating
PACP©	Pipeline Assessment and Certification Program
PDWF	Peak Dry Weather Flow
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
q/Q	Peak Flow to Pipe Capacity Ratio
R&R	Rehabilitation and Repair
RDII	Rainfall Derived Infiltration and Inflow
ROW	Right Of Way
RWRF	Regional Water Reclamation Facility
SCADA	Supervisory Control and Data Acquisition
SEDA	Southeast Development Area
SIU	Significant Industrial Users
SOI	Sphere of Influence
SSO	Sanitary Sewer Overflow
SWMM	Stormwater Management Model
VCP	Vitrified Clay Pipe
WaPUG	Wastewater Planning Users Group
WWF	Wet Weather Flow

1.8 REFERENCE MATERIAL

The following documents were referenced in the preparation of this Master Plan:

- *City of Fresno General Plan Update*, December 2014.
- *City of Fresno CCTV Inspection and Evaluation for Mid-Sized Concrete Sewers*, Final, Blair, Church & Flynn, July 2010.
- *City of Fresno Evaluation of Large Diameter Wastewater Collection System*, Final, Blair, Church & Flynn, 1992-1996.

- *City of Fresno Inspection and Evaluation of Concrete Sewers 12 Inches to 27 Inches in Diameter*, Final, Blair, Church & Flynn, July 2001.
- *City of Fresno Large Diameter Sewer Evaluation Update*, Final, Blair, Church & Flynn, January 2012.
- *City of Fresno North Avenue Trunk Sewer Evaluation*, Final, Blair, Church, and Flynn, 1990.
- *City of Fresno Permanent Flow Monitoring Data*, ADS, 2010-2012
- *City of Fresno Wastewater Collection System Master Plan,* Final, Brown and Caldwell, May 2006.

STUDY AREA DESCRIPTION

This chapter presents a description of the study area, defines the planning horizon for the study, and summarizes the land use classifications.

2.1 STUDY AREA

The area serviced by the City of Fresno (City) is characterized by residential, commercial, and industrial uses within the City limits. While the City has a diverse economy, Fresno County is the nations' top-ranked agriculture-producing county. There are some agricultural lands within the metropolitan area that are interspersed on larger parcels along the fringe of urbanized area and in between parcels.

There are many open space areas within the City, including Woodward Park and Roeding Park which is home of the Fresno Chaffee Zoo. The main water bodies near the City are located on the outskirts of town. The San Joaquin River runs east and west just to the North of the City limits. The Kings River is about 12 miles east of the City limits and the City diverts water from the river for part of their water supply. The Sierra Nevada Mountains are located about 25 miles east of the City.

There are four major highways that run through the City which include State Route 99, State Route 168, State Route 41, and State Route 180. State Route 99 connects the major cities in the central valley and runs north and south. State Route 168 heads east out of the City through Clovis and heads to the Sierras to the east. State Route 41 runs north and south which connects to Atascadero in the South and to Yosemite to the north. State Route 180 runs east and west which connects to Mendota to the west and to Kings Canyon National Park to the east.

The City's proposed Sphere of Influence (SOI), as defined in Fresno General Plan (General Plan) is the study area boundary for this Wastewater Collection System Master Plan Update (Master Plan). The Master Plan study area boundary and the SOI are synonymous and will be used interchangeably throughout this report. The SOI extends beyond the current sewer service area and is approximately 100,240 acres (156.6 square miles). This Master Plan is intended as the guiding document to plan and implement sewer system improvements to accommodate future growth to build out of the General Plan. Figure 2.1 shows the study area boundary and the current City limits.

2.2 PLANNING PERIOD

The Master Plan study area is intended to include the existing City limits and development that could occur through build out of the City's General Plan. Existing and build out land uses within the study area are discussed in this chapter.

Dickenson Ave
West Lawn Ave
Chateau Fresno Ave
Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave
Del Rey Ave
Bethel Ave
Academy Ave
Madsen Ave

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave
Central Ave
American Ave

99
41
168
180

RWRF

Legend

- Sphere of Influence
- City Limits

N

0 12,500 25,000 Feet

Figure 2.1
Study Area
Wastewater Collection System
Master Plan Update
City of Fresno

DPU

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2.3 CLIMATE

The City's study area is characterized by a semi-arid climate with mild, moderately wet winters and hot, dry summers. Table 2.1 summarizes the maximum and minimum monthly temperatures as well as the average monthly precipitation. January is the City's coldest and wettest month, with an average high temperature of 55.3 degrees Fahrenheit (°F), an average low temperature of 39.3°F, and 2.19 inches of precipitation. July is the City's hottest month, with an average high temperature of 98.7°F and an average low temperature of 68.1°F. Approximately 87 percent of the annual rainfall occurs between November and May, with an average annual rainfall of 10.73 inches.

Table 2.1 Study Area Climate
Wastewater Collection System Master Plan Update
City of Fresno

Month	Average Maximum Temperature (ºF)	Average Minimum Temperature (ºF)	Average Monthly Rainfall (inches)
January	55.3	39.3	2.19
February	61.0	41.7	2.08
March	68.3	45.8	1.40
April	73.4	49.0	1.05
May	84.4	56.5	0.42
June	92.1	62.4	0.23
July	98.7	68.1	0.01
August	97.2	66.0	0.08
September	90.8	61.3	0.07
October	78.7	52.6	0.62
November	65.0	44.8	0.98
December	55.7	38.4	1.62
Annual	**76.7**	**52.2**	**10.73**

Notes:
(1) Source: Western Regional Climate Center, Fresno Yosemite International Airport, www.wrcc.dri.edu.

2.4 TOPOGRAPHY

The City is located in the center of San Joaquin Valley near the eastern fringe of the Sierra Nevada mountain range. The terrain is flat except for the bluffs near the San Joaquin River.

The majority of the City is relatively flat with an average elevation of approximately 335 feet above mean sea level (MSL). Figure 2.2 shows the general topography of the study area.

2.5 LAND USE

Land use information is an integral component in determining the amount of wastewater generated within the City. The type of land use in an area will affect the volume and characteristics of the wastewater generation. Therefore, adequately estimating the generation of wastewater from various land use types is important in sizing and maintaining effective sanitary sewer system facilities. Existing land use was utilized to develop the initial estimate of wastewater flows for current conditions. For future flow conditions, the City's General Plan land use was used.

An important tool for determining land use projections is the City's General Plan, which guides development within the study area and establishes long-range development policies. Land use assumptions used in this study area consistent with those for existing and proposed development as published in the General Plan.

2.5.1 Existing Wastewater Collection System Service Area Land Use

The City provides wastewater collection service to residents, businesses, and other institutions within its service area, which currently encompasses and area of approximately 61,200 acres or 95.7 square miles. It should be noted that the 95.7 square miles excludes areas within the City limits that are developed but are unsewered (e.g., areas served by septic tanks), land area within the City of Clovis, and undeveloped land outside of the current service area. It does however include some County islands that area not technically within the City limits (e.g., Pinedale). Figure 2.3 shows the City's existing land use within the current sewer service area. Table 2.2 summarizes the existing sewer service land area by existing land use designation.

The largest land use category is residential, which accounts for approximately 44 percent of the total current service area acreage. Commercial land uses make up approximately 6 percent of the total. Industrial designations comprise 7 percent of the service area. Public land uses account for approximately 8 percent of the service area. Other land uses, such as open space, roads, and vacant land account for the remaining 35 percent of the total service area.

2.5.2 Build Out Wastewater Service Area Land Use

At build out of the General Plan, the City will encompass approximately 100,240 acres (156.6 square miles). Build out is defined as complete development of the General Plan Boundary. Appendix A provides a description of the different land uses associated with the General Plan. The descriptions are excerpts from the General Plan. Figure 2.4 and Table 2.3 show the General Plan land uses.

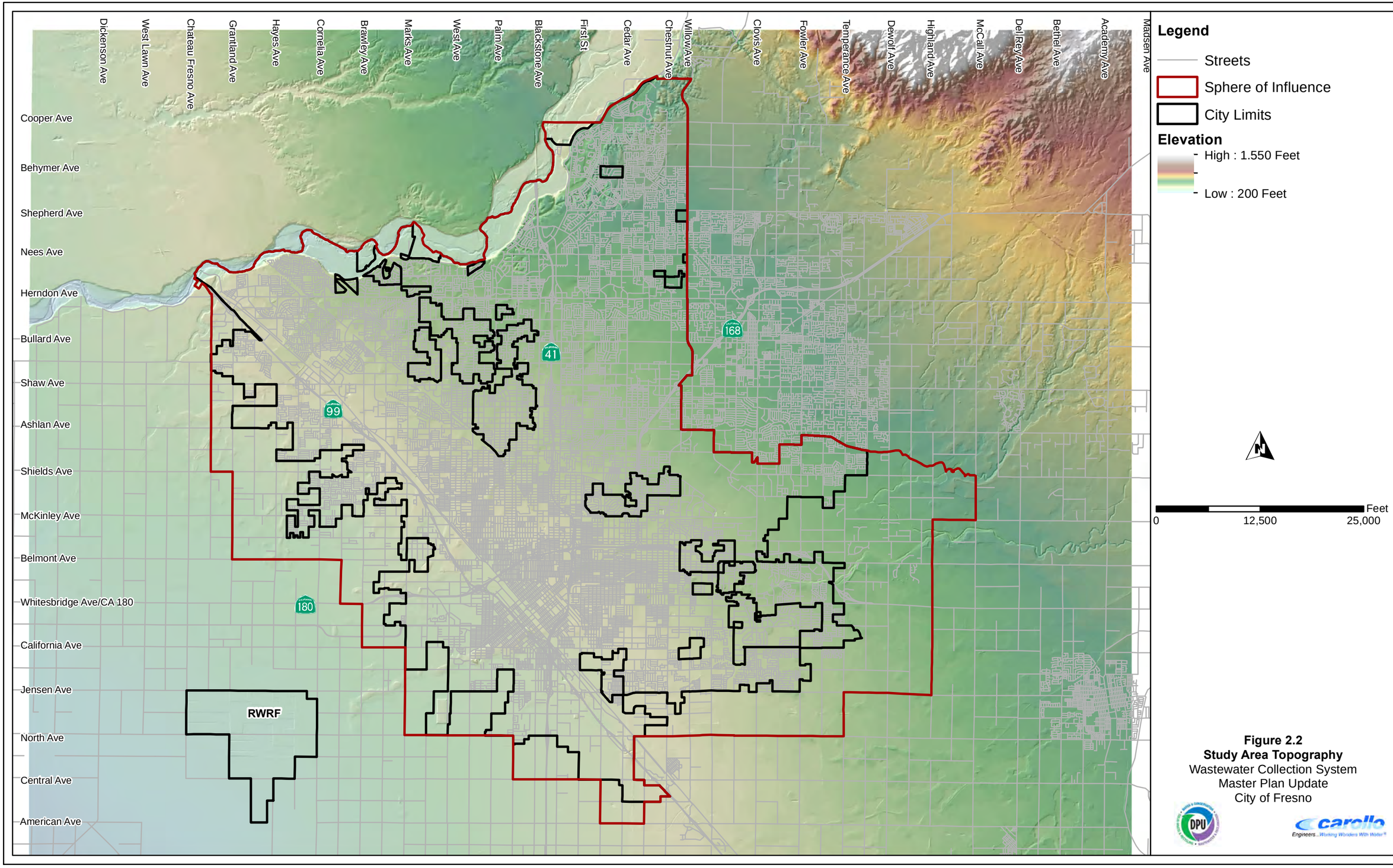


Figure 2.2
Study Area Topography
Wastewater Collection System
Master Plan Update
City of Fresno

Dickenson Ave
West Lawn Ave
Chateau Fresno Ave
Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave
Del Rey Ave
Bethel Ave
Academy Ave
Madsen Ave

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave
Central Ave
American Ave

99
41
168
180

RWRF

Legend

- Sphere of Influence
- City Limits
- Major Streets

Existing Land Use

- Residential Rural
- Residential Low Density
- Residential Medium Low Density
- Residential Medium Density
- Residential Medium High Density
- Residential High Density
- Residential Mobile Home
- Commercial
- Industrial
- Public Facilities
- Open Space
- Vacant

N

0 12,500 25,000 Feet

Figure 2.3
Existing Land Use
Wastewater Collection System
Master Plan Update
City of Fresno

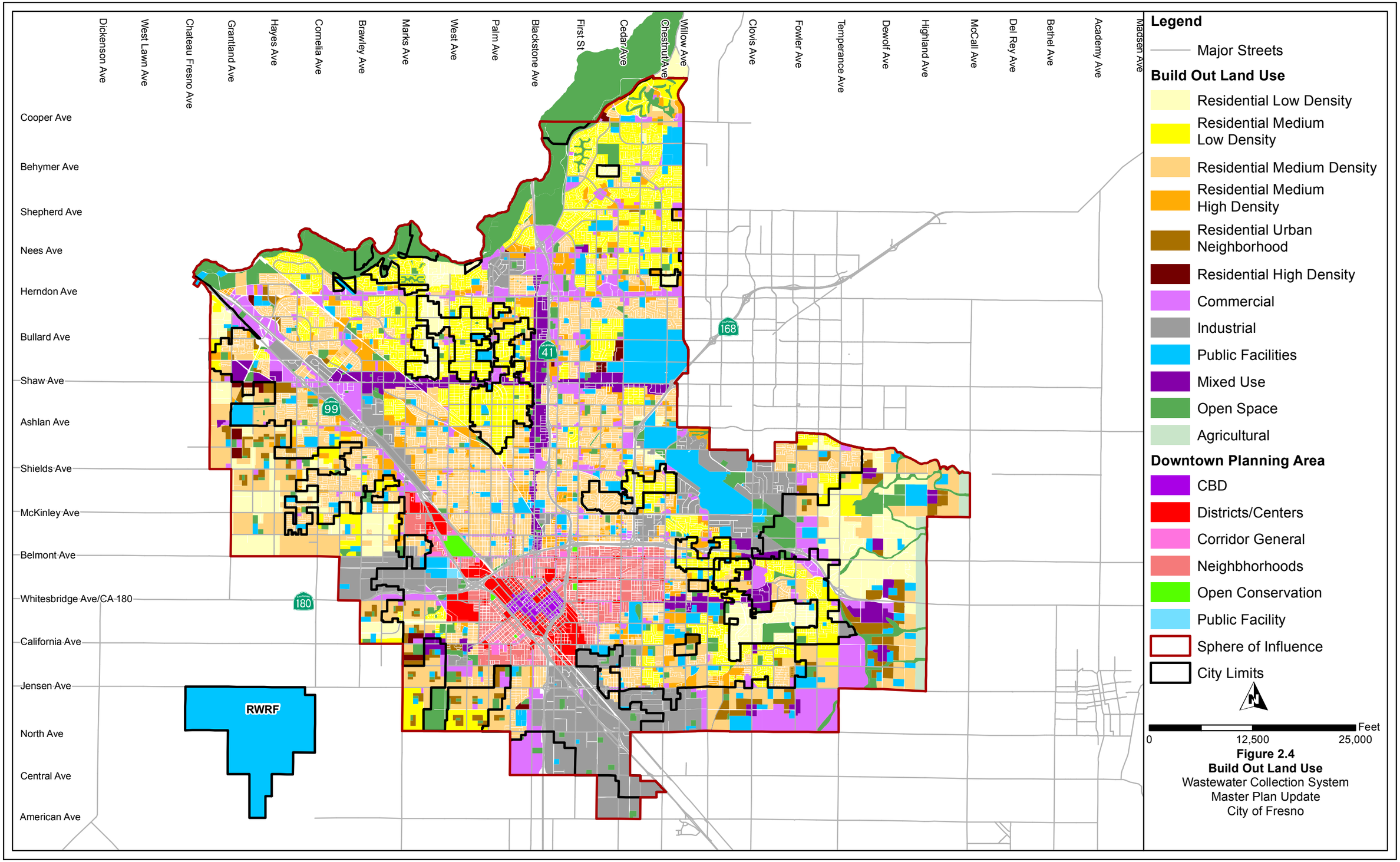


Figure 2.4
Build Out Land Use
Wastewater Collection System
Master Plan Update
City of Fresno

Table 2.2 Existing Land Use
Wastewater Collection System Master Plan Update
City of Fresno

Land Use Classification	Current Sewer Service Area Land Use	
	Land Use Area (acre)	Percent of Total (%)
Residential		
Rural Density	1,216	2.0%
Low Density (1-3 DU/acre)	1,138	1.9%
Medium Low Density (3.5 -6 DU/acre)	10,361	16.9%
Medium Density (5-12 DU/acre)	11,143	18.2%
Medium High Density (12-16 DU/acre)	2,039	3.3%
High Density (30-45 DU/acre)	1,316	2.1%
Subtotal	**27,212**	**44.4%**
Commercial		
Community	604	1.0%
General Heavy	1,054	1.7%
Neighborhood	569	0.9%
Neighborhood Limited	3	0.0%
Office	1,057	1.7%
Professional Services Office	100	0.2%
Regional	218	0.4%
Recreational	119	0.2%
Storage Limited	44	0.1%
Subtotal	**3,768**	**6.2%**
Public Facilities		
Airport	1,065	1.7%
College	151	0.2%
High school	475	0.8%
Elementary School and High School	141	0.2%
Middle School	233	0.4%
Elementary School and Middle School	188	0.3%
Elementary School	735	1.2%
Special School	42	0.1%
Cemetery	165	0.3%
Church	545	0.9%
Community Activity Center	8	0.0%
Neighborhood Center	5	0.0%
Convention Center	17	0.0%
Fairgounds	90	0.1%
Fire Station	14	0.0%
Government Offices	141	0.2%
County Court House Central Area	14	0.0%
Hospital	137	0.2%
Medical Center	10	0.0%
Convalescent Hospital	64	0.1%
Military	60	0.1%
Mobile Home Park	388	0.6%
Municipal Service Center	37	0.1%
Post Office	23	0.0%
Public Facility	21	0.0%
Public/Quasi-Public Facility	43	0.1%
Pump Station	44	0.1%
Subtotal	**4,854**	**7.9%**
Open Space		
Open Space	60	0.1%
Recreational Use/Clear Zone	16	0.0%
Ag	233	0.4%
Canal	38	0.1%
Community Park	28	0.0%
Golf Course	597	1.0%
Lake or Pond	54	0.1%
Multi-Use	101	0.2%
Neighborhood Park	212	0.3%
Recreational Park	59	0.1%
Recreational Use	12	0.0%
Regional Park	154	0.3%
Parking	78	0.1%
Pg&e Substation	117	0.2%
Ponding Basin	407	0.7%
Ponding Basin/Park	108	0.2%
Subtotal	**2,281**	**3.7%**
Other		
Roads/ Canals/ Highways	16,545	27.0%
Vacant	2,303	3.8%
Subtotal	**18,848**	**30.8%**
Industrial/Clovis		
Light Industrial	2,979	4.9%
Heavy Industrial	1,291	2.1%
Subtotal	**4,270**	**7.0%**
Total		
Total	**61,234**	**100.0%**

Table 2.3 Build Out Land Use
Wastewater Collection System Master Plan Update
City of Fresno

Land Use Type	Build Out Sewer Service Area Land Use	
	Land Use Area (acre)	Percent of Total (%)
Residential		
Low Density (1-3 DU/acre)	6,436	6.4%
Medium Low Density (3.5 -6 DU/acre)	12,558	12.5%
Medium Density (5-12 DU/acre)	17,977	17.9%
Medium High Density (12-16 DU/acre)	3,743	3.7%
Urban Neighborhood (16-30 DU/acre)	2,184	2.2%
High Density (30-45 DU/acre)	371	0.4%
Subtotal	**43,269**	**43.2%**
Commercial		
Main Street	72	0.1%
Community	1,363	1.4%
Recreation	111	0.1%
General Heavy	437	0.4%
Highway & Auto	253	0.3%
Regional	553	0.6%
Neighborhood	0	0.0%
Subtotal	**2,790**	**2.8%**
Employment		
Office	1,426	1.4%
Professional Services Office	1	0.0%
Business Park	842	0.8%
Regional Business Park	1,817	1.8%
Light Industrial	4,847	4.8%
Heavy Industrial	3,960	4.0%
Subtotal	**12,893**	**12.9%**
Mixed Use		
Corridor/Center Mixed Use	2,046	2.0%
Regional Mixed Use	956	1.0%
Neighborhood Mixed Use	131	0.1%
Subtotal	**3,133**	**3.1%**
Open Space		
Recreational Use/Clear Zone	8	0.0%
Recreational Use	339	0.3%
Commercial-Recreational	18	0.0%
Community Park	105	0.1%
Golf Course	985	1.0%
Lake, Pond	86	0.1%
Multi-Use	2,221	2.2%
Neighborhood Park	228	0.2%
Open Space	1,552	1.5%
Recreational Park	222	0.2%
Ponding Basin	1,244	1.2%
Ponding Basin (Park Use)	102	0.1%
Regional Park	561	0.6%
Subtotal	**7,670**	**7.7%**
Public Facilities		
Public/Quasi-Public Facility	596	0.6%
Public Facility	321	0.3%
Special School	635	0.6%
Elementary School	1,071	1.1%
Elementary & Middle School	62	0.1%
Elementary, Middle, & High School	40	0.0%
Middle School	290	0.3%
Junior High School	34	0.0%
High School	383	0.4%
College	282	0.3%
Cal State University	1,258	1.3%
Airport	928	0.9%
Cemetary	75	0.1%
Church	149	0.1%
Community Activity Center	9	0.0%
Convalescent Hospital	7	0.0%
Fairgrounds	116	0.1%
Fire Station	20	0.0%
Hospital	58	0.1%
Neighborhood Center	5	0.0%
PG&E Substation	141	0.1%
Police Dressing Station	1	0.0%
Water Recharge Basin	288	0.3%
Subtotal	**6,770**	**6.8%**
Buffer		
Buffer (Ag)	736	0.7%
Subtotal	**736**	**0.7%**
Downtown		
Central Business District	267	0.3%
Civic Center	37	0.0%
Town Center	55	0.1%
Neighborhood Center	84	0.1%
Chinatown District	29	0.0%
Cultural Arts District	69	0.1%
Corridor General	466	0.5%
Neighborhoods	2,584	2.6%
Special Districts	1,000	1.0%
Public Facility	150	0.1%
Open Conservation	178	0.2%
South Stadium District	120	0.1%
Subtotal	**5,039**	**5.0%**
Other		
Street, Rail, Canal, Etc.	17,941	17.9%
Subtotal	**17,941**	**17.9%**
Total		
Total	**100,240**	**100.0%**

At build out, the largest land use category is residential, which accounts for approximately 43 percent of the total service area acreage. Commercial land uses make up approximately 3 percent of the total. Employment land uses make up approximately 13 percent, and mixed use areas account for roughly 3 percent of the service area. Public land uses account for approximately 7 percent of the service area. The downtown area, which consists of a mixture of land uses, accounts for 5 percent of the service area. Other land uses, such as open space, roads, and vacant land account for the remaining 26 percent of the total service area.

In general terms, the study area can be grouped into two mains categories in regards to future development/land use. These are “Areas of Stability” and “Areas of Change,” as summarized below:

- **Areas of Change:** For the purposes of this Master Plan, areas of change are defined as an area within the study area that will contribute to a net increase in wastewater flows into the collection system. These areas are further broken down subcategories, as described below:
  - Downtown: A major component of the General Plan is Downtown. The General Plan envisions a new focus on land use and design along major streets and in neighborhoods that support Downtown. This new focus includes proposals for increased density in Downtown itself and vibrant mixed-use centers that will emanate from Downtown (mixed use corridors are described below), extending the reach of and connections with Downtown in all directions.
  - Bus Rapid Transit (BRT) Corridors: The City believes that the BRT corridors proposed in the General Plan offer great opportunities for future growth in form of mixed-use development on sites that are now underutilized or vacant. These areas are assigned a mixed use land use designation, and are targeted for densification in the General Plan. The City provided Carollo with a Geographic Information System (GIS) shape file indicating which areas are targeted for redevelopment in the BRT corridors, as well as the Downtown area.
  - Infill: For the purposes of this Master Plan, infill is defined as development of existing vacant parcels that lie within the existing wastewater service area. Development of these vacant areas will increase wastewater flows within the existing collection system, and are therefore targeted as areas of change.
  - New Growth Areas: There are several planned growths areas within the study area. These areas primarily consist of the Southeast Development Area (SEDA), the West Growth Area, and the Southwest Growth Area. In addition, this Master Plan includes other areas that are within the current City limits, but are not currently developed or otherwise connected to the wastewater collection system (i.e., areas on septic systems), as these areas will also contribute to an expansion of the service area and increased wastewater flows.

- **Areas of Stability:** The remaining land use areas within the current sewer service area (not designated as areas of change) are defined as areas of stability for the purposes of this Master Plan. Wastewater flows associated with areas of stability are assumed to remain unchanged at build out of the General Plan.

Figure 2.5 identifies the “Areas of Stability” and “Areas of Change” within the City’s General Plan Boundary.

Dickenson Ave
West Lawn Ave
Chateau Fresno Ave
Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave
Del Rey Ave
Bethel Ave
Academy Ave
Madsen Ave

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave
Central Ave
American Ave

99
41
168
180

RWRF

Legend

- Streets
- Areas of Change
- Existing Sewer Service Area
- Sphere of Influence
- City Limits

N

0 12,500 25,000 Feet

Figure 2.5
Areas of Stability and Areas of Change
Wastewater Collection System
Master Plan Update
City of Fresno

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Chapter 3

FLOW MONITORING PROGRAM

This chapter defines the typical components of wastewater in a collection system as they pertain to this Wastewater Collection System Master Plan Update (Master Plan). The flow monitoring data and results from the flow monitoring program are summarized and discussed.

3.1 PERMANENT FLOW MONITORING SITES AND TRIBUTARY AREAS

The City of Fresno (City) has an ongoing contract with ADS Environmental Services (ADS) to perform quarterly quality control on the City's permanent flow meters. The purpose of the City's permanent flow monitoring program monitors flows at specific locations in the collection system over an extended period of time. In general, the permanent flow monitors were located to capture flows from various sewer basins within the collection system, and to capture flows from the City of Clovis and a portion of the flow discharged from California State University, Fresno (CSUF). This section defines the typical components of wastewater in a collection system, and summarizes and discusses the flow monitoring data used as part of this study.

A total of 21 open channel flow meters are currently installed in the City's wastewater collection system at strategic locations. The meter sites were selected by the City to isolate flows in specific areas and subareas in the collection system, and to capture flows from the City of Clovis and Fresno State. The 21 flow monitoring locations, as well as the area tributary to each site, are shown on Figure 3.1. Table 3.1 lists the flow monitoring locations and the diameters for the sewers where the meters were installed. Figure 3.2 provides a schematic illustration of the flow monitoring locations.

3.2 WASTEWATER FLOW COMPONENTS

As a way to help the reader understand the wastewater flow components, this section describes and provides definitions of commonly used terminology in the wastewater collection system analysis and evaluations conducted as part of this project. In general, wastewater consists of base wastewater flow (BWF) and wet weather flow (WWF). BWF is flow generated by routine water usage in the residential, commercial, business and industrial sectors of the collection system.

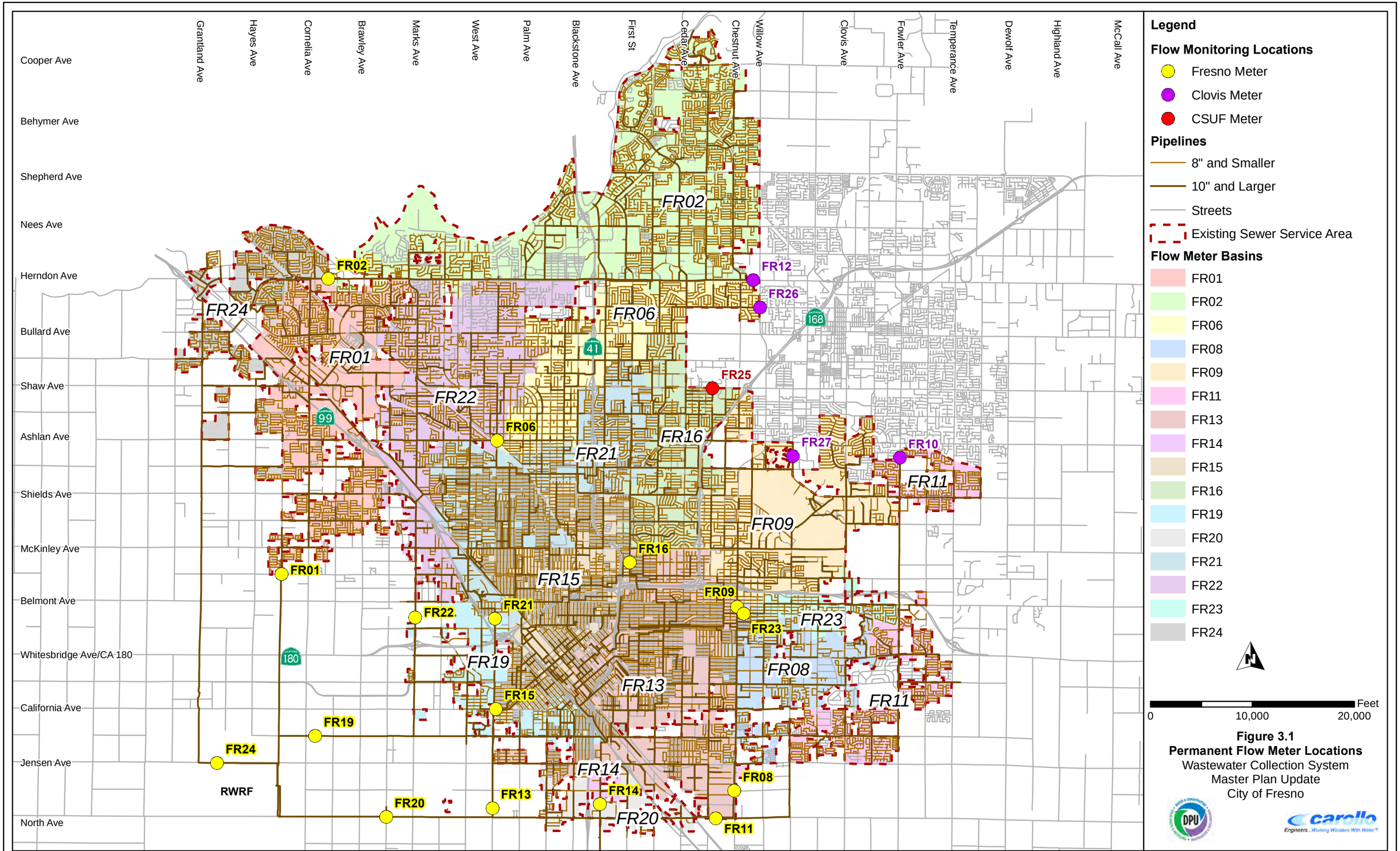
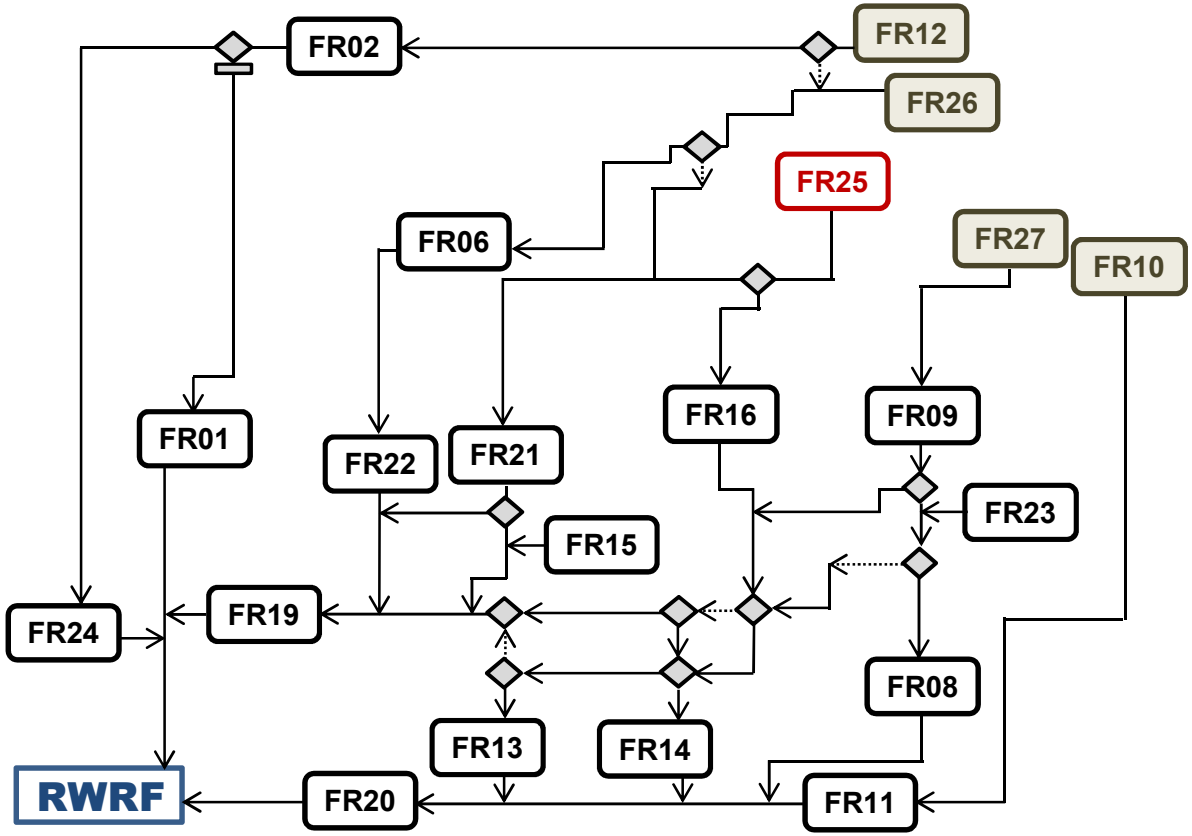


Figure 3.1
Permanent Flow Meter Locations
Wastewater Collection System
Master Plan Update
City of Fresno



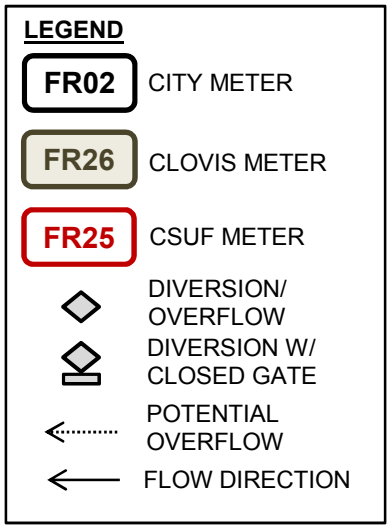


Figure 3.2
Flow Monitoring Locations Schematic
Wastewater Collection System Master Plan Update
City of Fresno

Table 3.1 Flow Monitoring Locations
Wastewater Collection System Master Plan Update
City of Fresno

Meter Site	Manhole ID	Pipe Diameter (in.)	Location	Notes
FR01	2345-01	45	Polk Ave. & Olive Ave.	
FR02	1346-24	45	Herndon Ave. & Blythe Ave.	
FR06	1953-02	36	Ashlan Ave. & Fruit Ave.	
FR08	3261-05	48	Chestnut Ave. & Annadale Ave.	
FR09	2561-09	39	Chestnut Ave. & Madison Ave.	
FR10	1967-46	36	Fowler Ave. near Sussex Way	Clovis
FR11	3361-01	66	North Ave. & Maple Ave.	
FR12	1362-02	33	Herndon Ave. & Willow Ave.	Clovis
FR13	3253-06	51	Fruit Ave. & North Ave.	
FR14	3256-11	36	Cherry Ave. & Edgar Ave.	
FR15	2853-86	48	California Ave. & Fruit Ave.	
FR16	2357-34	30	First St. & Floradora Ave.	
FR19	2946-02	66	Church Ave. & Cornelia Ave.	
FR20	3249-01	66	North Ave. & Prospect Ave.	
FR21	2552-36	42	Fruit Ave. & Nielsen Ave.	
FR22	2550-07	45	Marks Ave. & Nielsen Ave.	
FR23	2562-21	27	Washington Ave. & Garden Ave.	
FR24	3042-07	72	Jensen Ave. & Grantland Ave.	
FR25	1760-56	15	Shaw Ave. & Maple Ave.	Fresno State, Maple
FR26	1362-45	12	Sierra Ave. & Willow Ave.	Clovis
FR27	1963-09	27	Peach Ave. & Pontiac Way	Clovis

The other component of BWF is the contribution of dry weather groundwater infiltration (GWI) into the collection system. Dry weather GWI will enter the sewer system when the relative depth of the groundwater table is higher than the depth of the pipeline and when the susceptibility of the sanitary sewer pipe allows infiltration through defects such as cracks, misaligned joints, and broken pipelines. In the City specifically, the depth to the groundwater table is quite deep, and therefore there is little to no influence associated with dry weather GWI into the collection system.

WWF includes storm water inflow, trench infiltration, and wet weather GWI. The storm water inflow and trench infiltration comprise the WWF component termed infiltration and inflow (I/I). The response in the sewer system to rainfall is seen immediately (as with inflow) or within hours after the storm (as with infiltration).

The third element of WWF is GWI, which is not specific to a single rainfall event, but rather to the effects on the sewer system over the entire wet weather season. The depth of the groundwater table rising above the pipe invert elevation causes GWI. Sewer pipes within close proximity to a body of water can be greatly influenced by groundwater effects. As the groundwater table fluctuates over the wet weather season, this fluctuation is seen as a mounding effect in flow monitoring data. As previously mentioned, the depth to groundwater in Fresno is very deep, and so the effect of wet weather GWI is negligible. In fact, wastewater flows, on average, are lowest during the wet weather months in the City. Figure 3.3 illustrates the various flow components of wastewater in general, which are described in detail in the following sections.

3.2.1 Base Wastewater Flow

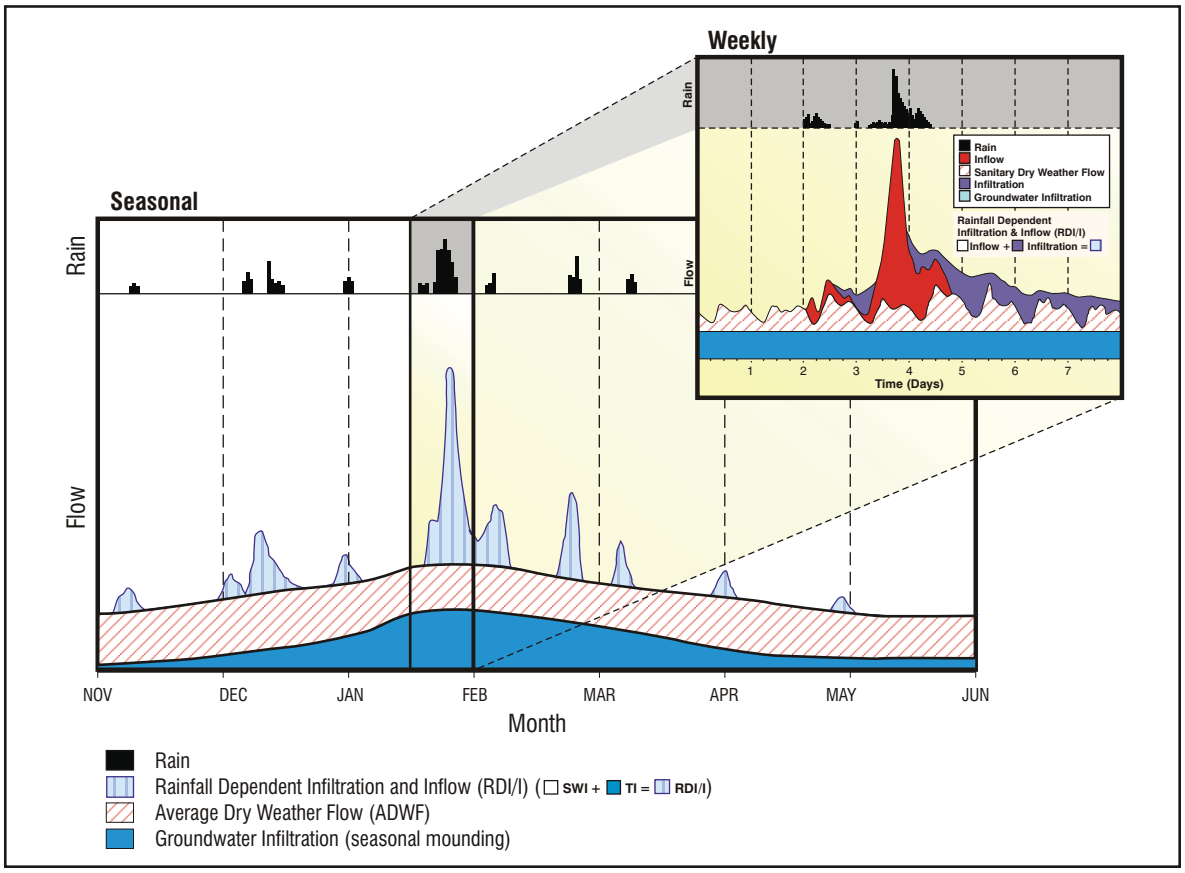
The BWF is the flow generated by the City's customers. The flow has a diurnal pattern that varies depending on the type of use. Commercial and industrial patterns, though they vary depending on the type of use, typically have more consistent higher flows during business hours and lower flows at night. Furthermore, the diurnal flow pattern experienced during a weekend may vary from the diurnal flow experienced during a weekday.

3.2.2 Average Annual Flow

The average annual flow (AAF) is the average flow that occurs on a daily basis throughout the year, including both periods of dry and wet weather conditions.

3.2.3 Average Dry Weather Flow

The Average Dry Weather Flow (ADWF) is the average flow that occurs on a daily basis during the dry weather season. The ADWF includes the BWF generated by the City's residential, commercial, and industrial users, plus the dry weather GWI component. For the City, the ADWF and the BWF are synonymous, because dry weather GWI is not a contributor to the City's collection system. Therefore, throughout the remainder of this Master Plan, the term BWF will be used in place of the term ADWF.



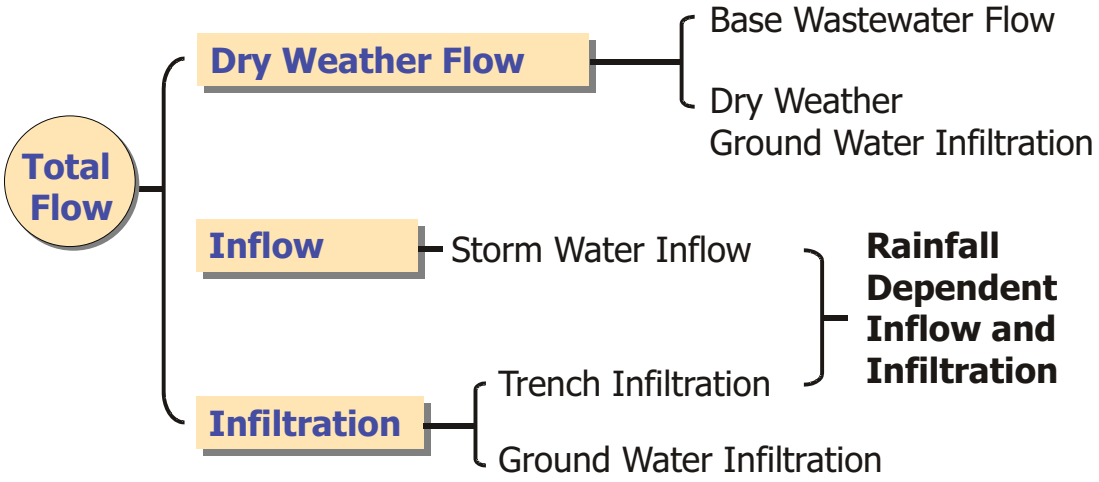


Figure 3.3
Typical Wastewater Flow Components
Wastewater Collection System Master Plan Update
City of Fresno

Note: This figure is not based on flow data specific to the City or this Master Plan

3.2.4 Infiltration and Inflow

All wastewater collection systems have some I/I, although the characteristics and severity vary by region and individual collection system. Some of the most common sources of I/I are shown on Figure 3.4. Infiltration is defined as storm water flows that enter the sewer system by percolating through the soil and then through defects in pipelines, manholes, and joints.

Examples of infiltration entry points are cracks in pipelines, misaligned joints, and root penetration. Inflow is defined as storm water that enters the sewer system via a storm drain cross connections, leaky manhole covers, or cleanouts. Examples of inflow entry points are roof drain and downspout connections, leaky manhole covers, and illegal storm drain connections.

The adverse effects of I/I entering the sewer system is that it increases both the flow volume and peak flows, as illustrated on Figure 3.5. If too much I/I enters the sewer system such that the sewer system is operating at or above its capacity, sanitary sewer overflows (SSOs) could occur. The City's wastewater collection system exhibits relatively low I/I contribution as a whole, although there are certain areas with relatively high rates of I/I.

3.2.5 Peak Dry Weather Flow

Peak dry weather flow (PDWF) is the highest observed hourly flow in the collection system during the dry weather season. In the case of the City, industrial flows increase significantly during the late summer months. The highest monthly flow rates at the RWRF are typically experienced in the months of August, September, and October. PDWF is used to evaluate the capacity of the collection system.

3.2.6 Peak Wet Weather Flow (Design Flow)

Peak wet weather flow (PWWF) is the highest observed flow that occurs following a design storm event. Wet weather I/I cause flows in the collection system to increase. PWWF is typically used for designing sewers and lift stations. Therefore, the PWWF and the "Design Flow" are synonymous and will be used interchangeably. As with PDWF, PWWF is also used to evaluate the capacity of the collection system.

3.3 FLOW MONITORING DATA SUMMARY

This section summarizes the data obtained and analyzed from the City's permanent flow monitoring program, including BWF data and wet weather flow data. Data collected from Meter FR06 is presented throughout this and other chapters as an example of the type of data collected from the flow monitoring program. Refer to Appendix B and Appendix C for additional data summaries and other information associated with the remaining meter sites.

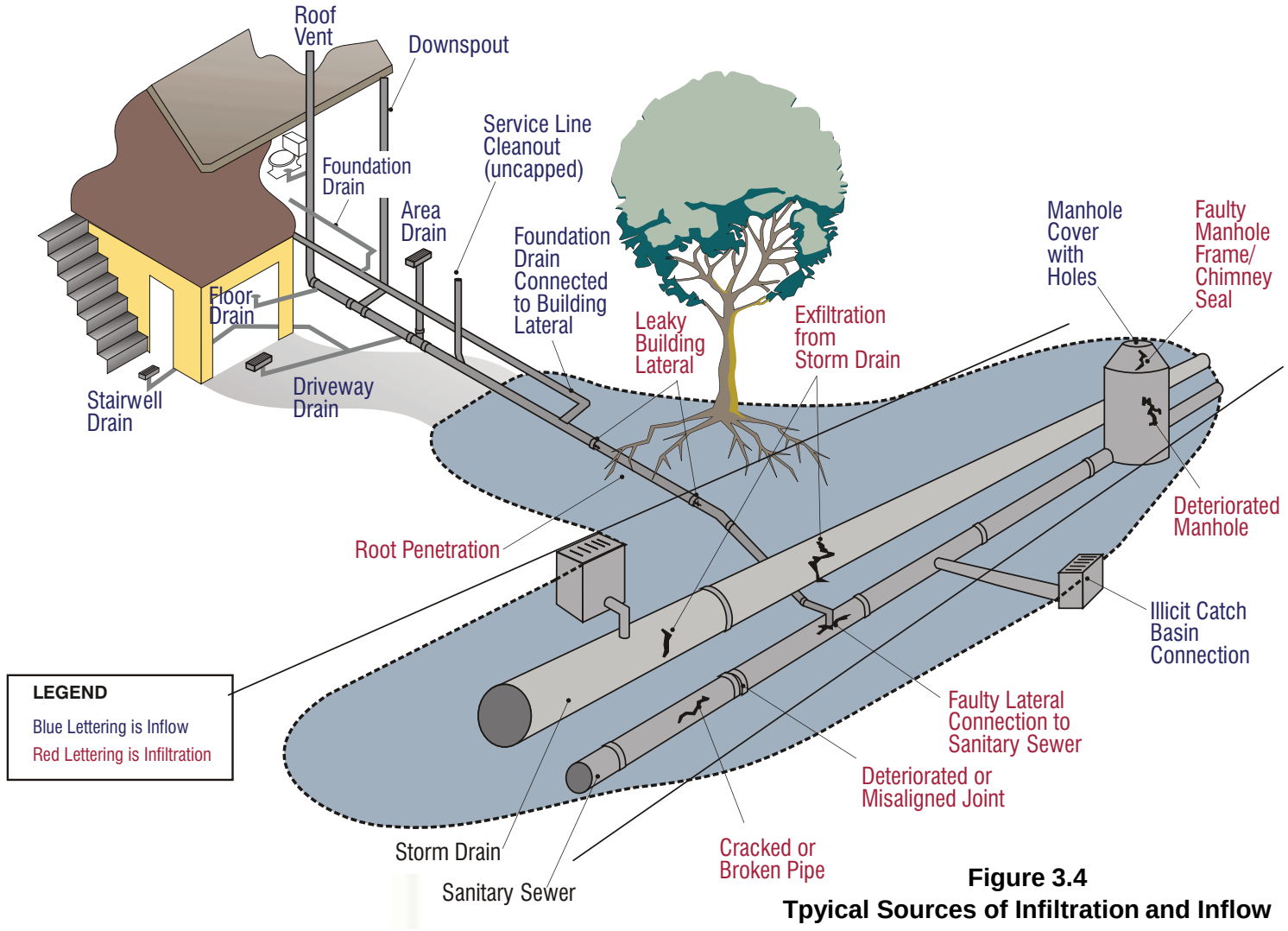


Figure 3.4

Tpyical Sources of Infiltration and Inflow

Wastewater Collection System Master Plan Update

City of Fresno

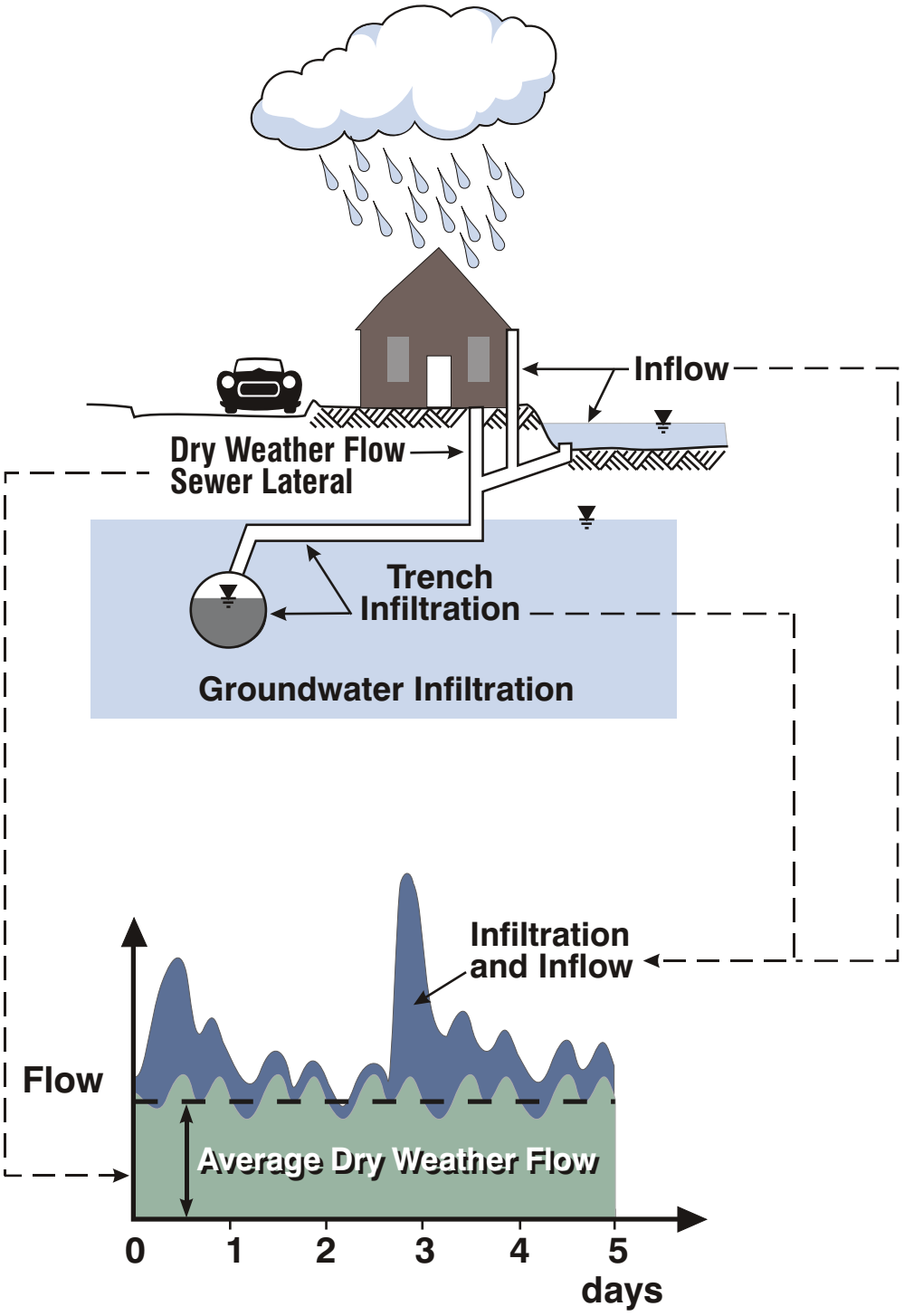


Figure 3.5
Typical Effects of Infiltration and Inflow
Wastewater Collection System Master Plan Update
City of Fresno

3.3.1 Base Wastewater Flow Data

The City's permanent flow meters collect depth and velocity data at 5-minute intervals. Characteristic dry weather 24 hour diurnal flow patterns for each site were developed for each meter based on data available during base flow periods (i.e., in the winter when there is no rainfall). This hourly flow data was then used to calibrate the hydraulic model for the observed dry weather flows during the flow monitoring period.

For Fresno, it was determined, based on a review of the available flow monitoring data and the monthly flows at the RWRF, that the month of January 2013 was the most appropriate time period to select for the determination of BWF at each flow meter. At a few sites, flow monitoring data were not available in January 2013. In these cases, January 2012 was used.

Hourly patterns for weekday and weekend flows vary and are separated to better understand dry weather flow. Carollo used the data from days in January 2013 that were least affected by rainfall to estimate the weekday and weekend dry weather flows. In addition, Carollo prepared estimates for the average weekday and weekend levels and velocities at each site, which are used in BWF calibration. Figure 3.6 illustrates a typical variation of weekday and weekend flow in the City, which is based on the data collection from Meter FR06. Similar graphics associated with the remaining sites are included in Appendix B. Table 3.2 summarizes the BWF at each meter.

3.3.2 Industrial Flow Data

The City has several large significant industrial users (SIUs). Some users have dedicated flow meters, and flow records were available on a monthly basis. For other SIUs, the City provided average flow estimates. A summary of the average flows associated with each SIU is provided in Appendix D.

3.3.3 Rainfall Data

Available rainfall data for the Fresno area were reviewed to identify significant rainfall events that have occurred in recent years. Based on a review of this data, as well as the available flow monitoring data, it was determined that the most significant rainfall events that have occurred in recent years occurred from March 20-21, 2011, and April 11-13, 2012.

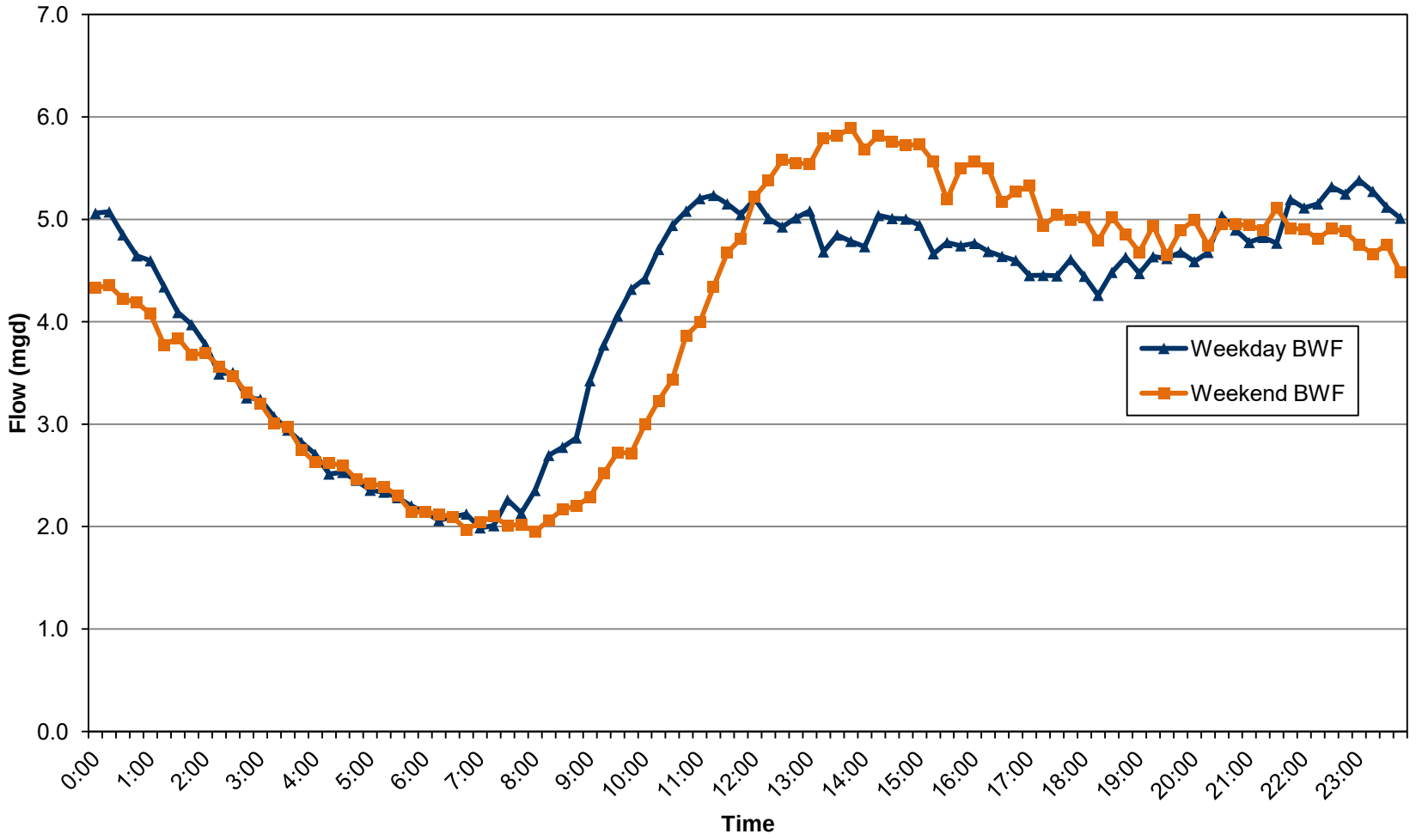


Figure 3.6

Example Weekday vs. Weekend Flow Variation (Meter FR06)

Wastewater Collection System Master Plan Update

Table 3.2 Base Wastewater Flow Summary
Wastewater Collection System Master Plan Update
City of Fresno

Meter Site	Weekday BWF (mgd)	Weekend BWF (mgd)	Overall BWF (mgd)	Weekend/ Weekday Ratio
FR01	3.70	3.70	3.76	1.05
FR02	8.05	7.73	8.07	1.01
FR06	4.13	4.13	4.12	0.99
FR08	7.66	7.67	7.51	0.93
FR09	5.03	4.86	4.92	0.93
FR10	1.49	1.46	1.49	1.00
FR11	3.58	3.61	3.55	0.97
FR12	1.58	1.58	1.58	1.01
FR13	8.53	8.33	8.36	0.93
FR14	4.06	4.02	4.05	0.99
FR15	6.19	6.07	6.12	0.96
FR16	3.72	3.70	3.72	1.00
FR19	23.15	23.07	22.51	0.90
FR20	29.85	26.96	28.94	0.89
FR21	4.40	4.45	4.42	1.01
FR22	7.46	7.47	7.51	1.02
FR23	1.25	1.26	1.11	0.61
FR24	8.12	8.99	8.15	1.01
FR25	0.08	0.08	0.08	0.96
FR26	0.19	0.19	0.19	1.03
FR27	1.90	1.90	1.91	1.02

3.3.4 Wet Weather Flow Data

The flow monitoring data was also evaluated to determine how the collection system responds to wet weather events. As mentioned above, the most significant rainfall events in recent years occurred in March 2011 and April 2012. There was limited flow monitoring data available for March 2011, but most of the City's flow meters had valid data for the April 2012. For this reason, the April 2012 storm was used for model calibration, and the March 2011 storm was used to validate the I/I parameters developed as part of the April 2012 WWF calibration.

Figure 3.7 shows an example of the wet weather response at Meter FR06 during the April 2012 storm. Figure 3.7 illustrates the volume of I/I that entered the system from the collection system upstream of Site FR06. The light blue area is the base sanitary flow while the gray area is the measured flow from the flow monitoring period. As can be seen in the figure, discernible amounts of I/I do enter the system during wet weather events.

The metric typically used to quantify the severity of the system's I/I is the R-value. The R-value is defined as the percentage of rainfall volume that makes it into the collection system as I/I. Table 3.3 summarizes the calibrated R-values for each flow monitoring basin. As shown in Table 3.3, the R-Values vary from 0.2-percent in basin FR02 to 1.45 percent in Basin 20. In general, an R-Value of 5 percent or more is usually considered indicative of a significant I/I response. It should be noted that Basin 23 exhibited an R-Value in excess of 5 percent. Based on a review of available data, it appears that the majority of I/I contributions in this basin are associated with the Gallo property (see Section 1.5.4 for more information).

The R-Value for each basin is determined by isolating I/I associated with individual flow monitoring basins (i.e., excluding flow rates from upstream flow monitors) and calculating the ratio of the volume of water that enters the system as I/I versus the volume of rainfall that fell over the flow monitoring basin tributary area.

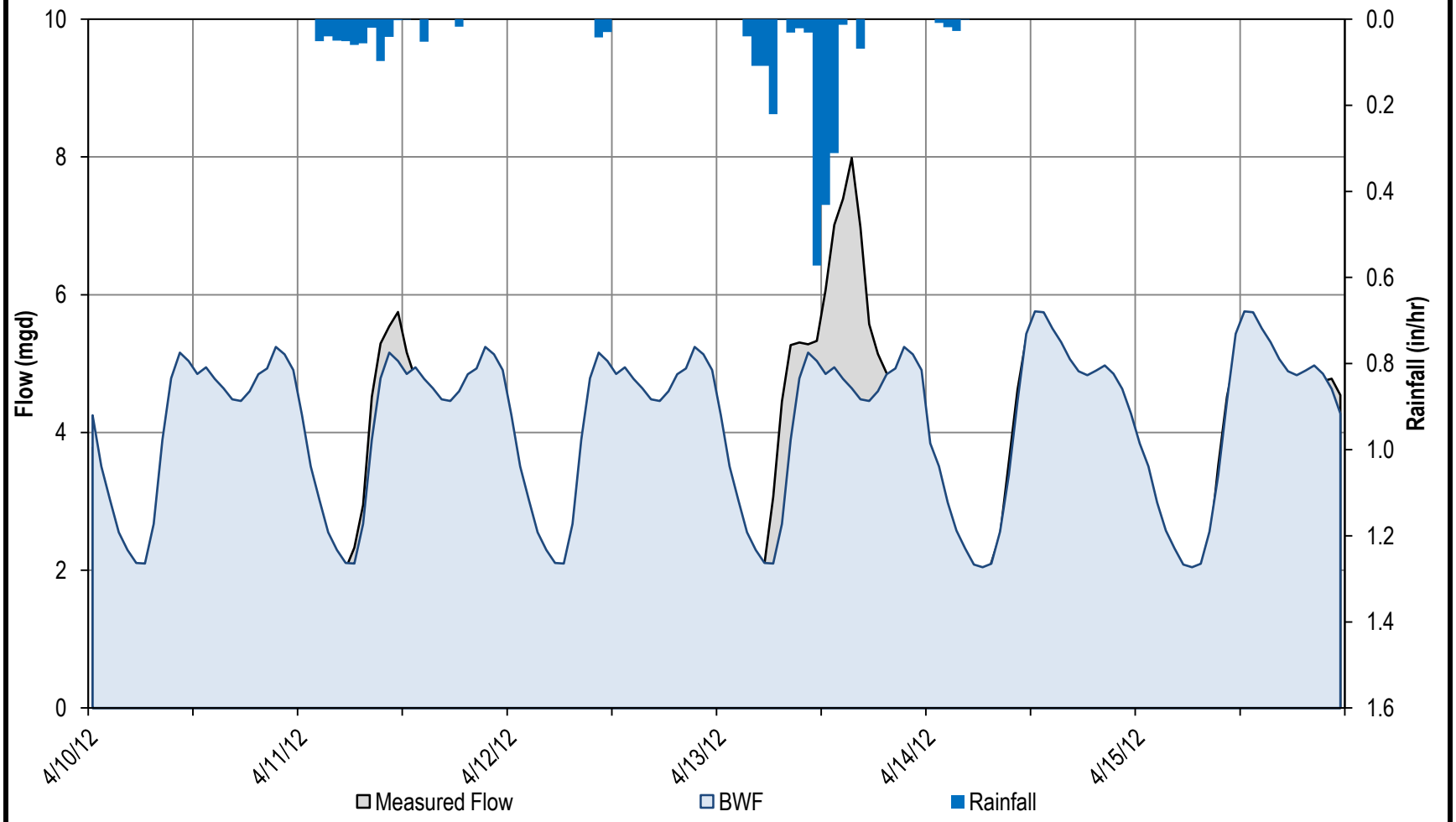


Figure 3.7

Example WWF Response (Meter FR06)

Wastewater Collection System Master Plan Update

City of Fresno

Table 3.3 R-Value Summary
Wastewater Collection System Master Plan Update
City of Fresno

Meter Basin	R-Value (%)
FR01	0.40
FR02	0.20
FR06	0.41
FR08	1.30
FR09	1.20
FR10	Note(1)
FR11	1.00
FR12	Note(1)
FR13	1.30
FR14	1.30
FR15	1.20
FR16	0.88
FR19	0.25
FR20	1.45
FR21	0.80
FR22	0.65
FR23(1)	0.75
Gallo Property, Basin 23	75
FR24	0.80
FR25	0.75
FR26	Note(1)
FR27	Note(1)

Notes:

(1) Tributary areas associated with the City of Clovis are not known. Therefore, R-values are not presented in this document.

(2) R-value presented excludes the Gallo Property, which is estimated to have an R-value of roughly 75 percent.

COLLECTION SYSTEM FACILITIES AND HYDRAULIC MODEL

This Chapter describes the update and calibration of the City of Fresno's (City's) collection system hydraulic model. A description of the City's wastewater collection system, the existing hydraulic model, and an outline of the steps used to update the model are provided. A detailed summary of the hydraulic model calibration steps, standards, and results for both base wastewater flow (BWF) and wet weather flow (WWF) conditions is also provided.

4.1 COLLECTION SYSTEM FACILITIES

The City's collection system consists of gravity sewers, lift stations, associated force mains, and several special structures/flow diversions that collect and convey wastewater to the Fresno/Clovis Regional Wastewater Reclamation Facility (RWRF), which is located on Jenson Avenue just west of Cornelia Avenue. In addition, the City operates the North Fresno Wastewater Reclamation Facilities (NFWRF) satellite plant, which serves the Copper River Ranch development, and provides recycled water via irrigation to the Copper River Country Club golf course.

Figure 4.1 presents the City's collection system, and the current wastewater service area. The collection system conveys wastewater primarily by gravity flow, generally from the northeast to the southwest, and ultimately to the RWRF. In addition to customers within City limits, the RWRF also serves a majority of flow generated within the City of Clovis, as well as unincorporated County islands within the City. The City of Clovis has four connections to the City collection system. The maximum discharge at each connection is defined by the Fresno-Clovis Regional Sewerage System Joint Powers Agreement (JPA), dated March 3, 1977.

The City's wastewater collection system has roughly 23,000 manholes, 15 lift stations, 1.7 miles of force mains, and 1,500 miles of gravity sewer pipes (excluding abandoned/out of service and private facilities).

4.1.1 Gravity Collection System

The City's existing sanitary sewer collection system is comprised of over 1,500 miles of gravity collection system pipe up to 84-inches in diameter, and over 23,000 manholes. Table 4.1 presents a summary by diameter of the known sewers in the collection system. This table excludes abandoned and private sewers, as well as sewers associated with the City of Clovis collection system.

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave

Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave

NFWRF
RWRF
LS01
LS02
LS03
LS04
LS05
LS06
LS10
LS12
LS13
LS14
LS15
LS16
LS18
LS20
1346-25
1961-01
2058-06
2253-15
2561-21
2652-03
2858-101
2952-49
2957-22
3057-07
3153-01
3056-03

99
180
41
168

Legend

Existing Wastewater Collection System

- Lift Stations
- Special Structures

Pipelines

- 8" and Smaller
- 10" - 18"
- 20" - 36"
- Greater than 36"
- Streets
- Existing Sewer Service Area
- City Limits

N

0 10,000 20,000 Feet

Figure 4.1
Existing Wastewater Collection System
Wastewater Collection System
Master Plan Update
City of Fresno

DPU

carollo
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As shown in Table 4.1, approximately 72-percent of the system is 8-inches in diameter and smaller, with the majority (46.6-percent) being 8-inches in diameter.

Table 4.1 Collection System Gravity Pipeline Summary
Wastewater Collection System Master Plan Update
City of Fresno

Diameter (inches)	Length[(1),(2)] (miles)	Percent of System (by length)	Diameter (inches)	Length[(1),(2)] (miles)	Percent of System (by length)
4	0.02	0.0	33	5.1	0.3
6	386.7	25.7	36	9.4	0.6
8	702.1	46.6	39	8.2	0.5
10	104.2	6.9	40	0.7	0.0
12	71.1	4.7	42	7.3	0.5
14	2.3	0.2	45	13.7	0.9
15	41.9	2.8	46	0.0	0.0
16	2.8	0.2	48	10.2	0.7
18	39.5	2.6	51	3.5	0.2
20	2.6	0.2	54	2.9	0.2
21	16.0	1.1	57	1.1	0.1
22	1.1	0.1	60	9.1	0.6
24	21.0	1.4	66	11.2	0.7
27	11.0	0.7	72	6.6	0.4
30	13.5	0.9	84	1.4	0.1
			Total (miles)	**1,506**	**100**

Notes:
(1) Source: City of Fresno GIS database
(2) Totals exclude abandoned and private facilities

Table 4.2 summarizes the gravity collection system by pipe material. As shown in Table 4.2, the majority of the collection system (56-percent) consists of vitrified clay pipe (VCP), and roughly one-third of the collection system (30.8-percent) consists of polyvinyl chloride (PVC) pipe.

Table 4.2 Collection System Gravity Pipeline Material Summary
Wastewater Collection System Master Plan Update
City of Fresno

Material	Abbreviation	Length[(1),(2)] (miles)	Percent of System (by length)
Asbestos Cement Pipe	ACP	6.2	0.4
Armco Plastic Truss	APT	5.7	0.4
Closed Profile PVC	CCP	1.1	0.1
Cast Iron Pipe	CIP	6.3	0.4
Ductile Iron Pipe	DIP	4.6	0.3
Fiberglass Reinforced Plastic	FRP	0.01	0.0
Polyvinyl Chloride Pipe	PVC	464.5	30.8
Reinforced Concrete Lined Pipe	RCL	20.2	1.3
Reinforced Concrete Pipe	RCP	95.0	6.3
Standard Concrete Pipe	SCP	56.0	3.7
Truss Pipe	TRS	0.2	0.0
Vitrified Clay Pipe	VCP	846.2	56.2
Total	**--**	**1,506.2**	**100.0**

Notes:
(1) Source: City of Fresno GIS database
(2) Totals exclude abandoned and private facilities
(3) Approximately 68.9 miles of pipe have been rehabilitated using a CIPP liner, or 4.6 percent of the system.

Table 4.3 summarizes the gravity collection system by installation year. As shown on Table 4.3, approximately 16-percent of the collection system was originally installed before 1950. Roughly 48-percent of the system was installed between 1950 and 1980 (26-percent of the system was installed in the 1970's), and the remaining 36-percent of the system was installed since 1980.

Table 4.3 Collection System Gravity Pipeline Installation Year Summary
Wastewater Collection System Master Plan Update
City of Fresno

Years	Length[(1),(2)] (miles)	Percent of System (by length)
Unknown	0.1	0.0
Pre 1900	8.8	0.6
1900-1910	7.4	0.5
1911-1920	55.9	3.7
1921-1930	29.0	1.9
1931-1940	25.8	1.7
1941-1950	106.5	7.1
1951-1960	163.1	10.8
1961-1970	179.6	11.9
1971-1980	385.7	25.6
1981-1990	153.0	10.2
1991-2000	196.7	13.1
2001-2010	185.2	12.3
2011-2013	9.4	0.6
Total	**1,506.2**	**100.0**

Notes:
(1) Source: City of Fresno GIS database
(2) Totals exclude abandoned and private facilities

4.1.2 Lift Stations

The City operates and maintains 15 active wastewater lift stations throughout the City (excluding private and abandoned lift stations). Figure 4.1 shows the location of each lift station. Table 4.4 summarizes the available design data for each f the City's active lift stations.

4.1.3 Special Structures/Field Reconnaissance

The City's collection system includes several important flow diversions, which split average and peak wastewater flows between sewer basins. The City's previous Collection System Master Plan provided a description of many of the flow diversions. In most cases, these descriptions were deemed sufficient for the purposes of this Master Plan. Supplemental field reconnaissance was also performed by Blair, Church, and Flynn (BC&F) and City staff at seven sites selected by Carollo (Figure 4.2). The sites selected for field reconnaissance

were determined to be complex or otherwise important enough to warrant further investigation. As part of the field reconnaissance, BC&F provided rim elevations, invert elevations, rough estimates for flow splits between outlet pipes, general observations, and photographs for each site (with the exception of the Dakota and Millbrook Structure, which was visually inspected by Carollo Engineers (Carollo)/City staff only).

Table 4.4 Wastewater Lift Station Summary
Wastewater Collection System Master Plan Update
City of Fresno

Name	Location	No. of Pumps	Capacity (per pump)		Firm Capacity (mgd)
			(gpm)	(mgd)	
LS01	Jensen and Walnut Avenues	2	750	1.080	1.080
LS02	Marks Avenue and Kearney Boulevard	2	450	0.648	0.648
LS03	Wilson Avenue north of Shields Avenue	2	250	0.360	0.360
LS04	Riverview Drive and Del Mar Avenue	2	186	0.272	0.272
LS05	Fort Washington Road and Champlain Drive	2	515	0.742	0.742
LS06	Champlain Drive and Perrin Avenue	2	1545	2.220	2.220
LS10	Stratford Drive and Woodlawn Drive	2	260	0.374	0.374
LS12	Bullard and Carnegie Avenues	2	200	0.288	0.288
LS13	Jackson and University Avenues	2	190	0.272	0.272
LS14	Alluvial and Carnegie Avenues	2	400	0.576	0.576
LS15	Hayston Avenue and Fountain Way	2	400	0.576	0.576
LS16	Santa Fe and Bluff Avenues	2	175	0.252	0.252
LS18	Hughes and Nielson Avenues	2	670	0.959	0.959
LS20	Cherry Avenue south of North Avenue	2	670	0.959	0.959
NFWRF	North Fresno WRF	2	440	0.639	0.639

Notes:
(1) Source: Data provided by City Staff.

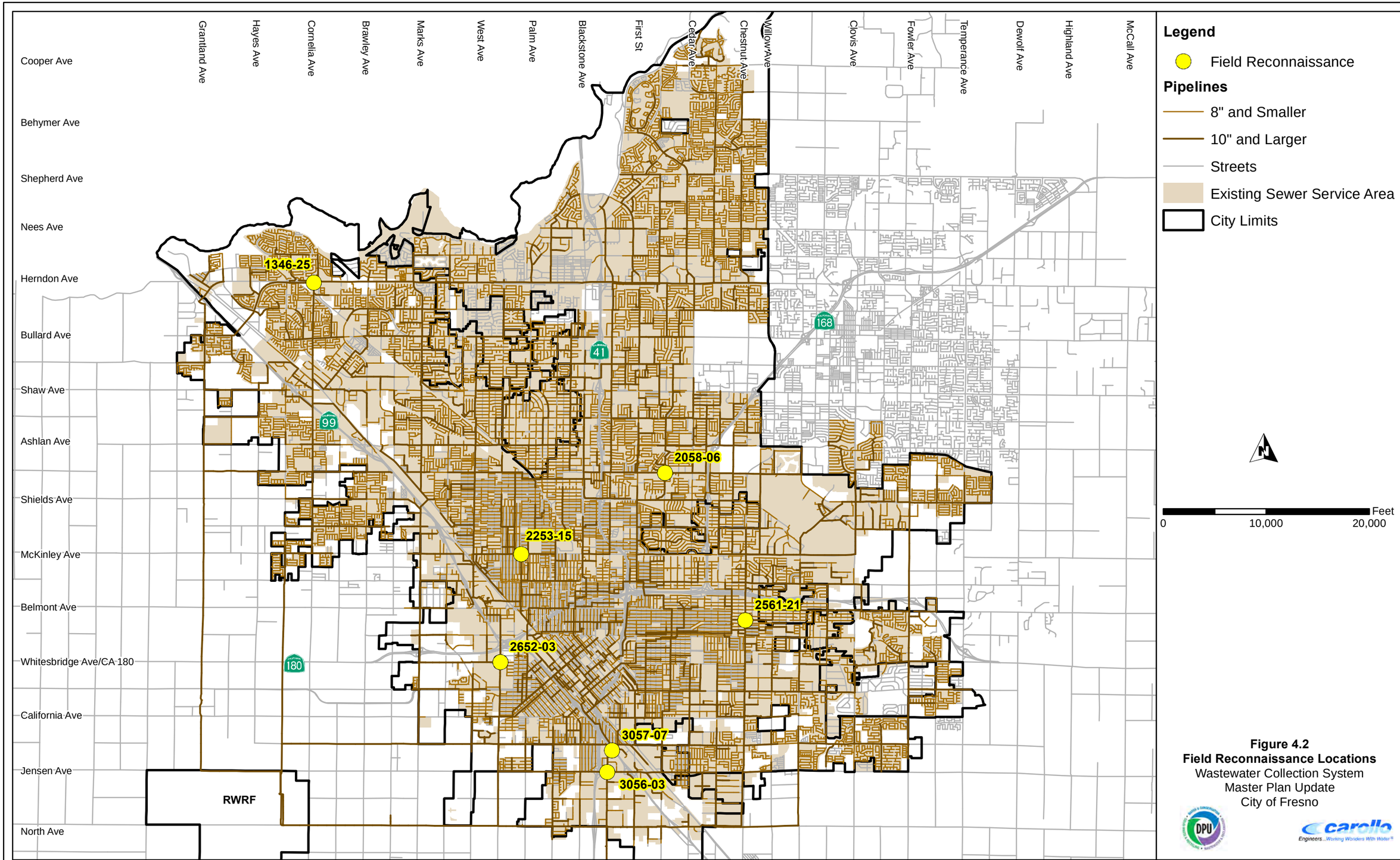


Figure 4.2
Field Reconnaissance Locations
Wastewater Collection System
Master Plan Update
City of Fresno

Table 4.5 provides a summary of the major diversions within the collection system, and identifies which of the structures were investigated as part of this Master Plan Update. Appendix E provides detailed survey data, sketches, and photographs from the site reconnaissance performed by BC&F.

During the base wastewater flow calibration process (see Section 3.4), it was discovered that there was a flow discrepancy in the model for Flow Meters FM16 and FM21. Further investigation revealed that the most likely source of the flow discrepancy was the junction structure located at the intersection of Dakota Avenue and Millbrook Avenue. For this reason, Carollo and City staff performed a site visit at one additional manhole to supplement the field reconnaissance activities performed by BC&F, as described below:

- **MH 2058-06, Dakota and Millbrook:** During the base wastewater flow calibration process (see Section 4.3.3), it was discovered that there was a flow discrepancy in the model for Flow Meters FM16 and FM21. Further investigation revealed that the most likely source of the flow discrepancy was the junction structure located at the intersection of Dakota Avenue and Millbrook Avenue. The previous Collection System Master Plan indicated that flows into this structure are split roughly 50/50 between a 21-inch diameter sewer that flows south into Basin 16 and a 21-inch sewer that flows west into Basin 21. However, Carollo determined that during base flow conditions, the majority of flow in this structure is routed to the 21-inch pipeline flowing south to Meter FM16. In order to confirm this, Carollo arranged with City staff to perform an additional site investigation of this structure. At the site investigation, it was discovered that a concrete wall has been installed on the 21-inch pipeline flowing to the west, approximately to the halfway depth of the pipe. Therefore, at this structure, low flows are conveyed south. Once flows reach a flow depth to pipe diameter ratio (d/D) of roughly 0.5, flows are split between both pipelines. At the time of the site visit (about 9:30 AM), it was estimated that approximately 10 to 20-percent of the flow into the structure was observed to be diverted west into Basin 21. The majority of the remaining flow continued south to Meter FM16, which was consistent with the flow monitoring data.

  A custom flow inflow/outflow diversion curve of this structure was developed using H_2OMAP SWMM and input into H_2OMAP Sewer. Because H_2OMAP SWMM features a more accurate routing engine than H_2OMAP Sewer, it was determined that a curve generated from H_2OMAP SWMM would be the most appropriate method of simulating this structure. Figure 4.3 shows the custom diversion curve that was developed for this structure. Furthermore, the pipelines downstream of this structure are known capacity issues, and therefore it is critical to simulate the flow splits at this location as accurately as possible.

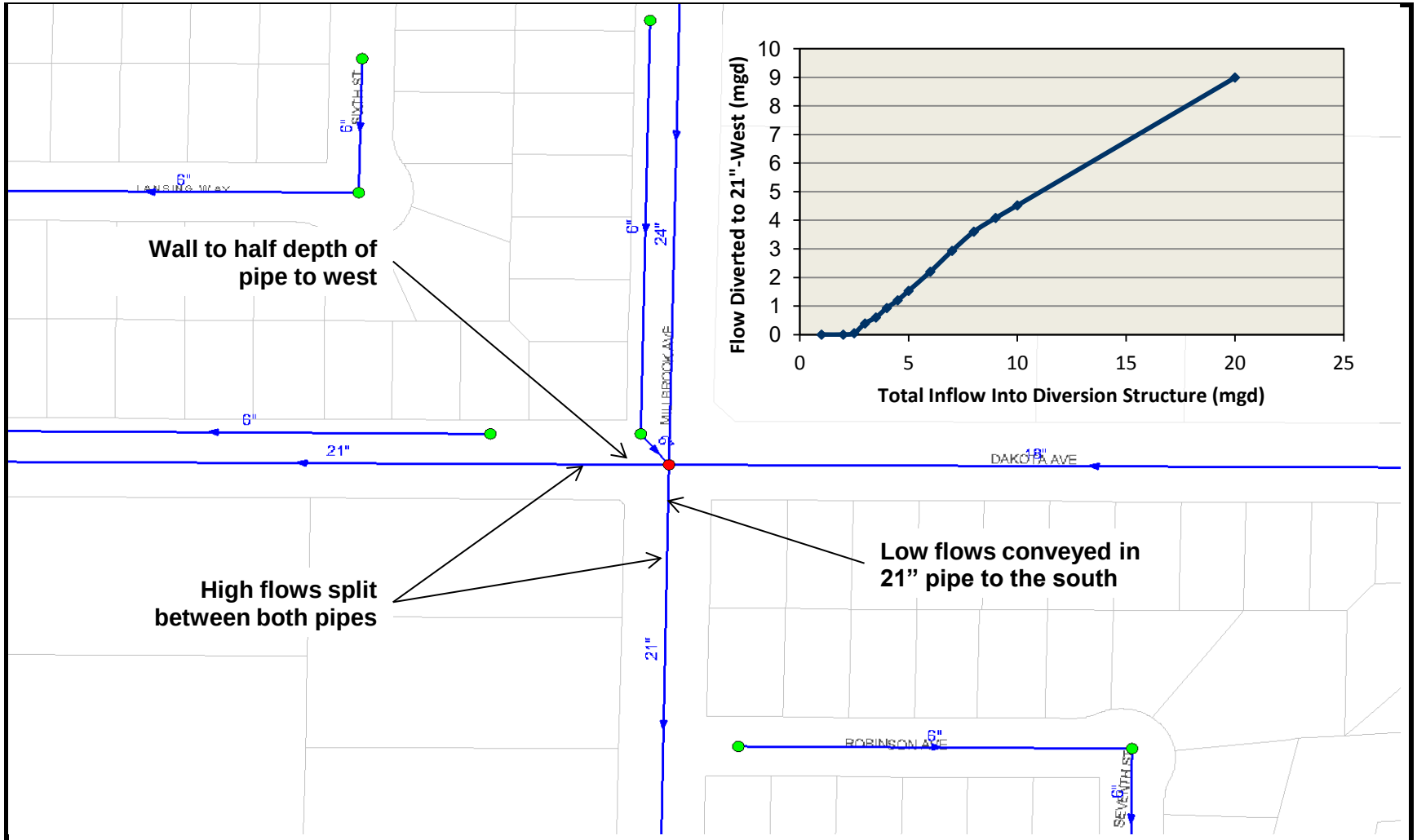


Figure 4.3
Dakota/Millbrook Diversion Curve
Wastewater Collection System Master Plan Update
City of Fresno

Table 4.5 Special Structures
Wastewater Collection System Master Plan
City of Fresno

Manhole ID	Location	Model ID	Structure Type	Flow Description	Reconn. Performed
2858-101	California Ave. and East Ave.	37421	This structure consists of a 60-inch standard manhole design with frame and cover, and channelized base.	Under average day conditions, all flow diverts east to the 30-inch pipe with an upstream invert elevation of 275.7 feet However, once the hydraulic grade line reaches 276.5 feet flow will split south to the 21-inch pipe.	
2952-49	Church Ave. and Fruit Ave.	39583	This structure is a cast-in-place, reinforced concrete structure with a channelized bottom, and the manhole risers are made of brick with cast iron covers.	Flow enters the structure from the east via two new 30-inch pipes. Currently, flow also enters from a 48-inch pipe from the south. Flow exits the structure through an existing 48-inch pipe to the west. The structure had options for installing 2"x12"x4'-4" redwood board gates on the 48- inch pipe exiting the structure; however, due to a blow-out in 2002 flow is no longer prohibited from exiting the structure and continuing westerly in Church Avenue. The structure was repaired in 2003, but the gate was not reinstated. A new gate will need to be constructed such that the flow can be diverted to the south in the 48-inch Fruit Avenue pipeline to North Avenue as originally conceived.	
3153-01	Jenson Ave. and Fruit Ave.	40580	This structure was constructed with reinforced, cast-in-place concrete. The structure has one 24"x 60" access manhole.	Currently, wastewater entering the structure from the north and east flows south in Fruit Avenue. The north and east are 48-inch pipelines and south is a 51-inch pipeline. There are channels provided to install a gate in this junction structure to block flow from going south to North Avenue, thus forcing flows north to West Church Avenue; however, gates are not currently installed. Therefore, no gates were modeled.	
3153-09	Jenson Ave. and Fruit Ave.		The structure has a standard manhole design with frame and cover for access.	Flow enters the structure from the easterly 48-inch pipeline and currently is diverted south to a 51-inch pipeline in South Fruit Avenue. Having since been plugged and abandoned, this structure was originally constructed with a 48-inch pipeline and radius bend to the north directing flow from West Jensen Avenue north in South Fruit Avenue to West Church Avenue. A 48-inch pipeline was also constructed with a radius bend to the south that allows flow from East Jensen Avenue to travel south in South Fruit Avenue when the gate described above for the structure at manhole 3153-01 is not in place. As mentioned above, this gate is currently not installed and flow is directed south in South Fruit Avenue to West North Avenue.	
3506-03	Jenson Ave. and Cherry Ave.	39753	This structure was constructed with reinforced, cast-inplace concrete. The structure has two 24"x 50" access manholes.	Flow entering the structure from the north and east is split to the south and west, respectively. The north and south pipelines are 48-inch pipes and the pipelines in the east and west directions are both 36-inch pipes. An existing manhole is located just outside the junction on the east and the 48-inch pipe passes through this manhole before entering the junction structure. There are notches provided to install gates in this junction structure for the east 48-inch pipe and the south 36-inch pipe; however, gates are not installed. Under average day conditions, approximately two-thirds of the wastewater flows west and the remaining one-third flows south.	X
3057-07	Highway 99 and South of Church Ave.	39851	This structure was constructed with reinforced, cast-in-place concrete. The structure has two 24"x 50" access manholes.	Flow enters the junction structure through a 6'x 3' single box sewer from the east. Currently, flow exits the structure to northwest and west by a 34" x 54" elliptical sewer and a 36-inch pipe, respectively. Under average day conditions, flow splits approximately in half between the two exiting pipes. There are notches provided to install gates in this junction structure for the northwest elliptical pipe and the west 36-inch pipe. However, gates are not currently in place.	X
2652-03	Whitesbridge Rd. at Fruit Ave.	33197	This structure was constructed with reinforced, cast-in-place concrete.	Flow enters the structure through a 42-inch pipe from the north and is split approximately in half between to the south and southwest into a 42-inch pipe and a 33-inch pipe respectively.	X
2957-22	Taylor Ave. and Church Ave.	39841	The structure was constructed with reinforced, cast-in-place concrete.	Flow enters the structure from the east via existing 27-inch and 30-inch pipes. Currently, flow exits the structure to the west through a 34" x 53" elliptical sewer pipe. The elliptical sewer pipe curves at a radius of 30 feet to the south into an existing manhole where a 6-inch pipe from the northwest connects. Flow is not split at this structure; the elliptical pipe and radius of this pipe are a unique feature of this collection system and is considered a special structure.	
1346-25	Herndon Ave. and Milburn Ave.	7780	The structure was constructed with reinforced, cast-in-place concrete. The interior concrete surfaces, except the floor of the structure, are lined with PVC.	Flow enters the junction structure from the north via an existing 45-inch pipe. The flow can be split to the southwest and south to 45-inch pipes. Flow is controlled using two 45" x 45" fabricated, stainless steel slide gates. A 24-inch PVC air jumper connects the junction structure with a manhole located to the west of the structure. Currently, the south slide gate is closed forcing all flow to the southwest into the Grantland Trunk.	X
1961-01	Ashlan Ave. and Sierra Vista Ave.	18338	Unknown	Currently, flow enters the structure from the north via a 12-inch pipe and splits approximately in half to the west and south into a 12-inch and a 15-inch pipe, respectively.	
2253-15	McKinley Ave. and Harrison Ave.	25677	This structure consists of a standard manhole design with frame and cover, and channelized base.	Under average day conditions, all the flow diverts west to the 21-inch pipe with an upstream invert elevation of 282.8 feet However, once the hydraulic grade line reaches 283.7 feet (0.8 ft depth) flow will split south to the 12-inch pipe.	X
2058-06	Dakota Ave. and Milbrook Ave.	19985	This structure is a cast-in-place, reinforced concrete structure with a a 42" diameter manhole cover.	Flow enters the structure from the north and east via a 24-inch and 18-inch pipe, respectively. Currently, flow is split approximately in half to the south and west through two 21-inch pipes.	X
2561-21	Chestnut Ave. and Washington Ave.	32321	The structure was constructed with reinforced, cast-in-place concrete.	Flow enters the structure from the north via a 42-inch pipe and can exit south and west into a 42-inch and 21-inch pipe, respectively. The majority of flow exits south in the 42-inch. Roughly a thrid of the flow is estimated to be conveyed in the 21-inch sewer.	X

4.2 HYDRAULIC MODEL UPDATE

A sewer collection system model is a simplified representation of the real sewer system. Sewer system models can assess the conveyance capacity for a collection system. In addition, sewer system models can perform "what if" scenarios to assess the impacts of future developments and land use changes. The City's collection system hydraulic model was constructed by City staff using a multi-step process utilizing data from a variety of sources.

As part of this Wastewater Collection System Master Plan Update (Master Plan Update) project, Carollo reviewed the existing hydraulic model, and updated/expanded upon certain aspects of the model. This section summarizes the hydraulic model review and update process.

4.2.1 Existing Hydraulic Model

The City's existing hydraulic model was built in-house using the City's current geographic information system (GIS) database. The hydraulic model was built using the H_2OMAP Sewer hydraulic modeling software package, developed by Innovyze (formerly MWH Soft). H_2OMAP Sewer tracks the movement of wastewater flowing through the network over an extended period of time under varying wastewater loading and operating conditions. The extended period simulation (EPS) model implemented in H_2OMAP Sewer is a quasi-dynamic model and is predicated on solving a simplified form of the full 1D Saint-Venant equations neglecting local acceleration. It provides seamless database and GIS interfacing and outputs features for presentations and reports.

The City's existing H_2OMAP Sewer model is an "all-pipe" model. In other words, the model includes all of the City's active wastewater collection system sewer mains, trunks, interceptors, and lift stations. Not included in the City's wastewater collection system hydraulic model are the City of Clovis collection system facilities, as well as other private collection system facilities (usually within County islands or other large facilities, such as the California State University Fresno (CSUF) campus or Pinedale).

The existing hydraulic model does include base wastewater loads (flows). However, these loads were reallocated and revised as part of the model update process.

4.2.2 Elements of the Hydraulic Model

The following provides a brief overview of the major elements of the City's hydraulic model and the required input parameters associated with each:

- **Loading Manholes**: Sewer manholes, cleanouts, as well as other locations where pipe sizes change or where pipelines intersect are represented by loading manholes in the hydraulic model. Required inputs for loading manholes include diameter, rim elevation, and wastewater loads (dry and wet weather). Loading manholes are also

used to represent locations where flows are split or diverted between two or more downstream links.

- **Chamber Manholes**: Chamber manholes connects pumps and force mains in the hydraulic model. The only required input parameter for a chamber manhole is elevation.
- **Gravity Mains**: Gravity sewers are represented as gravity mains in the hydraulic model. Input parameters for pipes include length, friction factor (i.e., Manning's n for gravity mains, Hazen Williams C for force mains), invert elevations, diameter, and a flow split type and percentage/curve (if the pipeline is directly downstream of an overflow/flow diversion).
- **Force Mains**: Force mains represent pressure sewers in the model. Required input parameters are diameter, invert elevations, length, and friction factor (i.e., Hazen Williams C).
- **Wet Wells**: Required input parameters for wet wells include invert elevation, wet well depth, cross section type (e.g., circular or variable area) and wet well cross section (e.g., diameter).
- **Pumps**: Pumps are included in the hydraulic model as links. Input parameters for pumps include type (fixed capacity, design point, or exponential 3 point curve), pump capacity/head information, and operational controls (on/off set points).
- **Outlets**: Outlets represent areas where flow leaves the system. For sewer system modeling, an outfall typically represents the connection to the influent pump station at a wastewater treatment plant.
- **Curves**: Curves represent a number of items in the hydraulic model, including rainfall hyetographs, flow split curves, and other miscellaneous items.
- **Inflows**: The following are the two types of wastewater flow sources that can be injected into individual model junctions:
  - Loads. Loads simulate base sanitary wastewater flows and represent the average flow. The base flows are multiplied by a pattern that varies the flow temporally. The base flow diurnal patterns are adjusted during the dry weather calibration process.
  - Stormwater Flows. Rainfall Derived Infiltration and Inflows (RDII) are applied in the model by assigning a unit hydrograph and a corresponding tributary area to a given loading manhole. The unit hydrographs consists of several parameters that are used to adjust the volume of RDII that enters the system at a given location. These parameters are adjusted during the wet weather calibration process.

4.2.3 General Model Review

In the early stages of the Master Plan Update project, Carollo worked closely with City Staff to gain an understanding of how the model was created. The model was then reviewed

against industry standards, to identify discrepancies, and to determine which aspects of the model could be improved upon.

The model review process consisted of several steps, as described below:

- **Step 1**: The first step involved in the model review process was to verify that the model data (i.e., inverts, diameters, etc.) were input correctly and that the flow direction, size, and layout of the modeled pipelines were logical. Additionally, the modeled lift stations were also checked to verify that they operated correctly.
- **Step 2**: Review which model nodes were associated with each significant industrial user (SIU) to verify that the flows associated each SIU are injected at the appropriate location in the model. For certain larger SIUs (e.g., Foster Farms, Beef Packers, Gallo), the industrial customer was contacted directly, as necessary, to verify their discharge point into the collection system and to obtain supplemental data.
- **Step 3**: Review pipeline connectivity to determine, in a general sense, how flows are routed through collection system basins, and to identify the locations of potential overflows.
- **Step 4**: Review the model/GIS facilities database to determine which portions of the existing City limits are currently served and which are not currently connected to the wastewater collection system.
- **Step 5**: Review the City's existing "master group polygons" (MGPs), which are used by the hydraulic model to allocate flows from specific parcels within the system to specific model nodes.
- **Step 6**: Review existing baseline wastewater flows in the existing hydraulic model to determine the need to develop new wastewater flow factors and reallocate the model.
- **Step 7**: Review other miscellaneous model parameters.

In general, the City's hydraulic model was constructed well and there were very few discrepancies with the physical configuration and invert elevations of the collection system facilities. However, there were some enhancements that were performed to the hydraulic model, which are summarized in the following sections.

4.2.4 Model Wastewater Loads

Determining the quantity of base wastewater flows generated by a municipality and how they are distributed throughout the collection system is a critical component of the hydraulic modeling process. Based on a review of the City's historical flow monitoring data (see Chapter 3) over the last few years, it was determined that the City's existing hydraulic model tended to overestimate wastewater flows into the collection system, in some cases by a significant amount. For this reason, it was determined that the model should be reallocated using revised wastewater flow factors.

Various techniques can be used to assign wastewater flows to individual model junctions, depending on the type of data that is available. Adequate estimates of the volume of

wastewater are important in maintaining and sizing sewer system facilities, both for present and future conditions. Baseline wastewater loads were allocated (assigned to specific nodes) in the hydraulic model based on land use data provided by the City and revised wastewater flow factors developed for each land use type (these are described in detail in Chapter 3). The flow coefficients and land use data provides a means to transform a specific land use category into a BWF, as described below:

- **Step 1**: The City's service area was broken up into individual loading polygons. The City's MGPs were used as the City's loading polygons. Each loading polygon represents the geographic area that contributes flows into a single model node (i.e., trunk system manhole). In an all pipe model, a loading polygon could be as small as a few parcels, or could encompass a particular subdivision or grouping of lots.

  In the case of the City, the MGPs were developed to allocate BWFs to "large diameter" pipes only (i.e., 10" and larger), and updating the MGPs to reassign individual loading polygons to small diameter pipes was beyond the scope of this Master Plan. For this reason, although the City's model is an "all pipe" model, there are only loads allocated to large diameter pipes. The City has indicated that it plans to revise the MGPs in house, at which point the model should be updated and reallocated, either in-house, or with the assistance or guidance of an outside consultant.

- **Step 2**: The loads were calculated for each loading polygon using the hydraulic model's "load allocator" tool by multiplying the appropriate flow coefficient by the land use acreage. Load = Land Use Area (ac) x Wastewater Flow Factor (gpd/ac) x conversion factor (mgd/gpd).

- **Step 3**: Once the load allocator tool assigns BWFs into the hydraulic model, the total flows were reviewed by type (i.e., residential vs. non-residential) to confirm that the load allocator functioned correctly.

- **Step 4**: The allocated loads were adjusted as necessary during the BWF calibration process (see Section 4.3.3) to closely match the actual BWFs recorded from the City's permanent flow monitoring data.

4.2.5 Model Scenarios

The City's existing hydraulic model contained only one scenario (the "BASE" scenario). As part of any master planning project, multiple scenarios are used to simulate different flow conditions, for both current flow conditions and future flow conditions. As part of the model update process, additional model scenarios were added. There are three model calibration scenarios, which usually are not modified by the end user after model calibration is complete. In addition, there are two "evaluation" scenarios for both existing and build out flow conditions. These are the peak dry weather flow (PDWF) condition, and the peak wet weather flow (PWWF) condition. These scenarios are used to identify system deficiencies and to develop capacity improvement projects, and can be used by the City in the future to

run several “what if” scenarios, such as the impact of new developments or land use changes.

4.2.6 Miscellaneous Model Updates

Several other additions/modifications were made to the hydraulic model as part of the model update process, including:

- Information fields were created in the model to identify which flow monitor a group of collection system facilities are associated with (e.g., FR01, FR02, etc.), and database queries/query sets were created for each flow monitoring basin.
- Custom diurnal patterns for each flow monitoring basin were created based on the flow data collected from the City’s permanent flow monitoring data. The custom diurnal patterns include both weekday and weekend flow conditions.
- Diurnal patterns for the City’s significant industrial users (SIU)s were updated based on available data to include both weekday and weekend flow conditions. For the build out scenario, SIU’s were modeled at their maximum permit capacity.
- Diurnal patterns for certain other large facilities (e.g., hospitals) were developed and applied based on typical hourly use patterns.
- Due to the limitations of the H_2OMAP Sewer hydraulic modeling package, the hydraulic grade line (HGL) calculations for flow diversions where an overflow pipe is significantly higher than the rim of the main downstream pipeline are inaccurate. An example of this condition is shown on Figure 4.4. Therefore, where an overflow pipeline was significantly higher than the rim of the main pipeline, and it was apparent that no flow would be diverted to the overflow pipeline, the overflow pipeline was deactivated in the model, similar to how loops have been deactivated in the existing hydraulic model. A selection set “Deactivated Overflows” was created to keep track of these the deactivated diversions. No pipelines were deactivated in the model that were deemed to be hydraulically significant. Should the City wish to include the inactivated pipelines, as well as the loops that had been previously deactivated, the City should consider converting to the H_2OMAP SWMM or InfoSWMM hydraulic modeling software platform.

4.3 MODEL CALIBRATION

Hydraulic models are built off the best available information regarding the physical attributes and operational conditions of the collection system, most of which are known to a reasonable level of confidence. Even so, there are a number of parameters that are not directly known and cannot be directly measured. For this reason, these parameters must be assumed initially based on typical values and engineering judgment. Every collection system is unique. For this reason, industry standard of care dictates that a model be validated to ensure that the assumptions built into the model are accurate. This validation process is commonly referred to as calibration.

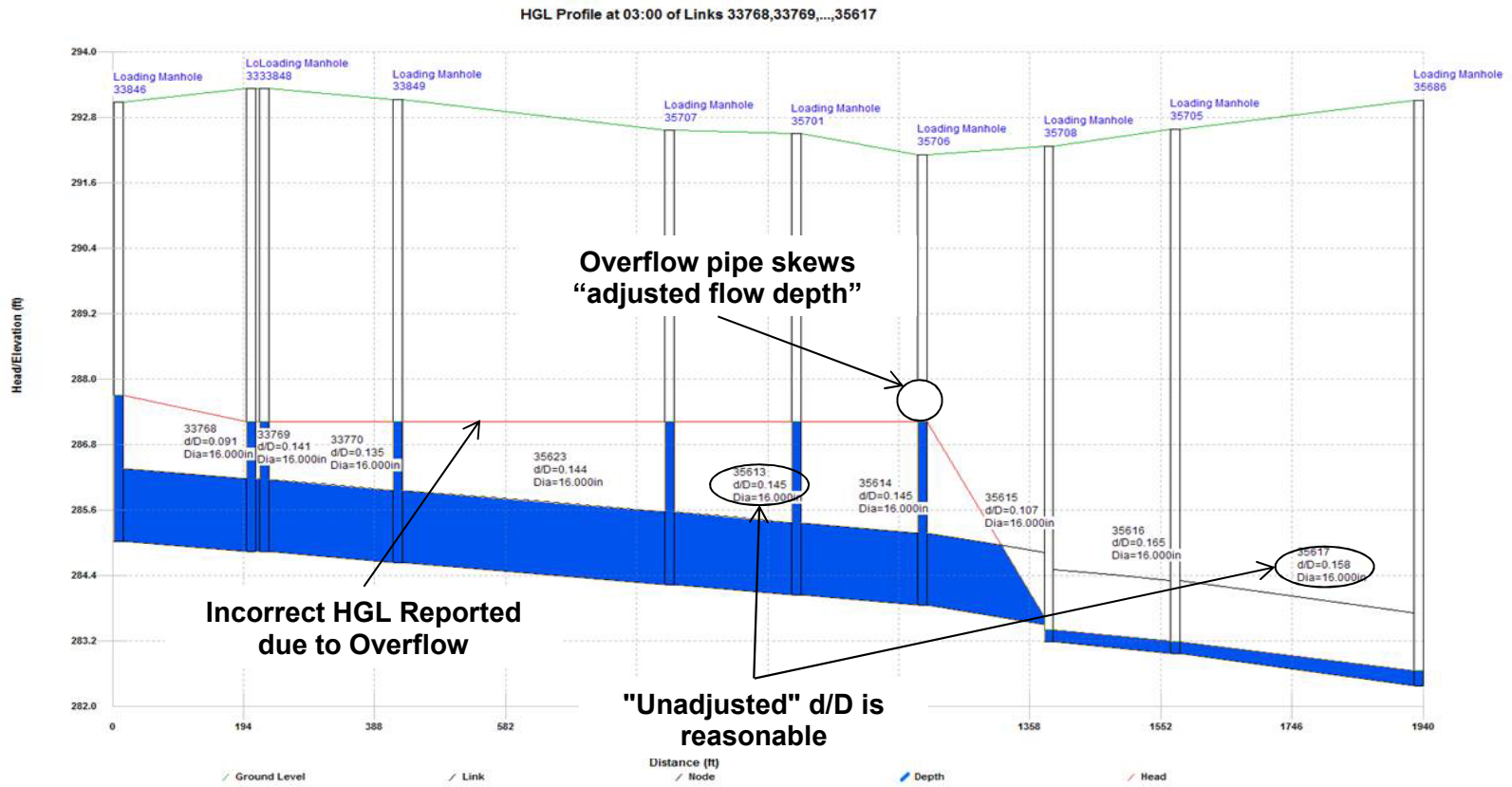


Figure 4.4
Example HGL Limitations for Overflow Pipelines in H_2OMAP Sewer
Wastewater Collection System Master Plan Update

The calibration process must be undertaken in any modeling effort. Having an appropriately calibrated model is necessary to provide confidence in all project team members and stakeholders that the results produced by the model are as accurate as possible and defensible.

A model cannot be considered calibrated unless it accurately represents flow conditions that have actually occurred, preferably in the very recent past. This dictates that the model include an "existing" model scenario, which represents the configuration and flow conditions that are currently experienced. Only after the model has been shown to accurately simulate these flow conditions can it be used to simulate hypothetical conditions, such as a design storm event or a build out flow condition.

The intended purpose of the model will dictate how the model is constructed and should be calibrated. For Fresno, flow conditions observed in the flow monitoring data and at the RWRF have demonstrated that it is necessary to calibrate to both dry weather and wet weather flow conditions. Model calibration of the City's collection system hydraulic model consisted of three main parts, a macro calibration, a base flow calibration, and wet weather flow calibration.

4.3.1 Calibration Standards

The hydraulic model was calibrated in accordance with international modeling standards. The Wastewater Planning Users Group (WaPUG), a section of the Chartered Institution of Water and Environmental Management, has established generally agreed upon principles for model verification. The base flow and wet weather calibration focused on meeting the recommendations on model verification contained in the "Code of Practice for the Hydraulic Modeling of Sewer Systems," published by the WaPUG (WaPUG 2002), as summarized below:

- **Base Wastewater Flow Calibration Standards**: Base flow calibration should be carried out for two base flow days and the modeled flows and depths should be compared to the field measured flows and depths. Both the modeled and field measured flow hydrographs should closely follow each other in both shape and magnitude.

  In addition to the shape, the flow hydrographs should also meet the following criteria as a general guide:

  – The timing of flow peaks and troughs should be within one hour.

  – The peak flow rate should be within the range of ±10 percent

  – The volume of flow (or the average rate of flow) should be within the range of ±10 percent. If applicable, care should be taken to exclude periods of missing or inaccurate data.

- **Wet Weather Calibration Standards**: The model simulated flows and depths should be compared to the field measured flows and depths. The flow hydrographs should

closely follow each other in both shape and magnitude, until the flow has substantially returned to dry weather flow rates.

In addition to the shape, the flow hydrographs should also meet the following criteria as a general guide:

– The timing of the peaks and troughs should be similar with regard to the duration of the events.

– The peak flow rates at significant peaks should be in the range of +25 percent to 15 percent and should be generally similar throughout.

– The volume of flow (or the average flow rate) should be within the range of +20 percent to -10 percent.

4.3.2 Macro Calibration

The initial calibration process consisted of a macro calibration. Initially, Carollo ran the model under existing BWF conditions and necessary adjustments were made to produce reasonable system flows. Such adjustments include modifications of pipeline connectivity, inverts, facility characteristics, and lift station characteristics.

4.3.3 Base Wastewater Flow Calibration

The BWF calibration process consists of several elements, as outlined below:

- **Divide the system into areas tributary to each flow meter**. The first step in the calibration process was to divide the City into flow meter tributary areas. Twenty-one tributary areas were created, one for each flow meter from the permanant flow monitoring program. A map showing the locations of each flow monitoring site and their associated tributary area are provided in Chapter 3 along with a schematic of the flow meters.
- **Define flow volumes within each area**. The next step was to define the flow volumes within each area, which was accomplished in the flow allocation step.
- **Create diurnal patterns to match the temporal distribution of flow**. A diurnal curve is a pattern of hourly multipliers that are applied to the base flow to simulate the variation in flow that occurs throughout the day. In order to match the flows throughout the week, a seven day diurnal pattern was established for each flow meter. The diurnal patterns were initially developed based on the flow monitoring data and adjusted as part of the calibration process until the model simulated flows closely matched the field measured flows. Figure 4.5 shows the calibrated weekday and weekend diurnal patterns for the area tributary to Site FR06. Similar diurnal curves were developed for each of the meters and its tributary area. These additional curves are available in Appendix B.

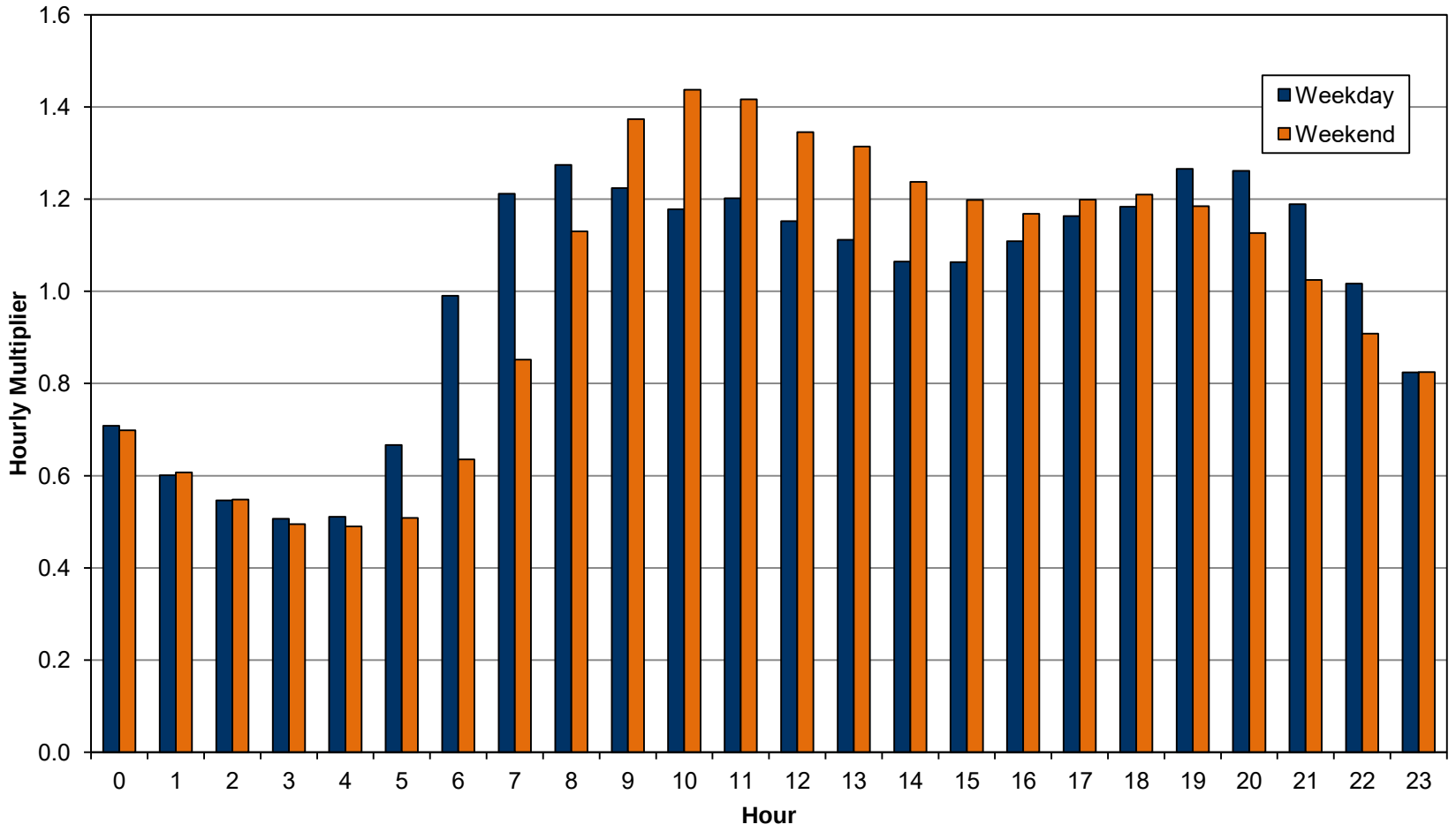


Figure 4.5

Example Diurnal Patterns (Meter FR06)
Wastewater Collection System Master Plan Update
City of Fresno

- **Adjust model variables to match field measured velocity and flow depths**. Once the model simulated flows acceptably matched the field measured flows, the model simulated velocity and flow depth were compared to the field measured velocity and flow depth. Adjustments were made to various model parameters until the modeled and measured velocity and depth closely matched one another. The primary varied parameters for this process are pipeline roughness (Manning's n) and sediment build up in the pipe, although other parameters can also be adjusted as calibration results are generated.

  Manning's roughness coefficients, or n values, have industry accepted ranges based on a number of variables. Roughness coefficients increase over time depending on the construction methods, installation quality, system maintenance, and other environmental factors. There can be certain factors within the City's collection system that can result in roughness coefficients which differ from the typical range. For example, pipeline bellies, joint misalignment, cracks, and debris (e.g., root intrusion, etc.) lead to increased turbulence in a pipe, as well as the apparent Manning's n factor.

  If the model is unable to reasonably match the field measured flow depth and velocity without leaving the acceptable range of Manning's roughness coefficients, further investigation is conducted to help determine the cause of the discrepancy. Some issues that could cause such a discrepancy can include errors in the slope or diameter of a pipeline, downstream blockages, pipeline sags, and, in some cases, influences from downstream lift station operations. This method was not needed on any of the City's current flow metering points to match flows.

Table 4.6 provides a summary of the BWF calibration using the average and daily peak flow results for both weekday and weekend conditions. As shown in Table 4.6, with the exception of Meter FR24 (which was only very slightly above 10-percent), the model simulated average and peak flows for both weekday and weekend BWF were all within 10-percent. The flow monitoring data associated with meter FR24 was limited and somewhat questionable, so a percent error of only slightly greater than 10-percent was deemed acceptable for this meter.

Appendix B contains a detailed BWF calibration summary sheet for each of the 21 meter sites. Each calibration sheet provides plots that compare the model simulated and field measured flow, velocity, and level data for both weekday and weekend conditions. An example of the dry weather calibration for Site FR06 is shown on Figure 4.6. As shown on Figure 4.6 and in Appendix B, there is excellent overall correlation of the field measured data to the model output results.

4.3.4 Wet Weather Flow Calibration

The WWF calibration enables the hydraulic model to accurately simulate I/I entering the collection system during a large storm. As outlined below, the WWF calibration process consists of several elements:

Table 4.6 BWF Calibration Summary
Wastewater Collection System Master Plan Update
City of Fresno

		Weekday Base Wastewater Flow												Weekend Base Wastewater Flow										Base Wastewater Flow[4]		
		Measured Data[1]				Modeled Data[2]				Percent Error[3]				Measured Data[1]				Modeled Data[2]				Percent Error[3]						
Meter Number	Pipe Diameter (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Measured BWF (mgd)	Modeled BWF (mgd)	Percent Difference (%)
FR01	45	3.701	5.507	3.36	9.3	3.704	5.212	3.06	10.0	0.1%	-5.4%	-8.9%	7.1%	3.904	5.939	3.39	9.5	3.927	5.766	3.09	10.2	0.6%	-2.9%	-8.7%	7.3%	3.759	3.768	0.2%
FR02	45	8.049	10.996	3.52	15.9	7.726	10.331	3.59	15.1	-4.0%	-6.0%	2.0%	-4.5%	8.135	12.465	3.51	15.9	7.777	11.659	3.57	15.1	-4.4%	-6.5%	1.7%	-4.9%	8.074	7.741	-4.1%
FR06	36	4.132	5.207	2.59	14.2	4.131	5.050	2.57	13.6	0.0%	-3.0%	-0.7%	-4.0%	4.089	5.758	2.54	14.2	4.118	5.630	2.56	13.5	0.7%	-2.2%	1.1%	-4.7%	4.120	4.128	0.2%
FR08	48	7.661	9.894	4.59	12.3	7.672	10.070	4.24	13.0	0.2%	1.8%	-7.7%	5.9%	7.131	9.883	4.52	11.7	7.336	10.727	4.16	12.6	2.9%	8.5%	-7.8%	8.1%	7.509	7.576	0.9%
FR09	39	5.025	6.285	3.41	12.8	4.860	6.020	3.23	12.4	-3.3%	-4.2%	-5.4%	-2.8%	4.673	6.466	3.31	12.3	4.556	6.325	3.16	12.0	-2.5%	-2.2%	-4.5%	-2.8%	4.925	4.773	-3.1%
FR10	0	1.491	2.750	1.16	10.4	1.464	2.697	1.19	10.3	-1.8%	-1.9%	2.3%	-1.4%	1.496	3.201	1.11	10.0	1.469	3.103	1.15	10.0	-1.8%	-3.1%	3.4%	-0.7%	1.492	1.465	-1.8%
FR11	66	3.582	5.199	2.23	10.3	3.609	4.851	2.16	10.8	0.8%	-6.7%	-3.3%	4.3%	3.483	5.471	2.24	10.0	3.665	5.539	2.16	10.7	5.2%	1.2%	-3.7%	7.0%	3.554	3.625	2.0%
FR12	33	1.578	2.513	1.89	8.6	1.579	2.502	1.93	8.5	0.0%	-0.4%	1.9%	-1.6%	1.590	2.673	1.84	8.7	1.592	2.671	1.91	8.4	0.1%	-0.1%	3.9%	-2.9%	1.582	1.582	0.0%
FR13	51	8.526	10.118	3.29	15.8	8.329	9.611	3.31	16.2	-2.3%	-5.0%	0.6%	2.3%	7.951	10.072	3.24	15.2	7.902	9.556	3.26	15.7	-0.6%	-5.1%	0.6%	3.6%	8.362	8.207	-1.9%
FR14	36	4.058	4.998	2.40	14.4	4.022	4.819	2.25	14.8	-0.9%	-3.6%	-6.1%	2.9%	4.017	5.367	2.39	14.3	3.762	4.806	2.21	14.2	-6.3%	-10.4%	-7.8%	-0.1%	4.046	3.948	-2.4%
FR15	48	6.194	7.184	2.19	18.2	6.071	6.949	2.25	17.5	-2.0%	-3.3%	2.7%	-3.5%	5.939	7.337	2.17	17.7	5.850	7.075	2.22	17.2	-1.5%	-3.6%	2.5%	-3.1%	6.121	6.008	-1.9%
FR16	30	3.724	4.692	3.34	11.5	3.702	4.463	3.26	11.5	-0.6%	-4.9%	-2.5%	0.3%	3.708	5.104	3.32	11.5	3.667	4.664	3.24	11.4	-1.1%	-8.6%	-2.3%	-0.5%	3.720	3.692	-0.7%
FR19	66	23.147	27.598	4.52	24.1	23.071	27.048	4.89	22.7	-0.3%	-2.0%	8.2%	-5.8%	20.907	26.800	4.35	22.8	22.057	28.163	4.81	22.1	5.5%	5.1%	10.6%	-3.2%	22.507	22.781	1.2%
FR20	66	29.854	34.806	4.60	28.6	26.961	31.643	4.71	26.2	-9.7%	-9.1%	2.3%	-8.3%	26.650	34.503	4.48	26.6	25.500	31.954	4.62	25.4	-4.3%	-7.4%	3.1%	-4.6%	28.939	26.544	-8.3%
FR21	42	4.403	5.596	2.11	15.3	4.451	5.716	2.11	15.4	1.1%	2.1%	0.0%	0.9%	4.454	6.167	2.10	15.4	4.541	6.199	2.11	15.6	1.9%	0.5%	0.7%	0.7%	4.418	4.477	1.3%
FR22	45	7.461	9.611	2.90	17.5	7.471	9.230	2.88	17.5	0.1%	-4.0%	-0.8%	0.0%	7.615	10.754	2.90	17.6	7.650	10.427	2.88	17.6	0.5%	-3.0%	-0.5%	0.1%	7.505	7.522	0.2%
FR23	27	1.251	1.638	2.08	7.5	1.262	1.521	2.20	7.4	0.9%	-7.2%	5.5%	-1.5%	0.762	1.032	1.94	5.5	0.827	1.469	1.93	5.9	8.5%	42.4%	-0.6%	7.6%	1.111	1.138	2.4%
FR24	72	8.120	10.599	2.60	16.1	8.987	11.826	2.63	17.3	10.7%	11.6%	0.9%	7.5%	8.216	11.913	2.61	16.1	9.103	13.093	2.63	17.3	10.8%	9.9%	0.8%	7.5%	8.147	9.021	10.7%
FR25	15	0.082	0.121	1.11	2.1	0.082	0.121	1.12	2.1	0.1%	0.1%	1.1%	1.0%	0.079	0.134	1.12	2.0	0.079	0.134	1.10	2.1	0.2%	-0.1%	-2.0%	3.0%	0.081	0.081	0.1%
FR26	0	0.190	0.311	0.92	4.9	0.192	0.308	0.91	5.1	1.4%	-1.0%	-1.1%	2.6%	0.195	0.321	0.93	5.0	0.198	0.322	0.91	5.1	1.3%	0.4%	-1.9%	3.3%	0.191	0.194	1.3%
FR27	27	1.900	2.558	1.82	12.1	1.900	2.546	1.86	11.1	0.0%	-0.5%	2.6%	-8.4%	1.935	2.786	1.86	12.1	1.935	2.783	1.86	11.2	0.0%	-0.1%	0.1%	-7.4%	1.910	1.910	0.0%

Notes:

1. Source: City of Fresno Permanent Flow Monitoring Data
2. Average flow, level, and velocity are calculated from weekday/weekend dry weather flow monitoring data. Maximum flow values are hourly peaks corresponding to either weekend or weekday confitions, as appropriate.
3. Percent Difference = (Modeled - Measured)/Measured*100.
4. Base Wastewater Flow = (5*Weekday Base Wastewater Flow + 2*Weekend Base Wastewater Flow)/7

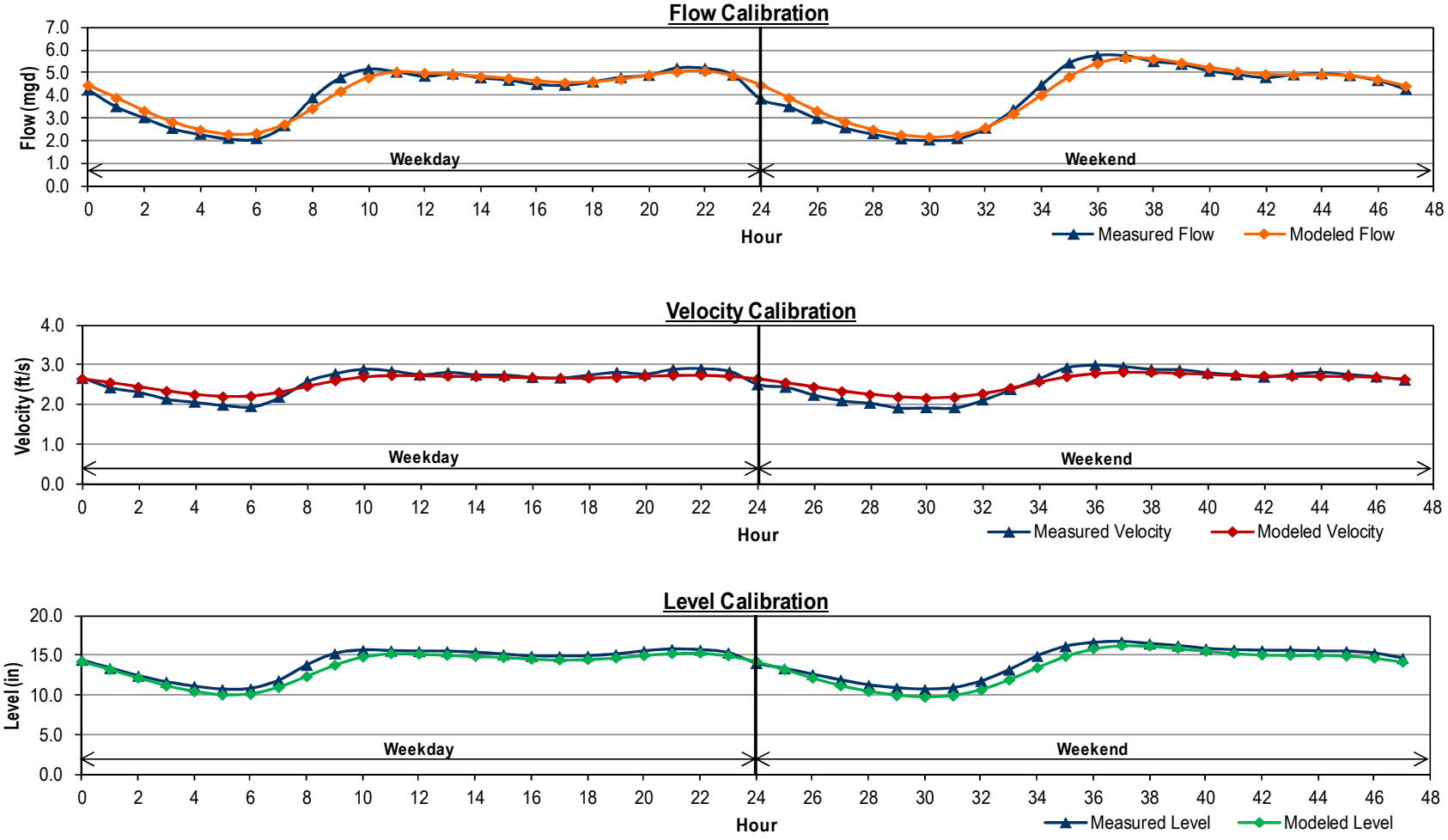


Figure 4.6

Example BWF Calibration (Meter FR06)
Wastewater Collection System Master Plan Update
City of Fresno

- **Identify calibration rainfall events**. The WWF calibration process consists of running model simulations of historic rainfall events based on data from the City's permanent flow monitoring program. The goal of any wet weather flow monitoring program is to capture and characterize a system's response to a significant rainfall event, preferably during wet antecedent moisture conditions. In the case of the City, although there is permanent flow monitoring data available, there were significant data gaps in recent years, and so selection of a calibration rainfall event was limited to periods of time in which sufficient data were available.

  The selection of a particular calibration storm or group of storms is based on a review of the flow and rainfall data. In the case of the City, the most significant event in recent years with sufficient data availability to perform an adequate WWF calibration occurred in April 2012, and therefore this storm was used as the basis for WWF calibration. As a validation of the April 2012 WWF calibration, the model was validated to a series of rainfall events that occurred in March 2011 for sites where data was available, and to the hourly influent flow data at the RWRF.

  In order to run a model simulation for the both of these rainfall events, the hourly rainfall data were input into the model for these events. Each flow monitoring tributary area, or basin, was assigned a specific rainfall hyetograph, which was calculated for each basin based on available historic rainfall data.

- **Define RDII tributary areas**. For the WWF calibration, RDII flows are superimposed on top of the BWF. RDII inflows consist of both a unit hydrograph and the total area that is tributary to the model node. The RDII tributary areas were calculated in GIS using the City's loading polygons (MGPs), excluding any large vacant, open space, or other areas in the system which are not expected to contribute to I/I into the collection system. The tributary area provides a means to transform hourly rainfall depth from the rainfall hyetographs into a rainfall volume. The rainfall volume is transformed into actual RDII flows using the unit hydrograph, as described in the next step.

- **Create I/I parameter database and modify to match field measured flows**. The main step in the WWF calibration process involves creating custom unit hydrographs for each flow monitoring tributary area using the "RTK Method," which is widely used in collection system master planning. Using the RTK Method, the RDII unit hydrograph is the summation of three separate triangular hydrographs (short term, medium term, and long term), which are each defined by three parameters: R, T, and K. R represents the fraction of rainfall over the sewer shed that enters the collection system; T represents the time to peak of the hydrograph; and K represents the ratio of time to recession to the time to peak. Therefore, there are a total of nine separate variables associated with each unit hydrograph. Figure 4.7 shows the shape of an example unit hydrograph.

  The hydrographs utilize the R-Values (percent of rainfall that enters the collection system) calculated for each basin to simulate I/I. The nine variables in each unit hydrograph were initially set based on engineering judgment and then adjusted until the model simulated flows (both peak flows and average flows) matched closely with the field measured flows.

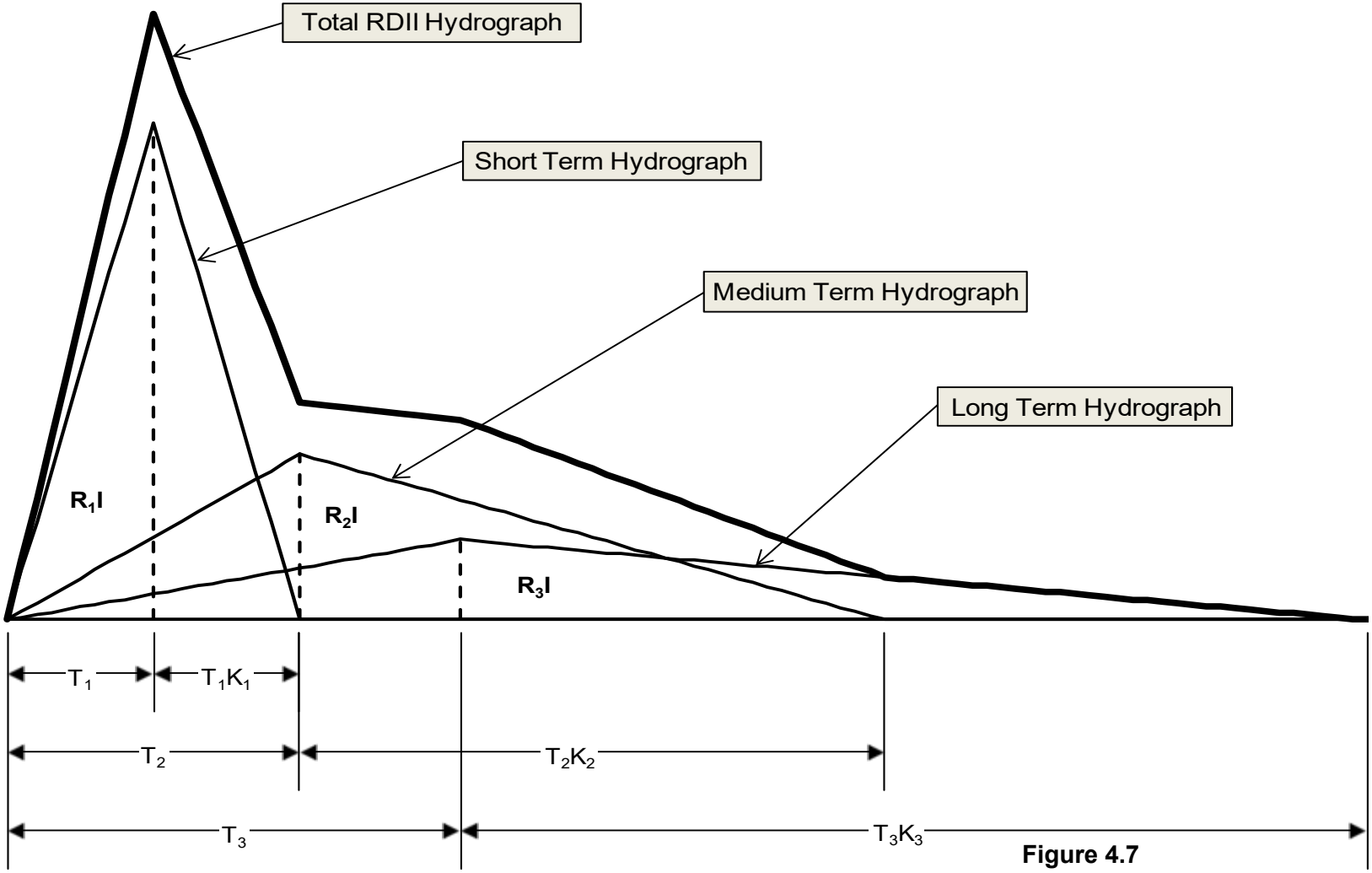


Figure 4.7

Example RDII Unit Hydrograph
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City of Fresno

As with the dry weather calibration, the wet weather calibration process compared the meter data with the model output. Comparisons were made for average and peak flows as well as the temporal distribution of flow until flows returned to their baseline levels. According to the WaPUG, a hydraulic model is generally considered to be satisfactorily calibrated to WWF conditions if the modeled peak flows are within +25 percent to -15 percent of the field measured data, and if the average modeled flows are within +20 percent to -10 percent of the field measured data.

- **Refine model variables to match field measured velocity and flow depths**. After the model was considered to be satisfactorily calibrated for wet weather flows, the model simulated velocities and flow depths were checked against the field measured velocities and flow depths during the calibration storms. Refinements were made to the various model parameters so that the modeled and measured velocity and depth closely matched one another. If any adjustments were made to Manning's n-values or other parameters, the BWF calibration was rechecked as well to make sure that the flow depth and velocities still matched well under BWF conditions.

Appendix C contains a detailed wet weather flow calibration summary sheet for each of the 21 meter sites. Each calibration sheet provides plots that compare the model simulated and field measured flow, velocity, and level data for the calibration storms. An example of the wet weather calibration for Site FR06 is shown on Figure 4.8. Table 4.7 provides a summary of the wet weather flow calibration using the average and peak flow results. Additionally, Figure 4.9 and Figure 4.10 show a comparison of the modeled and measured flows at the RWRF influent pump station for the April 2012 and March 2011 storms, respectively.

It should be noted that there is a considerable amount of I/I contributed into the collection system in Basin 23 (see Figure 4.11). This basin is relatively small and receives a significant amount of flow from Gallo, an SIU.

For this reason, flow data from Gallo was obtained for the April 2012 storm event. Based on a review of this data, it was confirmed that the majority of the observed I/I flow from Basin 23 appears to be associated with the Gallo property (see Appendix C). Furthermore, the amount of flow observed in Basin 23 during the April 2012 storm event would suggest that under PWWF conditions, there will be significant capacity deficiencies cause immediately downstream of Gallo. For this reason, it is recommended that the City investigate the cause of the excessive rates of I/I associated with the Gallo property, and work with Gallo to identify possible solutions to address the issue.

As shown on Table 4.7, the model simulated average and peak flows at all meter sites were within the acceptable tolerances for at least two of the three calibration storms, and therefore the model was considered calibrated and ready to use for capacity analysis purposes.

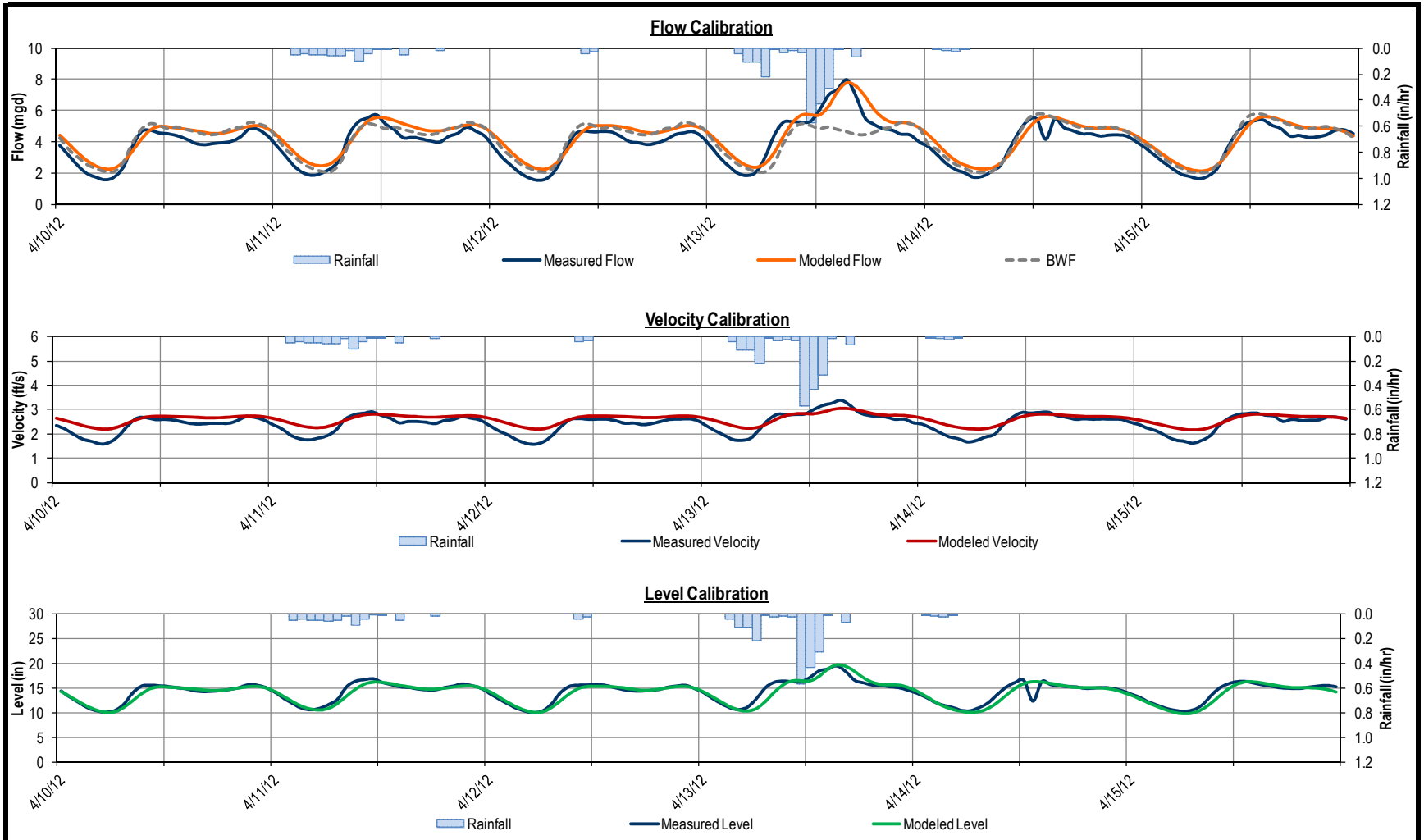


Figure 4.8
Example WWF Calibration (Meter FR06)
Wastewater Collection System Master Plan Update
City of Fresno

Table 4.7 WWF Calibration Sumnmary
Wastewater Collection System Master Plan Update
City of Fresno

		April 13-14, 2012 Storm Event												March 20-21, 2011 Storm Event											
		Measured Data[1]				Modeled Data[2]				Percent Error[3]				Measured Data[1]				Modeled Data[2]				Percent Error[3]			
Meter Number	Pipe Diameter (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)
FR01	45	3.60	5.50	3.40	9.07	4.08	5.81	3.14	10.46	13.2%	5.5%	-7.6%	15.4%	4.14	6.64	3.52	9.69	4.28	6.44	3.19	10.72	3.4%	-3.0%	-9.6%	10.7%
FR02	45	8.86	12.72	3.58	16.78	8.64	13.32	3.67	15.98	-2.5%	4.8%	2.6%	-4.7%	8.02	13.11	3.22	16.67	8.51	13.68	3.67	15.89	6.1%	4.4%	13.8%	-4.7%
FR06	36	4.24	7.99	2.52	14.58	4.57	7.80	2.63	14.33	7.8%	-2.3%	4.5%	-1.7%	--	--	--	--	--	--	--	--	--	--	--	--
FR08	48	Note 4	Note 4	Note 4	Note 4	9.47	15.58	4.46	14.35	Note 4	Note 4	Note 4	Note 4	--	--	--	--	--	--	--	--	--	--	--	--
FR09	39	--	--	--	--	5.73	9.77	3.36	13.48	n/a	n/a	n/a	n/a	--	--	--	--	--	--	--	--	--	--	--	--
FR10	0	1.33	2.98	1.19	8.22	1.68	3.26	1.23	10.99	26.1%	9.1%	2.9%	33.7%	--	--	--	--	--	--	--	--	--	--	--	--
FR11	66	--	--	--	--	4.16	6.22	2.24	11.45	n/a	n/a	n/a	n/a	--	--	--	--	--	--	--	--	--	--	--	--
FR12	33	1.79	4.58	1.89	9.28	2.07	4.65	2.06	9.64	15.6%	1.5%	8.7%	3.8%	2.11	3.82	1.95	10.32	2.09	3.85	2.08	9.75	-0.9%	0.6%	6.6%	-5.5%
FR13	51	--	--	--	--	9.28	14.37	3.40	17.04	n/a	n/a	n/a	n/a	10.26	14.43	3.54	17.09	9.62	12.90	3.44	17.40	-6.3%	-10.6%	-2.7%	1.8%
FR14	36	4.36	6.79	2.11	16.88	4.64	7.90	2.32	15.98	6.4%	16.3%	9.7%	-5.3%	--	--	--	--	--	--	--	--	--	--	--	--
FR15	48	6.33	8.27	2.14	18.79	6.57	9.51	2.29	18.25	3.7%	14.9%	6.8%	-2.9%	7.57	11.22	2.36	19.89	7.03	9.87	2.33	18.94	-7.2%	-12.0%	-1.4%	-4.8%
FR16	30	4.13	6.43	3.29	12.56	4.17	7.46	3.35	12.23	0.8%	16.0%	1.9%	-2.7%	3.91	6.18	3.18	12.24	4.24	5.87	3.37	12.37	8.3%	-4.9%	6.0%	1.1%
FR19	66	22.98	34.12	5.46	20.79	25.38	37.23	4.99	23.80	10.4%	9.1%	-8.6%	14.5%	--	--	--	--	--	--	--	--	--	--	--	--
FR20	66	Note 4	Note 4	Note 4	Note 4	31.07	47.74	4.86	28.24	Note 4	Note 4	Note 4	Note 4	--	--	--	--	--	--	--	--	--	--	--	--
FR21	42	5.49	9.33	2.13	17.91	5.24	9.03	2.18	16.76	-4.5%	-3.3%	2.5%	-6.4%	--	--	--	--	--	--	--	--	--	--	--	--
FR22	45	8.46	12.88	3.02	18.56	8.55	13.45	2.96	18.74	1.1%	4.5%	-1.7%	0.9%	--	--	--	--	--	--	--	--	--	--	--	--
FR23	27	1.46	5.03	2.01	8.22	1.73	4.52	2.29	8.37	18.6%	-10.0%	14.0%	1.8%	--	--	--	--	--	--	--	--	--	--	--	--
FR24	72	Note 4	Note 4	Note 4	Note 4	10.32	15.57	2.72	18.42	Note 4	Note 4	Note 4	Note 4	--	--	--	--	--	--	--	--	--	--	--	--
FR25	15	0.12	0.32	1.26	2.48	0.11	0.33	1.22	2.48	-3.4%	3.5%	-3.1%	-0.1%	--	--	--	--	--	--	--	--	--	--	--	--
FR26	0	0.22	0.67	0.93	5.28	0.25	0.66	0.95	5.91	14.8%	-1.5%	2.0%	11.9%	--	--	--	--	--	--	--	--	--	--	--	--
FR27	27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
1. Source: City of Fresno Permanent Flow Monitoring Data
2. Average flow, level, and velocity are calculated from weekday/weekend dry weather flow monitoring data.
3. Base Wastewater Flow = (5*Weekday Base Wastewater Flow + 2*Weekend Base Wastewater Flow)/7
4. "--" indicates that data were not available. "Note 4" indicates that data were available, but with data gaps.

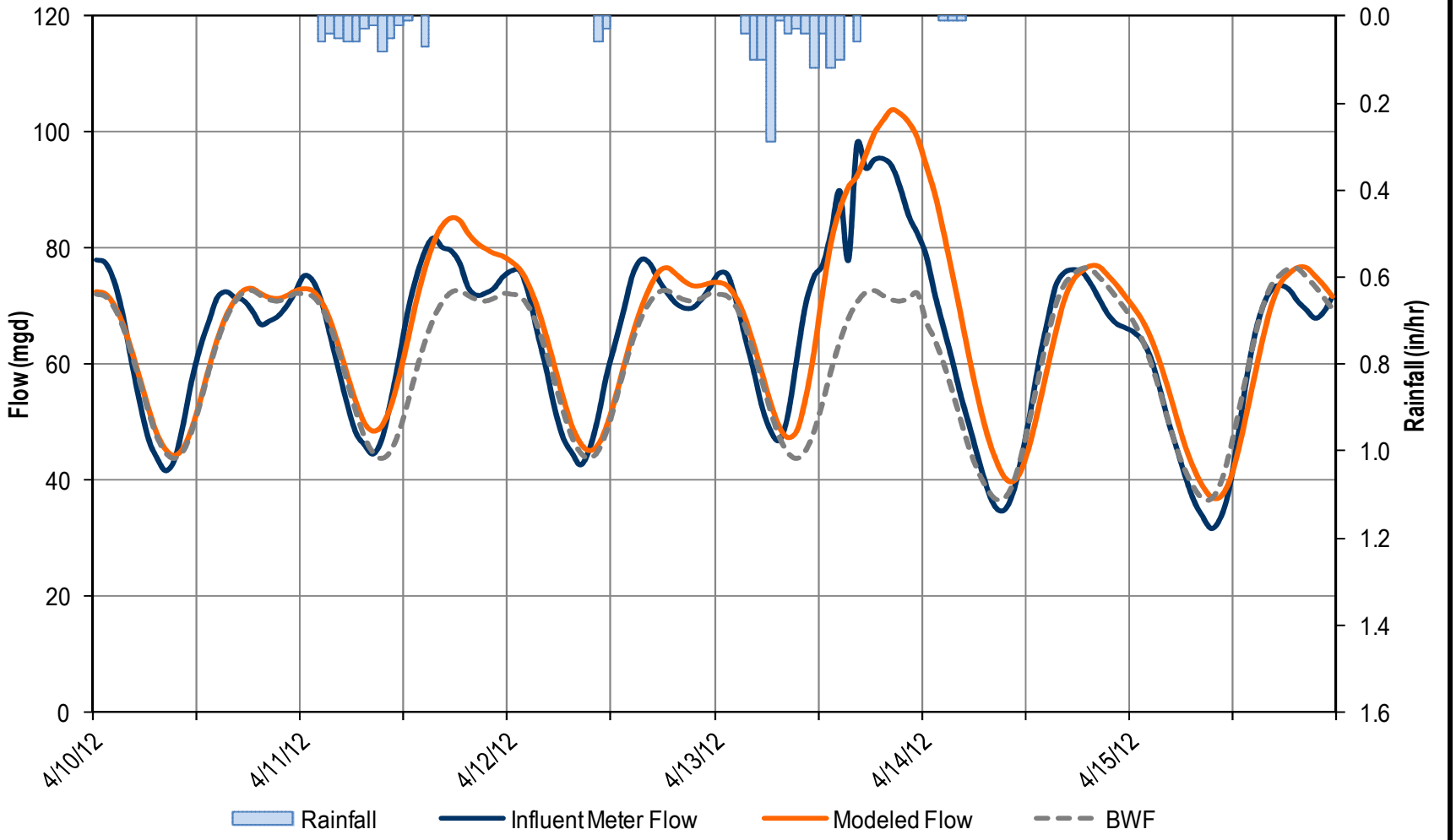


Figure 4.9
RWRF WWF Calibration (April 2012)
Wastewater Collection System Master Plan Update
City of Fresno

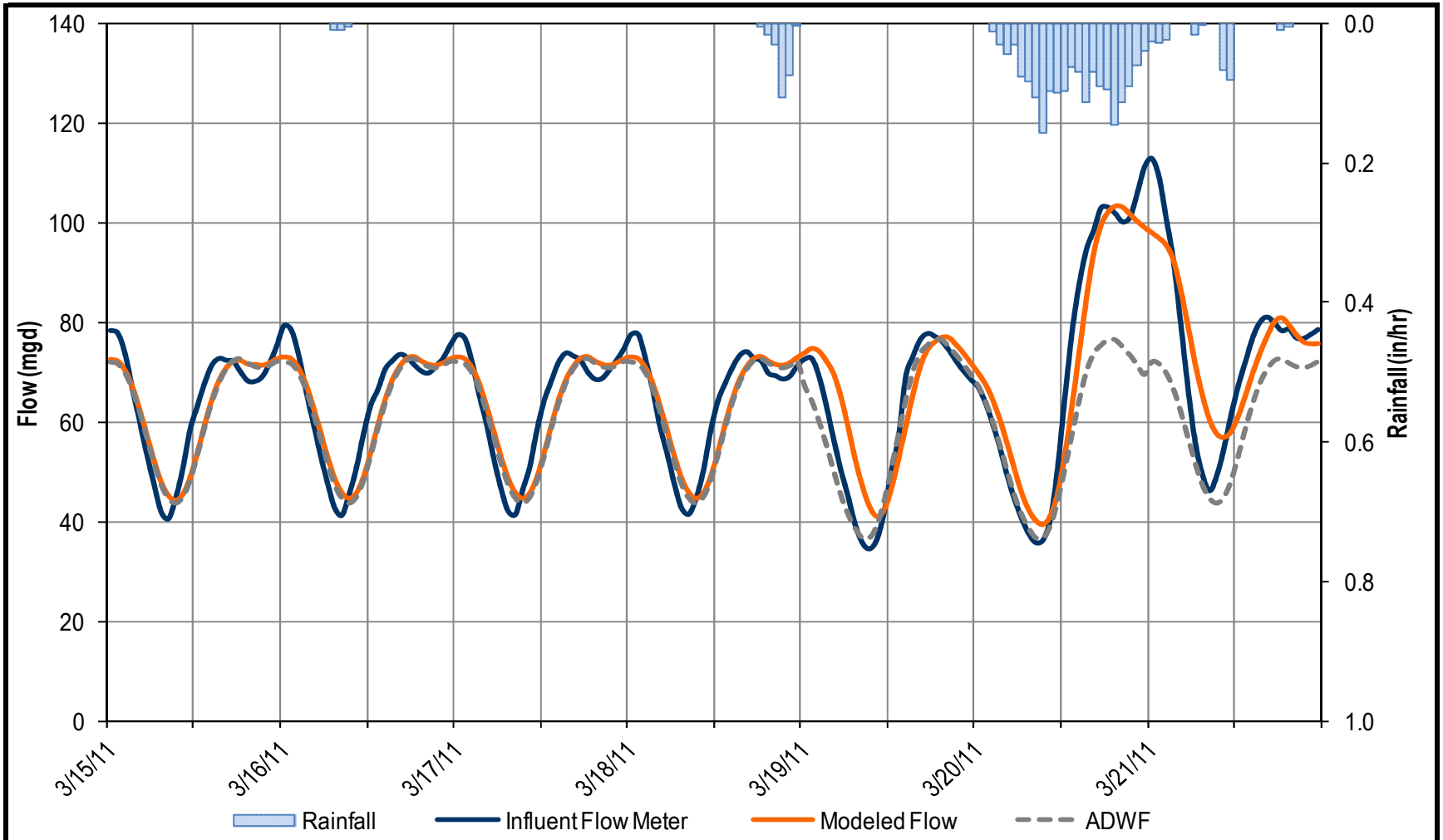


Figure 4.10

RWRF WWF Calibration (March 2011)
Wastewater Collection System Master Plan Update
City of Fresno

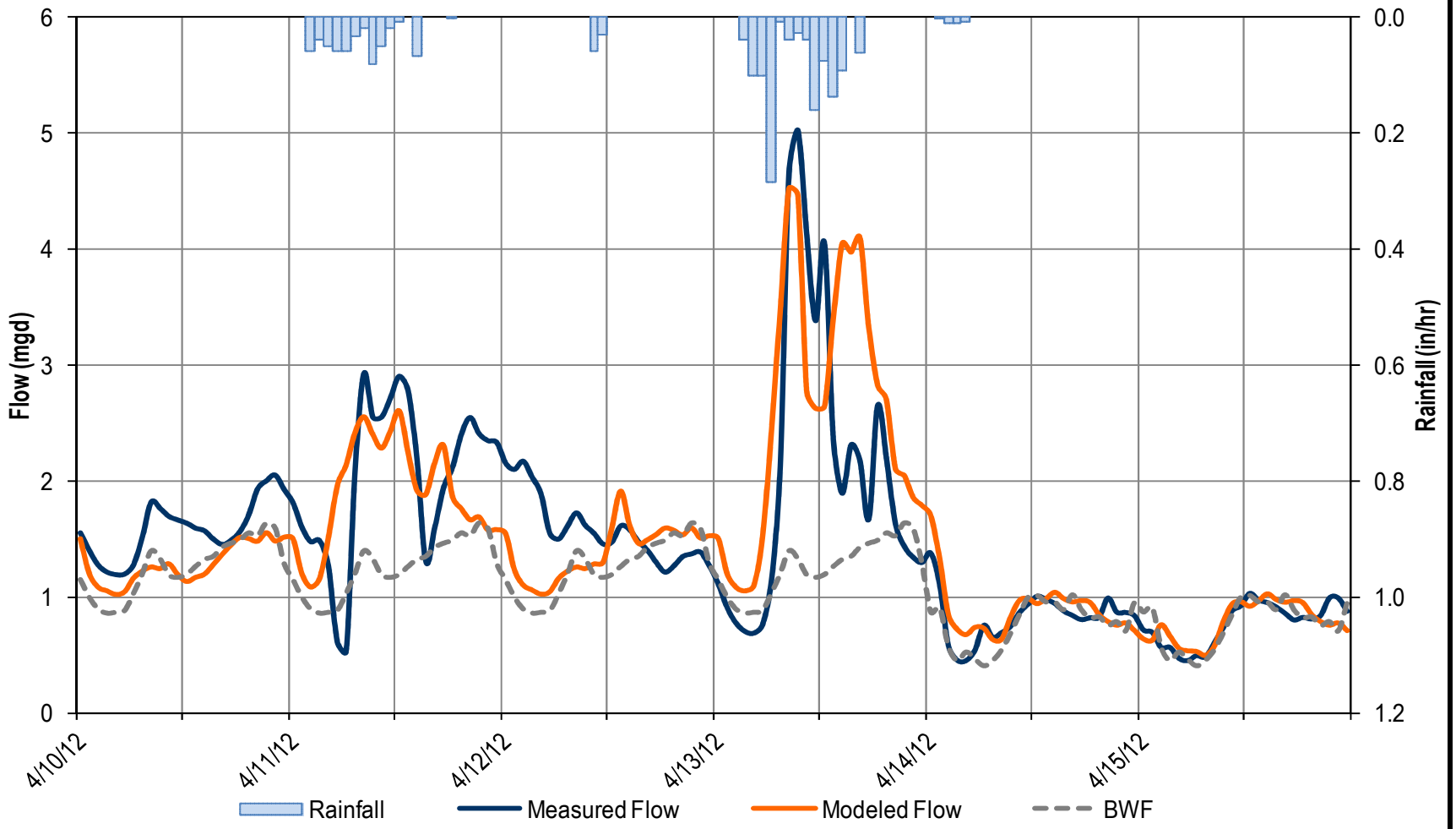


Figure 4.11
WWF Calibration for Meter 23
Wastewater Collection System Master Plan Update
City of Fresno

4.3.5 Model Calibration Summary

As documented in this section, there is excellent agreement between the field measured and hydraulic model simulated flows, depths, and velocities under both BWF and WWF conditions, and meets the generally accepted standards used to determine the adequacy of model calibration, according to the WaPUG. For this reason, the model is considered calibrated.

Chapter 5

PLANNING CRITERIA AND DESIGN FLOWS

The capacity of the City of Fresno's (City's) wastewater collection system was evaluated based on the planning criteria defined in this chapter. The planning criteria address the collection system capacity, gravity sewer pipe slopes, and maximum allowable depth of flow within a sewer. This chapter also summarizes the existing and build out design flows.

5.1 GRAVITY SEWERS

Gravity sewer pipe capacities are dependent on many factors. The factors include roughness of the pipe, the chosen maximum allowable depth of flow downstream, and limiting velocity and slope. The following sections describe the factors that account for the determination of existing and future pipeline capacities in the City's collection system.

5.1.1 Manning Coefficient (n)

The manning coefficient 'n' is a friction coefficient that varies with respect to pipe material, size of pipe, depth of flow, smoothness of joints, root intrusion, and other factors. For sewer pipes, the manning coefficient typically ranges between 0.011 and 0.017, with 0.013 being a representative value used for system planning purposes. For this study, the existing manning's coefficients provided in the hydraulic model were used, and then refined as necessary during model calibration to accurately simulated field measured levels and velocities.

5.1.2 Peak Flow Criteria

The primary criteria used to identify capacity deficient sewers or to size new sewer improvements are the maximum flow depth to pipe diameter ratio (d/D), as well as the peak flow to pipe capacity ratio (q/Q). The d/D value is defined as the depth of flow (d) in a pipe during peak (design) flow conditions divided by the pipe's diameter (D). The q/Q is defined as the maximum flow rate in a pipe (q) divided by the maximum flow capacity of the pipe (Q). Based on Carollo Engineers, Inc's (Carollo's) experience, City staff input, and industry standards, the following criteria were used:

- **Flow Depth for Existing Sewers.** Peak flow criteria for existing sanitary sewers are established based on a number of factors, including the acceptable risk tolerance of the utility, local standards and codes, and other factors. Using a conservative criterion for evaluating existing sewers may lead to unnecessary replacement of existing pipelines. Conversely, lenient criteria could increase the risk of sanitary sewer overflows (SSOs). Ultimately, the maximum allowable peak flow criteria should be established to be as cost effective as possible while at the same time reducing the risk of SSOs to the greatest extent possible.

For Fresno, it was decided that a maximum q/Q ratio of 1.15 would be used to identify capacity deficient sewers. In other words, a pipeline was considered capacity deficient if the peak flow is 15-percent over capacity.

- **Flow Depth for New Sewers.** When designing sewer pipelines, it is common practice to adopt variable flow depth criteria for various pipe sizes. Design d/D ratios typically range from 0.5 to 0.92, with the lower values typically used for smaller pipes, which may experience flow peaks greater than design flow or blockages from debris, paper, or rags. Table 5.1 summarizes the criteria for the evaluation of existing sewers and for sizing new trunk lines. For pipelines less than 12-inches in diameter the max d/D value is 0.5 or 50 percent of the pipeline depth. Pipelines 12- to 18-inches in diameter, the max d/D is 0.67, and for pipelines larger than 18-inches in diameter the maximum d/D value is 0.75.

Table 5.1 Maximum Flow Depth Criteria
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Maximum Flow Depth for Existing Sewers	
Peak Wet Weather Flow:	Maximum q/Q = 1.15
Maximum d/D for New Sewers	
Pipe Diameter (inches)	Maximum d/D Ratio (during Peak Flows)
Less than 12	0.50
12 to 18	0.67
Larger than 18	0.75

5.1.3 Design Velocities and Minimum Slopes

In order to minimize the settlement of sewage solids, it is standard practice in the design of gravity sewers to specify that a minimum velocity of two feet per second (ft/s) be maintained when the pipeline is half-full. At this velocity, the sewer flow will typically provide self cleaning for the pipe. Due to hydraulics of a circular conduit, velocity of half-full flow in pipes approaches the velocity of nearly full flow in pipes.

Table 5.2 lists the recommended minimum slopes and their corresponding maximum flows for maintaining self-cleaning velocities (equal to or greater than two ft/s) when the pipe is flowing at its maximum depth (d/D ratio).

Table 5.2 Minimum Slope for New Pipes Wastewater Collection System Master Plan Update City of Fresno			
Pipe Diameter (inches)	Minimum Slope[1][2] (feet/feet)	Calculated Flow at Maximum d/D[2][3]	
		d/D	Maximum Flow (mgd)
6	0.0050	0.50	0.127
8	0.0033	0.50	0.226
10	0.0025	0.50	0.353
12	0.0019	0.67	0.796
15	0.0014	0.67	1.24
18	0.0011	0.67	1.79
21	0.0009	0.75	2.84
24	0.0008	0.75	3.70
27	0.0007	0.75	4.68
30	0.0006	0.75	5.79
36	0.0006	0.75	9.65
42	0.0006	0.75	14.56

Notes:
(1) Recommended minimum slope for flows at a velocity greater than or equal to 2 ft/s.
(2) Manning's n = 0.013
(3) Calculated flow is determined using the minimum slope and maximum allowable d/D from Table 3.1.

5.1.4 Changes in Pipe Size

When a smaller sewer joins a large one, the invert of the larger sewer should be lowered sufficiently to maintain the same energy gradient. An approximate method for securing these results is to place the 0.8 depth point of both sewers at the same elevation. For planning purposes and designing new pipes, and in the absence of field data, sewer crowns are typically matched at the manholes.

5.2 LIFT STATIONS AND FORCE MAINS

Industry standard practice is to require that sewage lift stations have sufficient capacity to pump the Peak Dry Weather Flow (PDWF) and Peak Wet Weather Flow (PWWF) (whichever is greater) with the largest pump out of service (firm capacity).

Force main piping should be sized to provide a minimum velocity of 3 ft/s at the design flow rate of the lift station and no more than 8 ft/s. For the determination of head loss, the Hazen

Williams Equation is used with a C-factor of 110. These factors are typical for sewer system master planning purposes.

5.3 DESIGN FLOWS

This section summarizes the historic flows measured at the Fresno-Clovis Regional Wastewater Reclamation Facility (RWRF) and presents the calculation of the design flows used to model the existing and future sewer collection system.

5.3.1 Historic RWRF Flows

In addition to the flow monitoring data (summarized in Chapter 3), this project reviewed historical influent flow data at the RWRF from 2008 to 2012 to help establish wastewater flow criteria.

Flow data from January 2008 through December 2012 are summarized in Table 5.3. Table 5.3 lists the average flow at the RWRF for each month from 2007 through 2012. In addition, Table 5.3 summarizes the annual average flow (i.e., the average day flow) and the base wastewater flow (BWF) for each of those years. Flows at the plant have declined since 2008, due to economic conditions, and possibly increased water conservation. Therefore, based on a review of the historical flow data at the RWRF, the years 2010 through 2012 were determined to be the most appropriate time period to define the "existing" flow condition. As shown in Table 5.3, the annual average flow ranged from 63.2 million gallons per day (mgd) in 2012 to 68.8 mgd in 2008, with a three-year average of 64.7 mgd. The BWF (defined as the average flow during the months of November through July) ranged from 62.6 mgd in 2012 to 68.1 mgd in 2008, with a three year average of 64.1 mgd. For this study, the existing BWF was defined as the three year BWF, which is equal to 64.1 mgd.

5.3.2 Wastewater Unit Flow Factors

In order to develop wastewater flow projections and allocate future flows to the collection system, relationships between land use and wastewater generation were developed. These relationships, called wastewater flow factors are established based on the average wastewater flow generated for each existing land use type. The land use flow coefficients were established to project the estimated BWF through build out of the City's general plan boundary.

Unit flow factors provide a means to estimate flow per acre for each land use category. Wastewater unit flow factors are expressed in gallons per day per acre (gpd/ac), applied to land use acreage for calculating average day flow generated from a particular land use. A unit flow factor was developed for each of the City's existing land use classifications. The resulting flow was entered in the sewer system hydraulic model.

Table 5.3 Historical RWRF Flows
Wastewater Collection System Master Plan Update
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Month	RWRF Influent Flow[(1)] (mgd)					5-Year Average (2008-2012)	3-Year Average (2010-2012)
	2008	2009	2010	2011	2012		
January	70.0	66.2	62.9	65.9	62.4	65.5	63.7
February	67.4	66.8	64.8	65.1	64.1	65.6	64.7
March	66.0	65.3	64.7	64.2	62.1	64.5	63.7
April	66.8	65.1	66.1	63.1	62.0	64.6	63.7
May	67.5	65.5	64.8	63.3	62.2	64.7	63.4
June	68.7	66.5	65.3	64.3	63.1	65.6	64.2
July	69.7	65.6	65.7	63.5	62.8	65.5	64.0
August	70.7	66.0	67.5	65.3	65.3	67.0	66.0
September	71.6	66.9	68.9	66.5	64.6	67.7	66.6
October	70.9	67.3	68.7	65.9	64.9	67.5	66.5
November	68.7	64.2	67.8	64.8	62.5	65.6	65.0
December	67.6	64.0	68.7	62.8	61.8	65.0	64.4
Average Annual Flow	**68.8**	**65.8**	**66.3**	**64.6**	**63.2**	**65.7**	**64.7**
BWF (Nov.-July)	**68.1**	**65.5**	**65.6**	**64.1**	**62.6**	**65.2**	**64.1**
Minimum Month Flow	**66.0**	**64.0**	**62.9**	**62.8**	**61.8**	**63.5**	**62.5**
Maximum Month Flow	**71.6**	**67.3**	**68.9**	**66.5**	**65.3**	**67.9**	**66.9**

Notes:
(1) Source: City influent metering records.

Flow factors for residential areas typically range between 250 to 4,000 gallons per day per acre (gpd/ac), and commercial and industrial areas may range from 600 to 3,000 gpd/ac or higher. Open space land uses were assumed to generate negligible amounts of sewage flow. The factors were developed using the following procedure:

- Average flows for each flow metering tributary area were derived from the flow monitoring data (see Chapter 3).
- Flows associated with each of the City's existing significant industrial users (SIU)s were identified based on meter data provided by the City. A summary of the average flows associated with each SIU is provided in Appendix D. Each SIU was assigned to the appropriate flow metering tributary area and its average flows were subtracted

from the average flows measured during the flow monitoring period. Flows associated with the SIUs were input into the model as “point loads”.

- Using Geographic Information Systems (GIS), the acres for each existing land use type contained in each flow monitoring tributary area were calculated, excluding the SIU areas and vacant areas. According to City staff, the City’s vacant land shape file was is out of date. For this reason, Carollo examined and revised the City’s vacant land use database by comparing the vacant land shape file against a recent aerial photograph.
- Preliminary flow factors for each land use type are estimated based on the approximate number of dwelling units per acre, the assumed per capita wastewater generation rates, and the typical number of people per dwelling unit for each land use type.
- The flow factors for each flow metering tributary were then adjusted up or down (balanced) so that the calculated average flows from each tributary match what was measured from the flow monitoring data.
- Once the flow factors for each of the flowmeter tributary areas were balanced, the weighted average of the coefficients for each existing land use type was calculated based on the acreage contribution from each metering tributary area.

The calibrated wastewater flow factors developed for existing land uses are summarized in Table 5.4. A wastewater flow balance was performed to test the accuracy of the flow factor estimates. As with most cities throughout California, residential land use makes up the majority of developed land and wastewater flow. For Fresno, residential customers within the City proper (excluding Clovis) make up approximately 63 percent of the current flow (40.2 million gallons per day [mgd]). Additionally, Fresno’s industrial sector also makes up a significant portion of the City’s current flow. Industrial customers account for 17 percent of the current BWF (11.3 mgd) and a greater percentage in the summer months when industrial flows increase. The City of Clovis flows currently account for 8 percent of the existing flow (5.1 mgd), although the City of Clovis is entitled to discharge up to roughly 8.9 mgd. Commercial customers account for roughly 6 percent of the current flow (3.8 mgd), and other land uses, such as public land use areas, account for the remaining 5 percent of current flow (3.4 mgd).

Table 5.4 Wastewater Flow Balance
Wastewater Collection System Master Plan Update
City of Fresno

Land Use Classification	Current Sewer Service Area and Existing Land Use		
	Wastewater Flow Factor (gpd/ac)	Land Use Area (acre)	Base Wastewater Flow (gpd)
Residential			
Rural Density	250	1,216	0.30
Low Density (1-3 DU/acre)	600	1,138	0.68
Medium Low Density (3.5 -6 DU/acre)	900	10,361	9.33
Medium Density (5-12 DU/acre)	1,700	11,143	18.94
Medium High Density (12-16 DU/acre)	2,800	2,039	5.71
High Density (30-45 DU/acre)	4,000	1,316	5.26
Subtotal		**27,212**	**40.2**
Commercial			
Community	800	604	0.48
General Heavy	950	1,054	1.00
Neighborhood	1,660	569	1.06
Neighborhood Limited	1,410	3	0.94
Office	1,000	1,057	0.00
Professional Services Office	800	100	0.08
Regional	800	218	0.17
Recreational	600	119	0.07
Storage Limited	0	44	0.00
Subtotal		**3,768**	**3.8**
Public Facilities			
Airport	300	1,065	0.32
College	0	151	0.00
High school	700	475	0.33
Elementary School and High School	700	141	0.10
Middle School	700	233	0.16
Elementary School and Middle School	700	188	0.13
Elementary School	700	735	0.51
Special School	700	42	0.03
Cemetery	0	165	0.00
Church	500	545	0.27
Community Activity Center	850	8	0.01
Neighborhood Center	1,000	5	0.00
Convention Center	850	17	0.01
Fairgounds	500	90	0.04
Fire Station	850	14	0.01
Government Offices	1,000	141	0.14
County Court House Central Area	1,500	14	0.02
Hospital	4,000	137	0.55
Medical Center	3,000	10	0.03
Convalescent Hospital	3,000	64	0.19
Military	850	60	0.05
Mobile Home Park	500	388	0.19
Municipal Service Center	1,300	37	0.05
Post Office	1,200	23	0.03
Public Facility	1,200	21	0.03
Public/Quasi-Public Facility	850	43	0.04
Pump Station	0	44	0.00
Subtotal		**4,854**	**3.3**
Open Space			
Open Space	0	60	0.00
Recreational Use/Clear Zone	0	16	0.00
Ag	0	233	0.00
Canal	0	38	0.00
Community Park	0	28	0.00
Golf Course	150	597	0.09
Lake or Pond	0	54	0.00
Multi-Use	0	101	0.00
Neighborhood Park	0	212	0.00
Recreational Park	0	59	0.00
Recreational Use	0	12	0.00
Regional Park	0	154	0.00
Parking	0	78	0.00
Pg&e Substation	500	117	0.06
Ponding Basin	0	407	0.00
Ponding Basin/Park	0	108	0.00
Subtotal		**2,281**	**0.1**
Other			
Roads/ Canals/ Highways		16,545	0.00
Vacant	0	2,303	0.00
Subtotal		**18,848**	**0.0**
Industrial/Clovis			
Light Industrial	620	2,979	1.85
Heavy Industrial	1,160	1,291	1.50
Metered Industrial Users	-	-	7.95
City of Clovis	-	-	5.12
Subtotal		**4,270**	**16.4**
Total			
Total	**--**	**61,234**	**63.9**

5.3.3 Existing and Projected Base Wastewater Flow

Developing an accurate estimate of the future quantity of wastewater generated at build out of the collections system is an important step in maintaining and sizing sewer system facilities, for both existing conditions and future developments. In general, the future BWF for build out of the study area was determined by multiplying the wastewater flow factors by the projected land use acreage.

As noted in Chapter 2, the City's General Plan land use can be broken down into "Areas of Change" and "Areas of Stability." Areas of Change are generally defined as areas that contribute to a net increase in wastewater flow in the future, and include densification areas (i.e., Downtown, and densification corridors), infill areas (i.e., development of vacant parcels), and new growth areas (i.e., expansion of the wastewater service area). Wastewater flows associated with the "Areas of Change" were estimated to be 71.8 mgd, which was estimated by multiplying the appropriate wastewater unit flow factor by the land use acreage identified in Table 5.5.

Areas of Stability include the remaining land use areas within the existing sewer service area. The existing BWF associated with these "Areas of Stability" is estimated to be approximately 46.6 mgd, which includes 8.2 mgd of flow from the existing metered industrial customers, but not including the City of Clovis. City of Clovis flows at build out were assumed to be equal to their maximum permit capacity, as well as 3 mgd of additional flow associated with the future Leonard Trunk. In total, the City of Clovis wastewater flows are assumed to be 11.9 mgd at build out.

As shown in Table 5.5, the build out BWF is projected to be approximately 129.9 mgd.

5.3.4 Existing and Project PDWF

The PDWF is the highest hourly flow that occurs during dry weather conditions. In Fresno, the PDWF condition occurs in the late summer when industry is discharging at its maximum rate. Based on a review of the historical RWRF flow data (see Table 5.3), the highest monthly flow rate at the RWRF between 2010 and 2012 was 68.9 mgd (September 2010). The existing PDWF was derived throughout the system based on the hydraulic modeling results. For the PDWF model run, model flows were increased for each SIU based on the maximum monthly flow for each user (see Appendix C), and the remaining flows were scaled up to match 68.9 mgd (daily average flow). In addition, for the PDWF scenario, the City of Clovis flows were set to their maximum permitted discharge rates. From the modeling results, the existing PDWF is estimated to be 88.5 mgd. The build out PDWF was generated using this approach. At build out, the PDWF is estimated to increase to 164.7 mgd.

Table 5.5 Future BWF Projections
Wastewater Collection System Master Plan Update
City of Fresno

Land Use Type	Wastewater Flow Coefficient (gpd/ac)	Land Use Area Totals				BWF by Land Use Type			
		Current Service Area		New Growth Areas (acres)	Total (acres)	Current Service Area		New Growth Areas (mgd)	Total (mgd)
		Infill (acres)	Redevelopment (acres)			Infill (mgd)	Redevelopment (mgd)		
Residential									
Low Density (1-3 DU/acre)	600	75	0	5,089	5,164	0.0	0.0	3.1	**3.1**
Medium Low Density (3.5 -6 DU/acre)	900	191	4	2,226	2,421	0.2	0.0	2.0	**2.2**
Medium Density (5-12 DU/acre)	1,700	264	29	6,990	7,282	0.4	0.0	11.9	**12.4**
Medium High Density (12-16 DU/acre)	2,800	89	16	531	636	0.2	0.0	1.5	**1.8**
Urban Neighborhood (16-30 DU/acre)	3,500	63	121	2,001	2,184	0.2	0.4	7.0	**7.6**
High Density (30-45 DU/acre)	4,000	9	20	252	281	0.0	0.1	1.0	**1.1**
Commercial									
Main Street	800	4	67	0	72	0.0	0.1	0.0	**0.1**
Community	800	106	507	436	1,050	0.1	0.4	0.3	**0.8**
Recreation	500	0	0	8	8	0.0	0.0	0.0	**0.0**
General	950	73	0	75	147	0.1	0.0	0.1	**0.1**
Highway and Auto	950	31	50	169	250	0.0	0.0	0.2	**0.2**
Regional	800	8	136	186	331	0.0	0.1	0.1	**0.3**
Employment									
Office	1,000	217	5	226	448	0.2	0.0	0.2	**0.4**
Business Park	800	12	63	743	817	0.0	0.1	0.6	**0.7**
Regional Business Park	800	28	126	1,662	1,817	0.0	0.1	1.3	**1.5**
Light Industrial	620	362	2	1,781	2,145	0.2	0.0	1.1	**1.3**
Heavy Industrial	5,000	148	7	2,368	2,522	0.7	0.0	11.8	**12.6**
Mixed Use									
Corridor/Center Mixed Use	2,800	78	1,139	829	2,046	0.2	3.2	2.3	**5.7**
Regional Mixed Use	3,300	19	613	321	952	0.1	2.0	1.1	**3.1**
Neighborhood Mixed Use	2,300	3	112	15	131	0.0	0.3	0.0	**0.3**
Open Space									
Clear Zone	0	2	0	4	7	0.0	0.0	0.0	**0.0**
Commercial-Recreational	0	1	0	0	1	0.0	0.0	0.0	**0.0**
Community Park	0	0	0	40	41	0.0	0.0	0.0	**0.0**
Flood Control Project	0	0	0	0	0	0.0	0.0	0.0	**0.0**
Golf Course	150	8	0	418	426	0.0	0.0	0.1	**0.1**
Lake, Pond	0	0	0	32	32	0.0	0.0	0.0	**0.0**
Multi-Use	0	46	0	2,053	2,098	0.0	0.0	0.0	**0.0**
Neighborhood Park	0	17	0	61	79	0.0	0.0	0.0	**0.0**
Outdoor Environmental Education Area	0	0	0	0	0	0.0	0.0	0.0	**0.0**
Open Space	0	0	0	339	339	0.0	0.0	0.0	**0.0**
Park	0	11	12	1,441	1,464	0.0	0.0	0.0	**0.0**
Ponding Basin	0	0	0	894	894	0.0	0.0	0.0	**0.0**
Ponding Basin (Park Use)	0	0	15	0	15	0.0	0.0	0.0	**0.0**
Regional Park	0	44	43	642	729	0.0	0.0	0.0	**0.0**
Public Facilities									
Public/Quasi-Public Facility	850	47	88	535	670	0.0	0.1	0.5	**0.6**
Special School	700	0	0	0	0	0.0	0.0	0.0	**0.0**
Elementary School	700	4	12	236	252	0.0	0.0	0.2	**0.2**
Elementary & Middle School	700	0	0	0	0	0.0	0.0	0.0	**0.0**
Elementary, Middle, & High School	700	0	0	0	0	0.0	0.0	0.0	**0.0**
Middle School	700	0	17	115	132	0.0	0.0	0.1	**0.1**
High School	700	0	0	0	0	0.0	0.0	0.0	**0.0**
College	700	8	0	0	8	0.0	0.0	0.0	**0.0**
School with Park	700	0	0	596	596	0.0	0.0	0.4	**0.4**
Airport	300	0	0	86	86	0.0	0.0	0.0	**0.0**
Cemetary	0	0	0	61	61	0.0	0.0	0.0	**0.0**
Church	500	12	24	22	58	0.0	0.0	0.0	**0.0**
Community Activity Center	850	0	0	0	0	0.0	0.0	0.0	**0.0**
Convalescent Hospital	3,000	0	0	0	0	0.0	0.0	0.0	**0.0**
Fairgrounds	500	0	0	0	0	0.0	0.0	0.0	**0.0**
Fire Station	850	0	0	0	0	0.0	0.0	0.0	**0.0**
Government Offices	1,000	0	0	0	0	0.0	0.0	0.0	**0.0**
Hospital	4,000	0	0	0	0	0.0	0.0	0.0	**0.0**
Medical Center	3,000	0	0	0	0	0.0	0.0	0.0	**0.0**
Neighborhood Center	1,000	0	0	0	0	0.0	0.0	0.0	**0.0**
PG&E Substation	500	0	0	34	34	0.0	0.0	0.0	**0.0**
Police Dressing Station	1,200	0	0	0	0	0.0	0.0	0.0	**0.0**
Water Recharge Basin	0	0	0	288	288	0.0	0.0	0.0	**0.0**
Wastewater Treatment Facility	0	0	0	0	0	0.0	0.0	0.0	**0.0**
Buffer									
Buffer (Ag)	50	0	0	736	736	0.0	0.0	0.0	**0.0**
Downtown									
Central Business District	7,900	23	244	0	267	0.2	1.9	0.0	**2.1**
Civic Center	4,000	0	37	0	37	0.0	0.1	0.0	**0.1**
Town Center	5,200	1	54	0	55	0.0	0.3	0.0	**0.3**
Neighborhood Center	3,200	11	72	0	84	0.0	0.2	0.0	**0.3**
Chinatown District	4,800	5	24	0	29	0.0	0.1	0.0	**0.1**
Cultural Arts District	1,000	13	56	0	69	0.0	0.1	0.0	**0.1**
Corridor General	3,400	24	442	0	466	0.1	1.5	0.0	**1.6**
Downtown Neighborhoods	2,800	101	2,482	0	2,584	0.3	7.0	0.0	**7.2**
Special Districts	2,000	82	815	0	897	0.2	1.6	0.0	**1.8**
Public Facility	1,200	0	150	0	150	0.0	0.2	0.0	**0.2**
Open Conservation	0	0	178	0	178	0.0	0.0	0.0	**0.0**
South Stadium District	6,900	16	99	0	115	0.1	0.7	0.0	**0.8**
Other									
Street, Rail, Canal, Etc.	0	41	2,035	3,070	5,146	0.0	0.0	0.0	**0.0**
Total Infill, Redevelopment Areas, and Growth Areas									
Total	--	2,299	9,919	37,614	49,832	3.8	20.7	47.0	**71.5**

Grand Total BWF at Build Out	
Existing BWF from SIUs, mgd:	8.2
City of Clovis (Max Permit + 3 mgd in Leonard Trunk), mgd:	11.9
BWF from Existing "Areas of Stability", mgd:	38.4
BWF from Infill, Redevelopment, and Growth Areas, mgd:	71.5
Grand Total BWF at Build Out:	**129.9**

5.3.5 Design Storm

Design storms are rainfall events used to analyze the performance of a collection system under extreme wet weather events. The first step in the development of the design storm is to define its recurrence interval and rainfall duration. The recurrence interval is based on the probability that a given rainfall event will occur or be exceeded in any given year. For example, a “100-year storm” means there is a 1 in 100 chance that a storm as large or larger than this event will occur at a specific location in any year.

Duration is the length of time in which the rainfall occurs. It is an industry standard in California to use the 10-year, 24-hour design storm for analyzing wastewater collection system performance during PWWF conditions. For this reason, this study defines the design storm as a 10-year, 24-hour rainfall event. The 10-year, 24-hour design storm volume is available from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, which revealed that a 10-year storm would have a total volume of 2.06-inches.

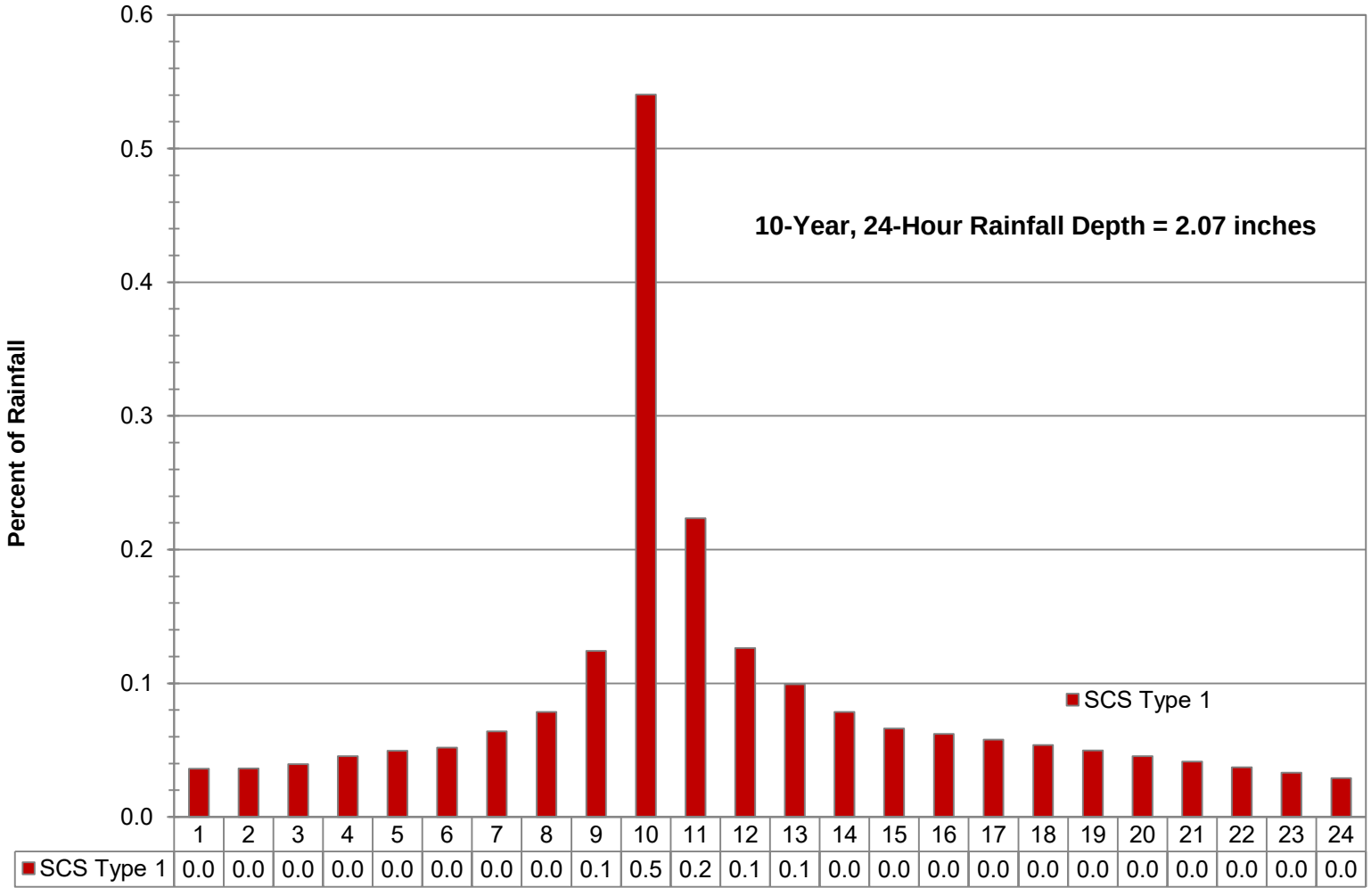
Once the design storm recurrence interval, duration, and associated rainfall volume have been determined, the next step in defining the design storm is to distribute the total rainfall over duration of the storm. To accomplish this, an industry standard synthetic rainfall distribution (SCS Type 1, developed by the Natural Resource Conservation Service [NRCS]) was used. Figure 5.1 shows the 10-year, 24-hour design storm.

5.3.6 Existing and Projected Peak Wet Weather Flow

The PWWF is the highest observed hourly flow that occurs following the design storm event. Wet weather infiltration and inflow (I/I), which occurs during and after rainfall events, increases flows in the collection system. PWWF is typically used for designing sewers and lift stations. The City’s sewers and lift stations were evaluated based on their capacity to convey the PWWF.

The existing PWWF was derived throughout the system based on the hydraulic modeling results. This was accomplished by routing the 10-year, 24-hour design storm through the hydraulic model, which was calibrated to both dry weather and wet weather conditions. Detailed information regarding the calibration of the City’s hydraulic model is provided in Chapter 4.

Similar to the existing PWWF, the build out PWWF was derived by routing a 10-year, 24 hour design storm through the hydraulic model. Peak I/I rates for future growth areas (e.g., vacant areas within the existing service area, growth areas outside of the current service area, etc.) were developed based on a peak I/I rate of 370 gpd/ac, based on the peak I/I rates experienced in Basin 2, which is considered the most representative area for new growth within the City.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
SCS Type 1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 5.1
10-Year, 24-Hour Design Storm
Wastewater Collection System Master Plan Update
City of Fresno

Table 5.6 presents a summary of the existing and build out BWF. In addition to the build out BWF, Table 5.6 includes the existing and build out peak dry weather flow (PDWF) and peak wet weather flow (PWWF). As shown in Table 5.6, the City's BWF is projected to roughly double from 64.1 mgd to 129.9 mgd by build out. The PDWF is projected to increase from 88.5 mgd to about 164.7 mgd (an increase of approximately 86-percent), and the PWWF is projected to increase from 123.9 mgd to about 202.4 mgd by build out (an increase of approximately 63 percent). Overall, the City's PWWF to ADWF peaking factor is projected to decrease from roughly 1.93 to 1.56, which is typical for sanitary sewer collection systems. Newer sewers tend to have less I/I response than older areas of the system, primarily due to better construction methods. Furthermore, flow attenuation also tends to dampen out flow peaks as collection systems expand. In addition, a significant portion of the future increase in wastewater flows at the City is associated with densification, which would not include a corresponding increase in I/I.

Table 5.6 Current and Projected Wastewater Flows
Wastewater Collection System Master Plan Update
City of Fresno

Year	BWF(1) (mgd)	PDWF(2) (mgd)	PDWF Peaking Factor	PWWF(3) (mgd)	PWWF Peaking Factor
Existing	64.1	88.5	1.38	123.9	1.93
Build Out	129.9	164.7	1.27	202.4	1.56

Notes:
(1) BWF = Base Wastewater Flow.
(2) PDWF = Peak Dry Weather Flow
(3) PWWF = Peak Wet Weather Flow.

CAPACITY EVALUATION AND PROPOSED IMPROVEMENTS

This chapter discusses the hydraulic evaluation of the sewer collection system and the proposed projects that correct capacity deficiencies and serve future users.

6.1 CAPACITY EVALUATION

This section summarizes the results of the capacity evaluation of the City of Fresno's (City's) wastewater collection system, which includes a gravity pipeline capacity evaluation, as well as a lift station capacity evaluation. The evaluation considers both current and projected peak dry weather flow (PDWF) and peak wet weather flow (PWWF) conditions.

6.1.1 Gravity Collection System Evaluation

Following the dry and wet weather flow calibration, which is summarized in detail in Chapter 4, a capacity analysis of the existing and future collection system was performed. The capacity analysis entailed identifying areas in the sewer system where flow restrictions occur or where pipe capacity is insufficient to convey PDWFs or PWWFs. Sewers that lack sufficient capacity to convey these flows create bottlenecks in the collection system that can potentially cause sanitary sewer overflows (SSOs). The sewer system was evaluated based on planning criteria presented in Chapter 5.

Per staff's request, it is recommended that each identified project be further investigated using temporary flow monitoring during the preliminary design phase of the project. This will not only further define the extent of the determined deficiency, but also allows the designer to have a better understanding of potential bypass flows which will help mitigate problems during the construction phase.

This section discusses the locations of current and projected hydraulic deficiencies resulting from flows exceeding the maximum flow depth criteria.

- PDWF Analysis:
  - Existing System. For the existing sewer collection system, the PDWF was routed through the hydraulic model. In accordance with the established flow depth criteria for existing sewers, pipelines where the maximum depth to full flow depth (d/D) ratio that exceeded 1.0 were flagged. Each pipeline with a maximum d/D in excess of 1.0 was reviewed on a case-by-case basis to determine if a capacity improvement project was warranted. Some pipelines with very shallow or flats slopes may exceed the 1.0 d/D threshold but only cause minor surcharging. Each of these cases was evaluated to determine the risk of SSO, and some pipeline reaches with slight surcharging were allowed. The locations of the capacity deficient pipelines for current PDWF conditions are shown on Figure 6.1 in red.

Dickenson Ave
West Lawn Ave
Chateau Fresno Ave
Grantland Ave
Hayes Ave
Cornelia Ave
Brawley Ave
Marks Ave
West Ave
Palm Ave
Blackstone Ave
First St
Cedar Ave
Chestnut Ave
Willow Ave
Clovis Ave
Fowler Ave
Temperance Ave
Dewolf Ave
Highland Ave
McCall Ave
Del Rey Ave
Bethel Ave
Academy Ave
Madsen Ave

Cooper Ave
Behymer Ave
Shepherd Ave
Nees Ave
Herndon Ave
Bullard Ave
Shaw Ave
Ashlan Ave
Shields Ave
McKinley Ave
Belmont Ave
Whitesbridge Ave/CA 180
California Ave
Jensen Ave
North Ave
Central Ave
American Ave

NFWRF
RWRF
LS01
LS02
LS03
LS04
LS05
LS06
LS10
LS12
LS13
LS14
LS15
LS16
LS18
LS20
GALLO
Direct Storm Drain Connections to be Removed

99
41
168
180

Legend

Existing Wastewater Collection System

- Lift Stations

Pipelines

- 8" and Smaller
- 10" and Larger

Proposed Improvements

- Existing System
- Future System
- Development
- Gallo Winery I/I Reduction Program
- Streets
- Sphere of Influence
- City Limits
- Existing Sewer Service Area

N

0 12,500 25,000 Feet

Figure 6.1
Proposed Collection System Capacity Improvements
Wastewater Collection System Master Plan Update
City of Fresno

DPU

carollo
Engineers...Working Wonders With Water®

- Build Out System. The build out system analysis was performed in a manner similar to the existing system analysis. The purpose of the build out system evaluation is to verify that the existing system improvements were appropriately sized to convey build out PDWFs, and to identify the locations of sewers that are adequately sized to convey existing PDWFs, but cannot convey build out PWWFs. At the time of this Master Plan, there are no known planned future industrial users that will add significant PDWFs to the collection system causing system deficiencies. Should new industrial loads increase in the future, a project-by-project analysis is recommended to assure the collection system has adequate capacity.

- **PWWF Analysis:**
  - Existing System. For the existing sewer collection system, the PWWF was routed through the hydraulic model. In accordance with the established flow depth criteria for existing sewers, manholes where the maximum flow to full flow (q/Q) ratio that exceeded 1.15 were flagged. Each pipeline with a maximum q/Q in excess of 1.15 was reviewed on a case-by-case basis to determine if a capacity improvement project was warranted. As with the PDWF analysis, some pipelines with very shallow or flats slopes may exceed the 1.15 q/Q threshold but only cause minor surcharging. In these cases, these pipelines were removed from the list of deficiencies.

    In general, the City's collection system has sufficient capacity to convey current PWWFs without exceeding the established q/Q ratio. However, there are a few areas where wet weather capacity restrictions are present and required mitigation. The location of these capacity deficient pipelines for current PWWF conditions are shown on Figure 6.1 in red.

    Following the completion of the existing system analysis, improvement projects and alternatives were identified in order to mitigate existing system pipeline capacity deficiencies. The recommended improvement projects are discussed in greater detail in Section 6.2 and project specific detail sheets will be provided in Appendix F. In accordance with the established planning criteria, new sewer pipelines were sized such that the maximum flow depth to pipe diameter ratio (d/D) did not exceed the values summarized in Chapter 5. In other words, flows in recommended improvements were not allowed to surcharge during PWWF conditions.
  - Build Out System. The build out system analysis was performed in a manner similar to the existing system analysis. The purpose of the build out system evaluation is to verify that the existing system improvements were appropriately sized to convey build out PWWFs, and to identify the locations of sewers that are adequately sized to convey existing PWWFs, but cannot convey build out PWWFs. Additionally, new trunk sewers were added to the hydraulic model and sized to service major growth areas beyond the current City sewer service area.

At build out, the City's wastewater flows are expected to increase substantially. As such, there are some areas of the existing collection system that cannot convey the build out PWWF within the established q/Q ratio. These pipelines are shown on Figure 6.1 in orange. The locations of new trunk sewers to service future growth are also shown in green.

6.1.2 Lift Station Evaluation

The City's hydraulic model includes 15 lift stations that service the major trunk system (typically pipes 10-inches and larger sewers) and smaller developments (less than 10-inch diameter). The hydraulic model does not have flows routed to a majority of these lift stations. However, the lift stations that do have flows allocated to them were determined to have sufficient capacity to convey the existing and future PWWF.

It is recommended that the capacity evaluation be updated when flows allocations within the hydraulic modeling software have been modified such that the capacity of the additional lift station can be evaluated. In addition, the City does not currently collect supervisory control and data acquisition (SCADA) data for their lift stations. Were feasible, it is recommended that upgrades be performed to allow for proper flow monitoring data acquisition, which will help confirm lift station capacity and monitor lift station performance.

6.2 COLLECTION SYSTEM IMPROVEMENTS

Figure 6.1 illustrates the proposed sewer improvements required to correct existing deficiencies and to serve future users. Detail maps for each of the proposed improvements are provided in Chapter 8 for clarity. Table 6.1 provides more detail of each improvement. Both Figure 6.1 and Table 6.1 should be used together to locate the proposed improvement and to gain details of the improvement (length, diameter, street location, etc.). The improvement identification number links the figure and table. The improvements summarized in Table 6.1 use a cross-referenced number system. The columns used in Table 6.1 refer to the following:

- **Improvement ID**: Assigned unique identifier associated with each improvement project. This is an alphanumeric number that starts with one letter indicating the type of improvement C = Capacity, D = Development, NCFWRF = North Central Fresno Wastewater Reclamation Facility, SEDA = Southeast Development Area Treatment Facility, and each continues with a number indicating different projects.
- **Type of improvement**: Pipelines, lift stations, force mains, and jacked steel casings.
- **Street Description**: Street in which the improvement is proposed.
- **Limits**: Description of the beginning and end of a proposed pipeline project.
- **Existing Size**: This is the size of the existing pipeline/facility. It represents the diameter of the existing pipelines (inches), and the total capacity of lift stations (million gallons per day [mgd]).

- **Proposed Size**: This is the size of the proposed improvement. It represents the diameter of the proposed pipelines (inches), and the total capacity of lift stations or plants (mgd). Additionally, for jacked steel casings, the size of the casing as well as the carrier pipe are indicated (inches).
- **Replace/New**: Indicates whether the proposed improvement is a replacement pipeline, parallel pipeline, or a new facility.
- **Length**: Estimated length of the proposed improvement (in feet). It should be noted that the length estimates do not account for re-routing the alignment to avoid unknown conditions.

When an increase to capacity is required, existing sewers can be upgraded or a parallel relief sewer can be constructed. For the purposes of this study, unless otherwise stated, we assumed that a capacity deficient sewer would be upgraded to a larger diameter. The upgraded pipeline generally followed the same slope as the existing pipeline, with the exception where survey data revealed negative or flat slopes in an existing alignment.

In essence, there are two alternatives for every trunk sewer project, but the decision to replace or construct a parallel sewer should be made during the preliminary design phase.

During the preliminary design phase, the existing sewer should be inspected by closed circuit television (CCTV) to determine its structural condition. If severely deteriorated, the existing sewer should be upgraded using a replacement pipe. If moderately deteriorated, slip lining or cured-in-place pipe lining can rehabilitate the existing sewer.

The proposed improvements that will serve future users are sized for build-out conditions. As the City continues to grow, it is recommended that the proposed pipeline diameters be constructed so that the facilities have sufficient capacity for build out conditions. Building a smaller interim project with the plans of upsizing in the future to account for further growth is not recommended due to the extended useful life of the improvements proposed herein. The proposed pipe diameter represents the ultimate diameter for build out conditions.

6.2.1 Existing versus Future Improvement

An existing deficiency is one where the existing facility's capacity is insufficient to meet the planning criteria (e.g., pipeline upgrades required to prevent severe surcharging during the design wet weather event) for existing users. If a project was proposed to correct an existing deficiency exclusively, then existing users were assigned 100 percent of the project's benefit, and therefore, 100 percent of the costs.

Table 6.1 Proposed Collection System Improvements
Collection System Master Plan
City of Fresno

Project Description					Project Size				Project Phasing			
Improv. ID	Type of Improv.	Description/Street	Description/Limits	Detail Sheet No. (Appendix xx)	Existing Size (in.)	Proposed Size (in)	Replace/ New	Length (ft)	Phase 1 (2014-2020)	Phase 2 (2020-2025)	Phase 3 (2025-2030)	Phase 4 (2030-2035)
Existing Improvements												
C-1A	Gravity	Hammond Avenue	Between Blackstone Ave. and Abby St.	1	20	**24**	Replace	390	x			
C-1B	Gravity	Abby Street	From Hammond Ave. to La Salle Ave.	2	20	**24**	Replace	1,619	x			
C-2A	Gravity	Glenn Avenue	From Brewer Ave. to Thomas Ave.	3	24	**27**	Replace	390	x			
C-2B	Gravity	Glenn Avenue	From HWY 180 to Voorman Ave.	4	24	**27**	Replace	2,594		x		
C-3	Gravity	Glenn Avenue / N Street	From Voorman Ave. to Tuolumne St.	5	27	**30**	Replace	1,343			x	
C-4	Gravity	Monterey Avenue	From Fulton Street to N Street	6	6	**10**	Replace	1,820			x	
C-5A	Gravity	Eighth Street	From Ventura Ave. to Woodward Ave.	7	36	**42**	Replace	4,752			x	
C-5B	Gravity	Woodward Avenue	From Eigth St. to Orange Ave.	8	36	**42**	Replace	597			x	
C-5C	Gravity	Orange Avenue	From Woodward Ave. to California Ave.	9	36	**42**	Replace	707			x	
C-6	Gravity	Safford Avenue	From Producers Dairy to H Street	10	6	**8**	Replace	930		x		
Build-Out Improvements												
C-7	Gravity	Tuolumne Street/ Van Ness Avenue	From N Street to Merced Ave.	11	27	**30**	Replace	1,680				x
C-8	Gravity	North Avenue	From Polk Ave. to Fruit Ave.	12	-	**60**	New	20,855				x
C-9	Gravity	North Avenue	From Fruit Ave. to HWY 99	13	60	**60**	Rehab	15,533				x
D-1	Gravity	Temperance Avenue	From North Ave. to Jensen Ave.	-	-	**48**	New	5,873				x
D-2	Gravity	Temperance Avenue	From Jensen Ave. to Tulare St.	-	-	**42**	New	13,350				x
D-3	Gravity	Temperance Avenue	From Tulare St. to Olive Ave.	-	-	**36**	New	4,987				x
D-4	Gravity	Temperance/McKinley/DeWolf	From Olive Ave. to Shields	-	-	**30**	New	13,299				x
D-5	Gravity	Shields Ave./Leonard Ave.	From DeWolf Ave. to Leonard Ave.	-	-	**27**	New	4,575				x
D-6A	Gravity	Jensen Avenue	From Temperance Ave. to DeWolf	-	-	**15**	New	5,227				x
D-6B	Gravity	Jensen Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**12**	New	2,732				x
D-7A	Gravity	Church Avenue	From Temperance Ave. to Locan Ave.	-	-	**15**	New	2,552				x
D-7B	Gravity	Church Avenue	From Locan Ave. to DeWolf Ave.	-	-	**12**	New	2,729				x
D-7C	Gravity	Church Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**8**	New	2,673				x
D-8A	Gravity	Locans Avenue	From Temperance Ave to Locan Ave.	-	-	**18**	New	2,676				x
D-8B	Gravity	Locans Avenue	From Locan Ave. to DeWolf Ave.	-	-	**15**	New	2,670				x
D-8C	Gravity	Locans Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**10**	New	2,492				x
D-9A	Gravity	Butler Avenue	From Temperance Ave to Locan Ave.	-	-	**18**	New	2,617				x
D-9B	Gravity	Butler Avenue	From Locan Ave. to DeWolf Ave.	-	-	**15**	New	2,611				x
D-9C	Gravity	Butler Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**8**	New	2,849				x
D-10A	Gravity	Tulare Street	From Temperance Ave. to Locan Ave.	-	-	**21**	New	2,730				x
D-10B	Gravity	Tulare Street/DeWolf Avenue	From Locan Ave. to DeWolf Ave.	-	-	**15**	New	4,034				x
D-10C	Gravity	Laurel Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**8**	New	2,729				x
D-10D	Gravity	Locan Ave/ Belmont Ave.	From Tulare St. to DeWolf Ave.	-	-	**12**	New	4,926				x
D-10E	Gravity	Belmont Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**10**	New	2,554				x
D-11A	Gravity	Olive Avenue	From Temperance Ave. to Locan Ave.	-	-	**15**	New	2,671				x
D-11B	Gravity	Olive Avenue	From Locan Ave. to DeWolf Ave.	-	-	**12**	New	2,613				x
D-11C	Gravity	Olive Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**8**	New	2,617				x
D-12A	Gravity	McKinley Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**21**	New	2,729				x
D-12B	Gravity	McKinley Avenue	From Leonard Ave. to Thompson Ave.	-	-	**18**	New	5,103				x
D-12C	Gravity	Thompson Avenue	From McKinley Ave. to Clinton Ave.	-	-	**15**	New	2,730				x
D-13	Gravity	Clinton Avenue	From DeWolf Ave. to Leonard Ave.	-	-	**10**	New	2,492				x

Table 6.1 Proposed Collection System Improvements
Collection System Master Plan
City of Fresno

Project Description					Project Size				Project Phasing			
Improv. ID	Type of Improv.	Description/Street	Description/Limits	Detail Sheet No. (Appendix xx)	Existing Size (in.)	Proposed Size (in)	Replace/ New	Length (ft)	Phase 1 (2014-2020)	Phase 2 (2020-2025)	Phase 3 (2025-2030)	Phase 4 (2030-2035)
D-14	Gravity	North Avenue	From Peach Ave. to Temperance Ave.	-	-	**36**	New	15,787				x
D-15	Gravity	Minnewawa	From North Ave. to Annadale Ave.	-	-	**12**	New	2,729				x
D-16	Gravity	Sunnyside Avenue	From North Ave. to Annadale Ave.	-	-	**15**	New	2,610				x
D-17	Gravity	Fowler Avenue	From North Ave. to Annadale Ave.	-	-	**10**	New	2,789				x
D-18	Gravity	Armstrong Avenue	From North Ave. to Annadale Ave.	-	-	**8**	New	2,671				x
D-19A	Gravity	Valentine Avenue	From Church Ave. to Kearney Frontage	-	-	**12**	New	3,976				x
D-19B	Gravity	Valentine Avenue	From Kearney Frontage to Madison Ave.	-	-	**10**	New	1,312				x
D-20	Gravity	Brawley Avenue	From Church Ave. to Madison Ave.	-	-	**8**	New	5,415				x
D-21A	Gravity	Whitesbridge Avenue	From Polk Ave. to Blythe Ave.	-	-	**12**	New	5,336				x
D-21B	Gravity	Whitesbridge/Brawley Avenue	From Blythe Ave. to Nelsen Ave.	-	-	**10**	New	5,392				x
D-22A	Gravity	Belmont Avenue	From Polk Ave. to Cornelia Ave.	-	-	**12**	New	2,734				x
D-22B	Gravity	Belmont Avenue	From Cornelia Ave. to Blythe Ave.	-	-	**10**	New	2,675				x
D-22C	Gravity	Belmont Avenue	From Blythe Ave. to Brawley Ave.	-	-	**8**	New	2,640				x
D-23A	Gravity	Olive Avenue	From Polk Ave. to Blythe Ave.	-	-	**12**	New	5,343				x
D-23B	Gravity	Olive Avenue	From Blythe Ave. to Brawley Ave.	-	-	**8**	New	2,675				x
D-24A	Gravity	Olive Avenue	From Grantland Ave. to Bryan Ave.	-	-	**12**	New	2,769				x
D-24B	Gravity	Olive Avenue	From Bryan Ave. to Hayes Ave.	-	-	**10**	New	1,973				x
D-25	Gravity	McKinley Avenue	From Grantland Ave. to Ring Ave.	-	-	**10**	New	3,748				x
D-26A	Gravity	Clinton Avenue	From Grantland Ave. to Bryan Ave.	-	-	**12**	New	2,621				x
D-26B	Gravity	Clinton Avenue	From Bryan Ave. to Hayes Ave.	-	-	**10**	New	2,592				x
D-27A	Gravity	Shields Avenue	From Grantland Ave. to Bryan Ave.	-	-	**15**	New	2,775				x
D-27B	Gravity	Shields Avenue	From Bryan Ave. to Hayes Ave.	-	-	**12**	New	2,592				x
New Facilities												
NCFWRF-1	Treatment	Cedar/Dakota	Reclamation Facility at Vacant Field Behind Granite Park	-	-	**3 mgd**	New	-	x			
NCFWRF-2	Gravity	Dakota	From Treatment Facility to Millbrook Ave.	-	-	**36**	New	4,042	x			
SEGA	Treatment	Temperance	Reclamation Facility on Corner of Temperance and North Ave.	-	-	**12 mgd**	New	-				x

Many of the Master Plan improvements will serve future users, even when an improvement calls for the upgrade of an existing facility. In these cases, an existing sewer or lift station may have sufficient capacity to convey current PWWFs, but as growth continues and more users are added to the system, the increased flow results in capacity deficiencies. These projects, as well as new trunk sewers to extend wastewater collection system service to future growth areas, are future improvements. Future users were assigned 100 percent of the future project's benefit and 100 percent of the costs.

In some cases, a project is needed to correct an existing capacity deficiency, but is sized to accommodate additional flows from future development. In these cases, the hydraulic modeling results were used to determine the cost breakdown between existing and future users based on the ratio of existing and build out average dry weather flows. More information on the breakdown in cost split between existing and future users and whether a proposed improvement is intended to correct an existing deficiency, to serve a future user, or both, is provided in Chapter 8.

6.2.2 Existing System Improvements

For the majority of the City, the existing wastewater collection system contains sufficient capacity to convey the PDWF and PWWF without exceeding the capacity criteria discussed Chapter 5. There are a few exceptions where existing sewers will need to be replaced by larger diameter sewers, or parallel sewers will need to be constructed to bypass flow around hydraulically deficient sewers. These projects are discussed in this section and details for each are provided in Chapter 8. Detail sheets for individual projects are provided in Appendix F.

- **Project 1 – Hammond Avenue and Abby Street Sewers (C-1A and C-1B)**. This project consists of replacing approximately 2,000 feet of existing 20-inch diameter sewer on Hammond Avenue and Abby Street from Blackstone Avenue to La Salle Avenue with a new 24-inch diameter sewer. This project is required to mitigate surcharged conditions for existing PWWFs. It is recommended that the City perform a flow-monitoring program to confirm the capacity deficiency in this pipeline prior to construction. If the flow-monitoring program determines that the I/I for this pipeline is significantly lower, then this project could possibly be avoided. However, due to the age of this pipeline (over 100 years old) it is recommended that the City develop a program for flow monitoring and inspection in the near future.
- **Project 2 – Glenn Avenue Sewers (C-2A and C-2B)**. This project consists of replacing the existing 24-inch diameter sewer on Glenn Avenue, from Brewer Avenue to Voorman Avenue with a new 27-inch diameter sewer. This project is required to mitigate surcharged conditions on the Glenn Avenue sewer for existing PWWFs. It is recommended that the City perform a flow-monitoring program to confirm the capacity deficiency in this pipeline prior to construction. If the flow-monitoring program determines that the I/I for this pipeline is significantly lower, then this project could

possibly be avoided. However, due to the age of this pipeline (over 100 years old) it is recommended that the City develop a program for flow monitoring and inspection in the near future.

- **Project 3 – Glenn Avenue Sewer (C-3)**. This project is required to mitigate existing capacity deficiencies due to PWWF in the 27-inch diameter gravity sewer immediately downstream of Project C-2. The replacement 30-inch sewer extends from Voorman Avenue to Tuolumne Street. It is recommended that the City perform a flow-monitoring program to confirm the capacity deficiency in this pipeline prior to construction. If the flow-monitoring program determines that the I/I for this pipeline is significantly lower, then this project could possibly be avoided. However, due to the age of this pipeline (over 100 years old) it is recommended that the City develop a program for flow monitoring and inspection in the near future.
- **Project 4 – Monterey Avenue Sewer (C-4)**. This project mitigates existing capacity deficiencies in the sewer immediately downstream of two medium sized industrial users. The existing 6-inch sewer is capacity deficient during PDWF caused by the two large industrial users directly upstream. This project consists of replacing approximately 1,800 feet of 6-inch diameter pipeline with a new 10-inch diameter sewer on Monterey Avenue from Fulton Street to N Street.
- **Project 5 – Orange Avenue Trunk Sewers (C-5A, C-5B, and C-5C)**. The Orange Avenue trunk is a main sewer artery that conveys flows from the City of Clovis, California State University Fresno (CSUF), and a large area of the central section of the City. This project mitigates existing capacity deficiencies during PWWF. This project consists of replacing approximately 6,050 feet of 36-inch diameter pipeline with a new 42-inch diameter sewer on Eighth Street, Woodward Avenue, and Orange Avenue from Ventura Street to California Avenue.
- **Project 6 – Safford Avenue Sewer (C-6)**. The Safford Avenue project consists of replacing approximately 930 feet of existing 6-inch diameter sewer from Producers Dairy to H Street with a new 8-inch diameter sewer. This project is required to mitigate surcharged conditions for existing PDWFs due to the flows from Producers Dairy.

6.2.3 Build Out System Improvements

The following discussion summarizes the new trunk sewers that will serve future users, as well as the locations of existing pipelines that would need to be replaced in order to accommodate build out PWWFs. The locations of the new trunk sewers are conceptual and are likely to change during the design phase. The locations shown are possible alignments based on available information and are intended to assist in the development of probable construction costs. No investigation into the feasibility of these alignments has been conducted. However, an attempt was made to place new trunk sewer alignments within existing streets or other feasible pipeline alignments.

- **Project 7 – Tuolumne Street and Van Ness Avenue Sewers (C-7).** . Under current PWWF conditions, the existing 27-inch diameter sewers on Tuolumne Street and Van Ness Avenue from N Street to Merced Avenue experience surcharging. However, the surcharged conditions did not exceed the allowable flow depth criteria and therefore no improvement is required for current PWWFs.

  At build out, however, there is a capacity increase seen in this sewer due to redevelopment areas and requires the existing 27-inch sewer to be replaced with a 30-inch sewer.

- **Project 8 – North Avenue Trunk (C-8 and C-9)**. As determined in the previous 2006 Master Plan, the North Avenue trunk is capacity deficient under current PWWF conditions and the existing 66-inch diameter sewers on North Avenue experience surcharging. However, the surcharged conditions did not exceed the allowable flow depth criteria and therefore no improvement is required for existing PWWFs.

  However, at build out, a significant increase in flow from new industrial land uses as well as redevelopment causes significant surcharging throughout the North Avenue trunk. The flows exceed the flow depth criteria and create a condition that requires an improvement project.

  This proposed improvement project is broken up into two portions. The fist project (C-8) entails constructing a new 60-inch diameter sewer parallel to the existing 66-inch diameter sewer on North Avenue that will tie into the existing 60-inch diameter at Polk Avenue and extend to a new flow diversion structure at Fruit Avenue. The second project (C-9) will require the rehabilitation of the existing abandoned 60-inch diameter sewer on North Avenue from Fruit Avenue to Highway 99.

- **Project 10 – SEDA North Trunk Sewers (D-1 through D-13)**. In order to serve the planned growth areas in the Southeast Development Area (SEDA), it is recommended that a new sewer be constructed from 8-inch diameter up to 48-inch diameter. The main 48-inch diameter trunk sewer will extend up Temperance Avenue from the proposed SEDA scalping facility near the intersection of North Avenue and Temperance Avenue. The trunk sewer will extend from the scalping facility sequentially reducing in diameter to the 27-inch diameter sewer at the upstream City of Clovis connection near Leonard Avenue and Shields Avenue. Laterals from the main Temperance trunk are sized from 8-inch, 10-inch, 12-inch, and 15-inch diameter to serve new developments.

- **Project 11 – SEDA South Sewers (D-14 through D-18)**. Similar to project 10, this project involves development improvements stemming from the SEDA. It is recommended that a 24-inch diameter trunk sewer be constructed in North Avenue from Peach Avenue to Armstrong Avenue. This pipeline is sized to convey the PWWF and solids from the SEDA facility and to serve the new developments planned for this area. Arterial laterals from the North Avenue trunk main sized from 8-inch, 10-inch,

12-inch, and 15-inch diameter sewers will be connected to serve planned developments.

- **Project 12 – West Fresno Development Sewers (D-19 through D-27)**. There are a number of planned developments in west Fresno within the existing sphere of influence. This project provides new 8-inch to 15-inch diameter sewers to serve these new planned development areas.
- **Project 13 – North Central Fresno Wastewater Reclamation Facility (NCFWRF-1 and NCFWRF -2)**. The 2010 Fresno Recycled Water Master Plan has identified an alternative to provide recycled water to potential users in the central portion of the City. In this alternative, a satellite treatment facility would be constructed at the CSUF campus (as a demonstration reuse project) or on a parcel of land currently owned by the City at the intersection of Cedar Avenue and Dakota Avenue(Granite Park). The proposed treatment facility would treat 2-4 mgd average daily flow and alleviate a number of deficient pipelines downstream of the diversion. However, if the treatment facility is not constructed to intercept wastewater flows, further investigations is needed to investigate the capacity deficiencies in the Orange Avenue Trunk system.
- **Project 14 – Southeast Development Area Reclamation Facility (SEDA)**. Staff has planned for a satellite treatment facility in the southeast portion of the City near North Avenue and Temperance Avenue. This treatment plant would treat all the flow from the new development pipelines in Project 10 and treat between 12-15 mgd average daily flows. If the treatment facility is not constructed and development projects begin to be built, further analysis on the existing downstream pipelines in North Avenue is needed to determine if wastewater capacity is available.
- **Project 15 – Gallo Direct Storm Drain**. During the PWWF analysis, it was determined that a number of pipelines downstream of the Gallo winery facility are experiencing very high peak flows during storm events. After discussion with staff, it was confirmed that Gallo has a direct storm drain connection to the sewer system. It is recommended that this direct connection be removed to eliminate the PWWF surcharging currently present in the downstream pipelines. If the storm drain connection cannot be performed, further analysis shall be performed to determine the required additional capacity for downstream pipelines.

6.2.4 Project Prioritization

The majority of the improvements listed in Table 6.1 are driven by future development, which consist of new sewers that serve future growth or improvements to existing facilities that are needed to serve future growth. When fully implemented, the capital projects will allow the conveyance of PWWFs to the RWRF and satellite plants during build out conditions.

Prioritizing the required capital improvements for the City's sewer system is an important aspect of this study. The improvement projects were prioritized based on the following factors:

- Upgrading existing facilities to mitigate current capacity deficiencies and to serve future users
- Building the new trunks necessary to serve future users

Improvements to existing facilities will provide sufficient capacity to mitigate existing issues and to convey increased flows resulting from future growth. Future development will require the construction of sewers to serve new users. The projects were grouped into the following phases:

- Phase 1: Years 2014 through 2015
- Phase 2: Years 2016 through 2020
- Phase 3: Years 2021 through 2025
- Phase 4: Years 2026 through 2030

The projects were phased based on the best available information for how the City will develop moving forward. The actual implementation of the improvements serving future users ultimately depends on growth. The priorities presented in Table 6.1 are estimates, and changes in the City's planning assumptions or growth projections could increase or decrease the priority of each improvement.

REHABILITATION AND REPAIR PLAN

This Chapter describes the proposed rehabilitation and repair (R&R) plan for the City of Fresno (City) wastewater collection system. This chapter also includes the objectives of the plan, the data used to develop the plan, and the evaluation of the City's collection system assets.

7.1 BACKGROUND AND OBJECTIVES

The purpose of the R&R plan is to identify sewer infrastructure conditions that pose a current or future threat to regular sewer operations and restore the affected facilities to an acceptable state. Sewer system conditions change over time and require periodic examination to monitor deterioration and determine when rehabilitation efforts are warranted. When sewer condition assessment activities yield signs of significant deterioration, rehabilitation is recommended to prevent operational system failures. Rehabilitation may include removing and replacing the existing infrastructure, installing a new liner in deteriorated sewer mains, or individual point repairs. Sewer systems also experience blockages for various reasons and require routine maintenance for problem areas. The routine maintenance of sewer systems is crucial and includes cleaning, root removal, obstruction elimination, and other efforts as needed. This rehabilitation and repair plan provides tools for the orderly and timely implementation of rehabilitation projects that will extend the useful life and strengthen the condition of the City's current wastewater collection system.

7.2 COLLECTION SYSTEM ASSET DATA

7.2.1 Collection System GIS Data

The City has developed and actively maintains a Geographic Information System (GIS) database of their sewer system. This GIS database includes detailed information that was used in the development of this R&R plan. For gravity sewers, key facility attributes available in the GIS data include pipe size, pipe material, installation year, upstream and downstream manhole ID's, pipe slope, pipeline alignment, and past rehabilitation information.

7.2.2 CCTV Inspection Data

City owned and operated truck mounted closed circuit television (CCTV) units have been used to collect video and condition assessment data for approximately 43 percent (690.5 miles) of the City's gravity sewer system. The City uses the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP) evaluation protocols to rate the condition of each CCTV inspected sewer main. Figure 7.1 shows inspected and non-inspected sewers as of December 2012.

GRANTLAND
BRYAN
HAYES
POLK
CORNELIA
BLYTHE
BRAWLEY
VALENTINE
MARKS
VAN NESS
WEST
FRUIT
PALM
MAROA
BLACKSTONE
FRESNO
FIRST
MILLBROOK
CEDAR
MAPLE
CHESTNUT
WILLOW
PEACH
MINNEWAWA
CLOVIS
SUNNYSIDE
FOWLER
ARMSTRONG
TEMPERANCE
LOGAN

COPPER
INTERNATIONAL
BEHYMER
PERRIN
SHEPHERD
TEAGUE
NEES
ALLUVIAL
HERNDON
SIERRA
BULLARD
BARSTOW
SHAW
GETTYSBURG
ASHLAN
DAKOTA
SHIELDS
CLINTON
McKINLEY
OLIVE
BELMONT
NIELSEN
WHITESBRIDGE
KEARNEY
CALIFORNIA
CHURCH
JENSEN
ANNADALE
NORTH

RIVER

CALIFORNIA STATE UNIVERSITY, FRESNO

CLOVIS

FRESNO YOSEMITE INTERNATIONAL AIRPORT

DOWNTOWN FRESNO

FRESNO/CLOVIS REGIONAL WASTEWATER RECLAMATION FACILITY

99
41
180

LEGEND

- SEWER EVALUATED WITH CCTV
- SEWER NOT EVALUATED WITH CCTV
- CITY LIMITS

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

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CITY OF FRESNO

WASTEWATER MASTER PLAN
EVALUATED VS UNEVALUATED SEWER SEGMENTS
FIGURE 7.1

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_Sewers Evaluated.dwg; 11X17 Plot by: mgraham Jul 11, 2014 - 4:51pm

Approximately 57 percent (916 miles) of the City's gravity sewers have not received an initial CCTV inspection. Table 7.1 summarizes the total length of sewer, by pipe diameter, that has been inspected to date by the City. As shown in Table 7.1, sewers that are 6-inch and 8-inch have the highest percent of completed CCTV inspection. Small sewers have relatively low wastewater flows, which is accommodating to the CCTV inspection process. For sewers larger than 30-inches there is little or no CCTV inspection completed, likely due to the challenges in bypassing the high wastewater flows typical for these large diameter sewer mains.

Table 7.1 CCTV Inspection Summary by Pipe Diameter
Wastewater Collection System Master Plan Update
City of Fresno

Pipe Diameter (in)	Inspected Length (miles)	Total Pipeline Length (miles)	Percent Inspected to Date (%)
3	-	0.0	0.0
4	-	0.9	0.0
6	209.9	409.1	51.3
8	371.6	742.4	50.1
10	43.1	110.2	39.1
12	26.8	79.6	33.7
14	0.9	7.9	11.9
15	17.1	43.3	39.5
16	0.9	3.2	27.4
18	7.9	40.0	19.7
20	0.8	2.9	28.8
21	1.4	16.5	8.4
22	0.6	1.3	48.0
24	1.7	21.2	8.1
27	3.4	11.2	30.2
30	2.7	14.5	18.5
33	0.1	6.0	1.8
36	0.1	11.1	0.6
39	0.6	8.2	7.4

Table 7.1 CCTV Inspection Summary by Pipe Diameter
Wastewater Collection System Master Plan Update
City of Fresno

Pipe Diameter (in)	Inspected Length (miles)	Total Pipeline Length (miles)	Percent Inspected to Date (%)
40	-	0.7	0.0
42	-	7.6	0.0
45	0.2	13.7	1.4
46	-	0.3	0.0
48	0.6	10.2	6.2
51	-	3.5	0.0
54	-	5.5	0.0
57	-	1.1	0.0
60	-	15.4	0.0
66	-	11.1	0.0
72	-	6.6	0.0
84	-	1.4	0.0
Total	**690.5**	**1,606.5**	**43.0**

Table 7.2 summarizes the total length of sewers, by material type, within the City that have been inspected. As shown in Table 7.2, cast iron, polyvinyl chloride (PVC), vitrified clay and asbestos cement sewers have the greatest percent of completed CCTV inspections. These pipe materials are generally used for small diameter sewers, which are easier to CCTV than the mid-sized and large diameter sewers.

The PACP standards enable an objective evaluation of the condition of gravity sewers based on a standard and consistent coding system. The Pipeline Assessment and Certification Program (PACP©) coding system allows the user to code structural defects, operational and maintenance (O&M) defects, and construction features/defects. Structural defects are assigned a structural grade that ranges from 1 (minor defect) to 5 (most significant defect). O&M and construction defects are also assigned a grade that ranges from 1 (minor defect) to 5 (most significant defect).

Table 7.2 CCTV Inspection Summary by Pipe Material Wastewater Collection System Master Plan Update City of Fresno			
Pipe Material	**Inspected Pipeline Length (miles)**	**Total Pipeline Length (miles)**	**Percent Inspected to Date (%)**
Asbestos Cement	2.6	6.3	41.6
Cast Iron	4.1	6.4	64.1
Concrete	19.1	64.4	29.7
Concrete Cylinder		1.1	0.0
Ductile Iron	1.3	4.7	28.2
Fiberglass		9.6	0.0
PVC	314.8	503.4	62.5
Reinforced Concrete	8.7	123.7	7.1
Truss	0.2	6.2	3.2
Vitrified Clay	334.1	880.8	37.9
Not Identified	5.5	0.0	N/A
Total	**690.5**	**1,606.5**	**43.0**

The PACP condition grading system uses more than one method to rate the condition of each pipe segment, including a rating that considers the total number of defects within a pipe segment (Overall Rating) and a rating that only considers the most severe defects within a pipe segment (Quick Rating). Appendix G provides a short guidance document that summarizes the PACP rating system.

7.2.3 Previous Reports

Previous evaluations of the City's system have been conducted and described in the following documents:

- *North Avenue Trunk Sewer Evaluation;* Final, Blair, Church, & Flynn, 1990.
- *Evaluation of Large Diameter Wastewater Collection System;* Final, Blair, Church, & Flynn, 1992-1996.
- *Inspection and Evaluation of Concrete Sewers 12-inches to 27-inches in Diameter;* Final, Blair, Church, & Flynn, July 2001.
- *Wastewater Collection System Master Plan*, Final; Brown and Caldwell, May 2006.
- *CCTV Inspection and Evaluation for Mid-Sized Concrete Sewers;* Final, Blair, Church, & Flynn, July 2010.

- *Large Diameter Sewer Evaluation Update;* Final, Blair, Church, & Flynn, January 2012.

These reports identified substantial rehabilitation work for mid-sized and large diameter concrete sewers. Most of the rehabilitation work identified in the previous reports has been completed or is in some stage of design or construction Recommended rehabilitation and repair projects that have not been completed are described in Section 7.3.2.3.

7.2.4 Lift Station Visual Inspection

The sewer system includes 15 submersible-type sewer lift stations, which are owned, operated, and maintained by the City. Figure 4.1 includes the location of each lift station and Table 4.4 identifies their pumping capacities. The lift stations are generally situated on relatively small sites and consist of either duplex or triplex submersible pumps housed in circular wet wells. A limited on-site review of each lift station site was conducted on October 10, 2013 by Blair, Church, & Flynn Consulting Engineers (BC&F) Staff to help identify lift station infrastructure in need of repair or rehabilitation. Wet well, valve vault, and discharge manhole inspections consisted of an above-grade visual observation aided by illumination tools. Available City staff was interviewed on site regarding lift station operation and maintenance.

7.3 COLLECTION SYSTEM ASSET EVALUATION

This section summarizes the criteria used to identify pipelines in need of R&R and the results of the asset evaluation.

7.3.1 Rehabilitation Project Selection Criteria

The priorities for project selection for the R&R Plan begin with sewer segments that are in the most severe state followed by successively less severe sewer mains.

7.3.1.1 High Priority Point Repair Criteria

There are locations within the City's sewer system where significant structural defects in sewer mains exist. The City has selected the PACP structural defect codes that should be considered for high priority repairs, and are shown in Table 7.3. Sewer mains that were coded with a high priority structural defect code are designated in this report for high priority repair projects.

Table 7.3 High Priority PACP Structural Defects Codes
Wastewater Collection System Master Plan Update
City of Fresno

Group	Descriptor	Modifier	Code	Structural Grade
Crack (C)	Hinge (CH3)	-	CH3	5
Crack (C)	Hinge (CH4)	-	CH3	5
Fracture (F)	Hinge (H3)	-	FH3	5
Fracture (F)	Hinge (H4)	-	FH3	5
Pipe Failures (Silent)	Broken (B)	-	B	3,4,5
Pipe Failures (Silent)	Broken (B)	Soil Visible (SV)	BSV	5
Pipe Failures (Silent)	Broken (B)	Void Visible (VV)	BVV	5
Pipe Failures (Silent)	Hole (H)	-	H	3,4,5
Pipe Failures (Silent)	Hole (H)	Soil Visible (SV)	HSV	5
Pipe Failures (Silent)	Hole (H)	Void Visible (VV)	HVV	5
Collapse (X)	Pipe (P)	-	XP	5
Deformed	(Pipe)	-	D	4,5
Surface Damage Chemical (S)	Reinforcement Visible (RV)	C	SRVC	5
Surface Damage Chemical (S)	Reinforcement Corroded (RC)	C	SRCC	5
Surface Damage Chemical (S)	Missing Wall (MW)	C	SMWC	5
Surface Damage Mechanical (M)	Reinforcement Visible (RV)	M	SRVM	5
Surface Damage Mechanical (M)	Reinforcement Corroded (RC)	M	SRCM	5
Surface Damage Mechanical (M)	Missing Wall (MW)	M	SMWM	5
Surface Damage Not Evident (Z)	Reinforcement Visible (RV)	Z	SRVZ	5
Surface Damage Not Evident (Z)	Reinforcement Corroded (RC)	Z	SRCZ	5
Surface Damage Not Evident (Z)	Missing Wall (MW)	Z	SMWZ	5

7.3.1.2 Modified Overall Structural Rating

The PACP coding system includes an overall structural rating (OSR) that represents a weighted total of all defects coded for each sewer segment. The number of occurrences of

each pipe code is multiplied by the pipe defect grade (1 though 5) to calculate the overall structural rating of the pipe segment.

Per City staff direction, the OSR was modified to eliminate contributions from defect Grades 1 and 2 (minor and minor-moderate defects), resulting in a Modified Overall Structural Rating (MOSR) that was used for the purpose of this Master Plan. Minor and minor to moderate grades were omitted from the overall scores to prevent artificially high scores being created by less significant defects.

The MOSR information in Table 7.4 was developed to provide tools for the categorization of each sewer segment by priority and sorting based on sewer conditions. Analysis of the current City of Fresno sewer system showed MOSR scores varying from 0 to 630. The MOSR range criterion was determined from review of CCTV data that was made available for each inspected sewer segment. General review of the CCTV videos provided insight about the actual sewer conditions of the MOSR sewers and an appropriate range was developed for each condition. The critical and severe conditions were chosen to be rehabilitated as part of the recommended projects within this master plan. Further rehabilitation projects may continue with sewer segments that received a poor rating after the severe and critical sewers are rehabilitated.

Table 7.4 MOSR Overview
Wastewater Collection System Master Plan Update
City of Fresno

Sewer Condition	Range
Severe	MOSR ≥ 200
Critical	100 ≤ MOSR < 200
Poor	50 ≤ MOSR < 100
Moderate	25 ≤ MOSR < 50
Average	0 ≤ MOSR < 25

7.3.1.3 Previously Recommended Rehabilitation Projects

Rehabilitation projects recommended in previous reports that have yet to be completed are included as rehabilitation projects in this Master Plan. Section 7.3.2.3 includes a detailed description of these projects.

7.3.2 Evaluation Results

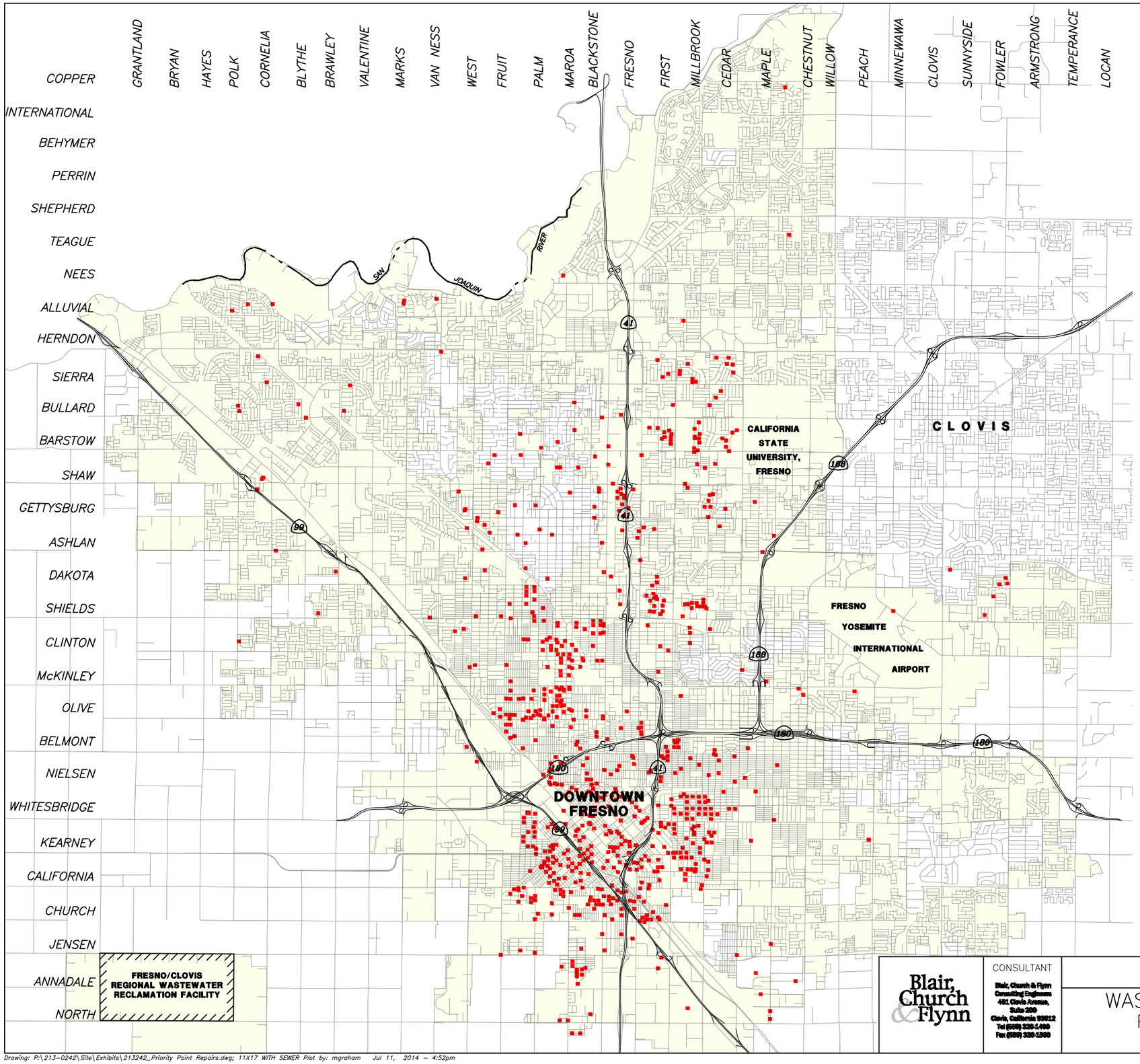
A summary of the evaluation results is presented within this section.

7.3.2.1 High Priority Point Repairs

Sewer main defects requiring high priority point repairs exist at 1,249 locations. Table 7.5 includes the priority codes together with the number of occurrence per code.

Table 7.5 Point Repairs Wastewater Collection System Master Plan Update City of Fresno		
Priority Code	**Code Description**	**Occurrences**
B	Broken	616
BSV	Broken Soil Visible	136
BVV	Broken Void Visible	139
CH3	Hinge Crack	3
CH4	Hinge Crack	2
D	Deformed	33
FH3	Hinge Fracture	2
FH4	Hinge Fracture	1
H	Hole	195
HSV	Hole Soil Visible	31
HVV	Hole Void Visible	28
SMW	Missing Wall	4
SMWZ	Missing Wall, Surface Damage Not Evident	6
SRC	Reinforcement Corroded	35
SRCZ	Reinforcement Corroded, Surface Damage Not Evident	1
SRV	Reinforcement Visible	6
SRVC	Reinforcement Visible, Surface Damage Chemical	1
XP	Pipe Collapse	10
	Point Repair Total:	**1,249**

Figure 7.2 shows high priority repair locations. Appendix H provides a summary list of the significant sewer main defects described above and includes information on the type of pipe defect, pipe size, pipe material, upstream and downstream manhole identification numbers, street name and sewer plat area. An initial order of work for the point repairs is also included in Appendix H. The City should review available data and new data as it becomes available and adjust the order of work as necessary.



LEGEND

- PRIORITY POINT REPAIRS
- STREETS
- CITY LIMITS

Priority Point Repairs
Wastewater Master Plan Update
City of Fresno

Priority Code	Code Description	Occurrences
□	□ro□e□	616
□S□	□ro□e□ Soil □i□□le	136
□□□	□ro□e□ □oi□ i□□□le	13□
C□3	□i□□e Crac□	3
C□4	□i□□e Crac□	2
□	□e□r□ e□	33
□□3	□i□□e □ract□re	2
□□4	□i□□e □ract□re	1
□	□ole	1□5
□S□	□ole Soil □i□□le	31
□□□	□ole □oi□ i□□□le	28
SM□	Mi□□□□ □ all	4
SM□ □	Mi□□□□ □ all□ S□r□ace □a□ a□e □ot □vi□e□t	6
SRC	Rei□□orce□ e□t Corro□e□	35
SRC□	Rei□□orce□ e□t Corro□e□□ S□r□ace □a□ a□e □ot □vi□e□t	1
SR□	Rei□□orce□ e□t □i□□le	6
SR□C	Rei□□orce□ e□t □i□□le□ S□r□ace □a□ a□e C□e□ ical	1
□P	Pi□e Colla□□e	10
	Priority Point Repair Total:	**1249**

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

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CITY OF FRESNO

WASTEWATER MASTER PLAN
PRIORITY POINT REPAIRS
FIGURE 7.2

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_Priority Point Repairs.dwg; 11X17 WITH SEWER Plot by: mgraham Jul 11, 2014 - 4:52pm

7.3.2.2 Modified Overall Structural Rating

Sewer mains with a MOSR greater than or equal to 100 meet the criteria developed for rehabilitation. Rehabilitation is expected to be a cured-in-place pipe (CIPP) liner as described in Section 7.4.1.2. A total of 86 pipe segments were identified as having a MOSR greater than 100.

Figure 7.3 shows pipe segments with a high MOSR that are recommended for rehabilitation. Appendix BCF-3 includes each sewer segment MOSR, pipe size, pipe material, upstream and downstream manhole identification numbers, street name and sewer plat area for proposed rehabilitation projects.

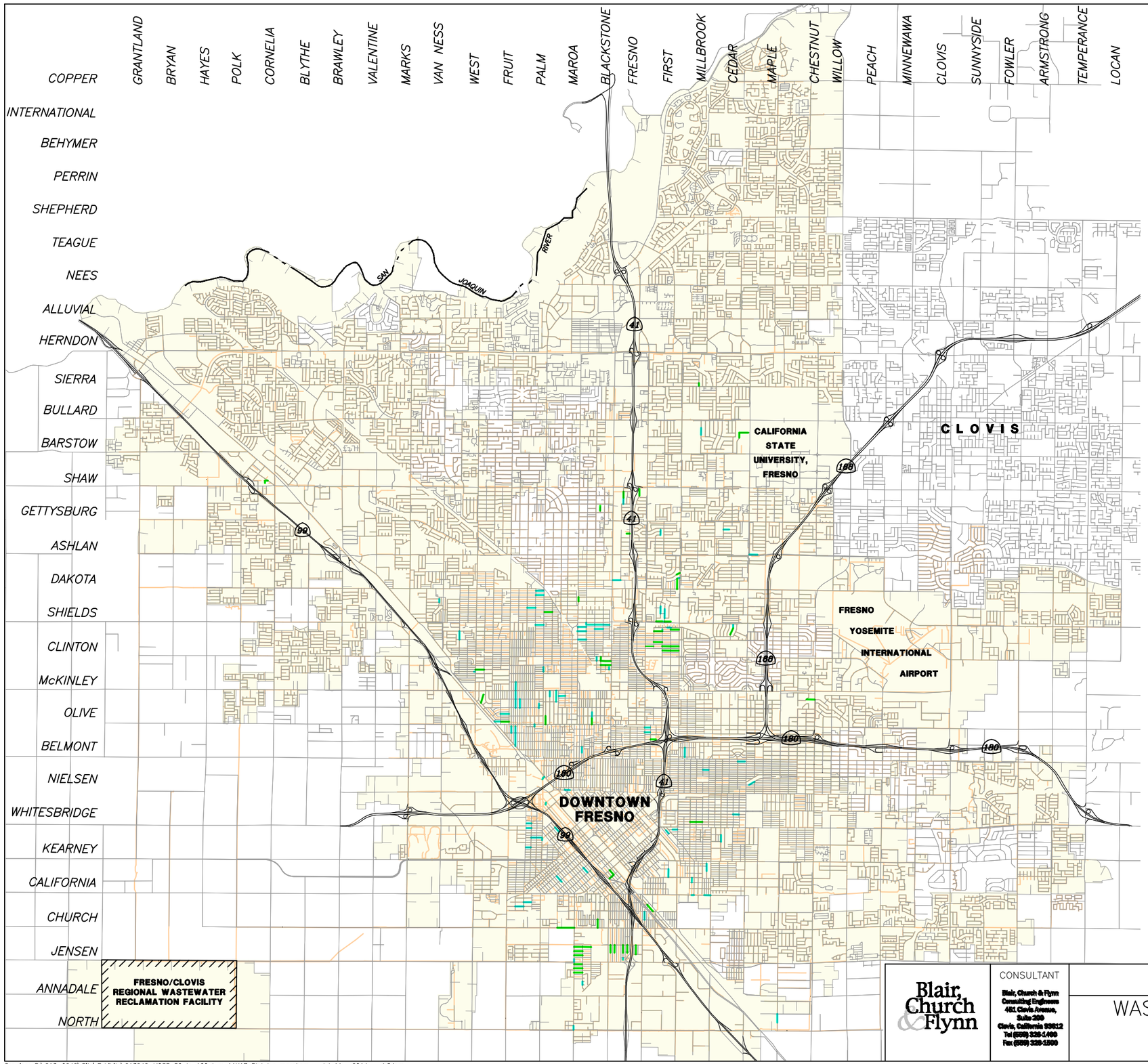
As shown in Table 7.6, only 0.7 percent of the sewers that have been inspected received a MOSR in the severe to critical range, and 2.5 percent of the system received a MOSR in the poor to moderate range. The vast majority (96.9 percent) received an average MOSR rating. It should be noted that as older portions of the city are inspected, the percent of the system with a MOSR greater than 25 will likely increase.

Table 7.6 MOSR Overview
Wastewater Collection System Master Plan Update
City of Fresno

Sewer Condition	Range	Condition Occurrence	Percent of Inspected System
Severe	MOSR ≥ 200	53	0.43
Critical	100 ≤ MOSR < 200	33	0.27
Poor	50 ≤ MOSR < 100	84	0.68
Moderate	25 ≤ MOSR < 50	219	1.77
Average	0 ≤ MOSR < 25	12,010	96.85

7.3.2.3 Previously Recommend Rehabilitation Projects

Five rehabilitation projects identified in the 2006 Wastewater Master Plan remain uncompleted. The rehabilitation projects are identified in the 2006 Wastewater Master Plan as Projects RL11, RS06B, RL02, RS03A and RS04A are summarized in Table 7.7. The project locations can be seen on Figure 7.4.



LEGEND

- SEVERE & CRITICAL MOSR SEWERS (MOSR ≥ 100)
- POOR MOSR SEWERS (50 ≤ MOSR < 100)
- OTHER EXISTING SEWERS
- STREETS
- CITY LIMITS

MOSR Overview
Wastewater Collection System Master Plan Update
City of Fresno

Sewer Condition	Range	Condition Occurrence	Percent of Inspected System
Severe	MOSR ≥ 200	53	0.43
Critical	100 ≤ MOSR < 200	33	0.27
Poor	50 ≤ MOSR < 100	84	0.68

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

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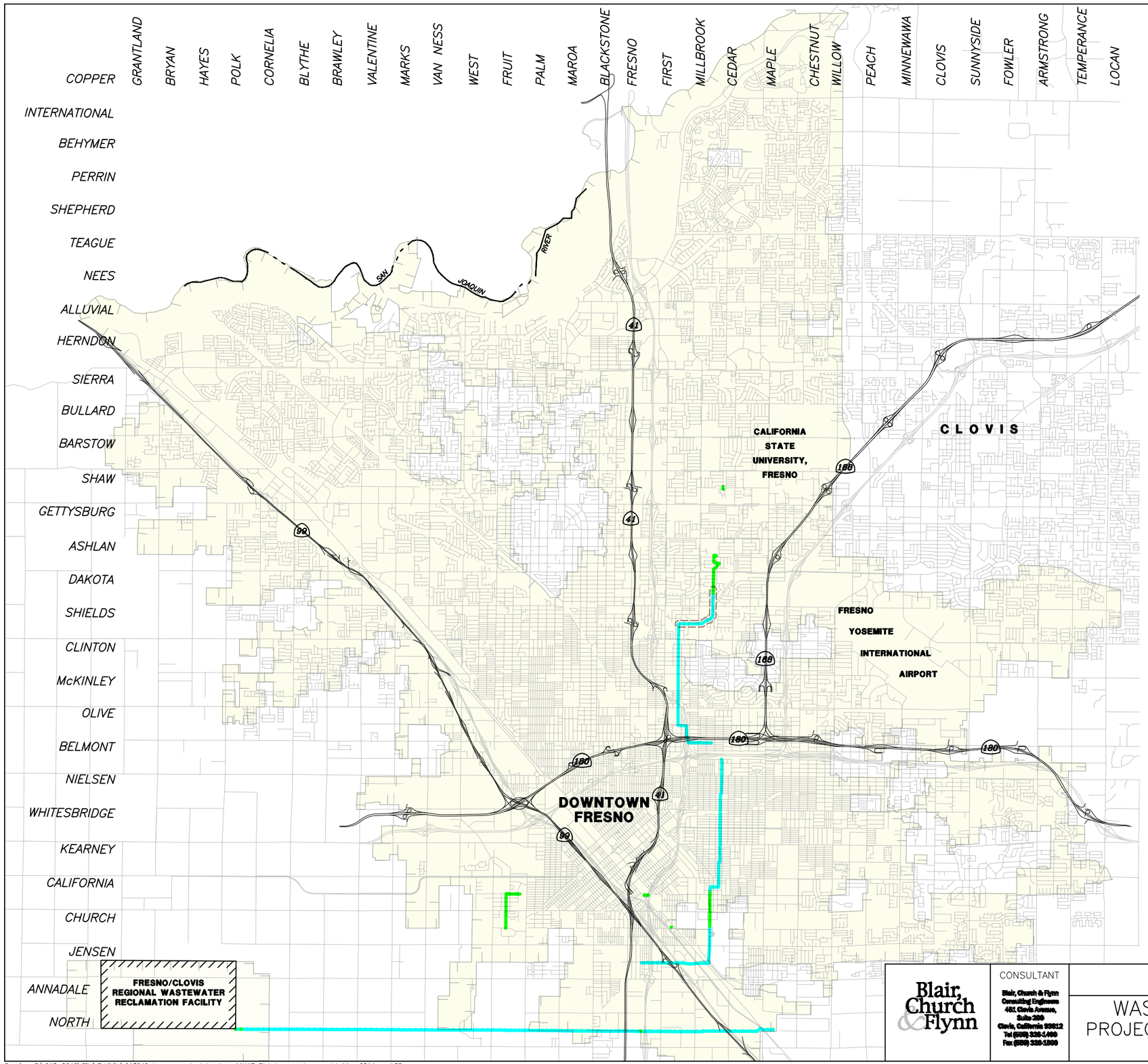
CITY OF FRESNO

WASTEWATER MASTER PLAN
HIGH MOSR SEWERS
FIGURE 7.3

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR 50 to 100.dwg; 11X17 Plot by: mgraham Jul 11, 2014 - 4:54pm



LEGEND

- REHABILITATION PROJECTS
- CAPACITY PROJECTS
- ACTION RECOMMENDED PER THE 2010 MID-SIZED CONCRETE SEWER REPORT
- STREETS
- CITY LIMITS

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

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CITY OF FRESNO

WASTEWATER MASTER PLAN
PROJECTS FROM PREVIOUS REPORTS
FIGURE 7.4

DR. BY JRS
CH. BY LMG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_Improvement status.dwg; 11X17 Plot by: mgraham Jul 11, 2014 - 4:55pm

Table 7.7 Previously Recommend Rehabilitation Projects Wastewater Collection System Master Plan Update City of Fresno			
2006 Master Plan Project Designation	**Pipe Size (inches)**	**Rehabilitation Length (feet)**	**Type of Rehabilitation**
RS03A	24	3,118	CIPP Liner
RS04A	18-21	4,341	CIPP Liner
RS06B	15	300	CIPP Liner
RL02	48	2,644	CIPP Liner
RL11	48-54	3,992	CIPP Liner

7.3.2.4 Sewer Lift Station Survey Results

The City's lift stations were inspected to document existing conditions and make recommendations for rehabilitation. The findings from the inspection are summarized in Table 7.8 for all surveyed locations. Existing liners or coatings were observed to be in some level of distress at all but four of the lift stations inspected and will require liner/coating repair or removal and replacement. Complications with failing liners getting caught in the wet well pumps has been a maintenance issue and can potentially cause damage to the current infrastructure. Lack of liner/coating integrity can allow corrosion and deterioration of substrate materials. During the rehabilitation process, quick connect locations for bypass pumping will be available for some locations on the upstream and downstream side of the wet wells as seen in the available data.

7.4 RECOMMENDED REHABILITATION/REPAIR PLAN

This section summarizes the proposed R&R plan for the City, including a description of the highest priority projects in the "Primary Recommendations" section, and the lower priority projects in the "Secondary Recommendations" section.

All of the proposed projects included in the recommended R&R plan were developed for general master planning purposes based on the best available information provided by the City. For all proposed sewer system rehabilitation and repair projects, the City or its design consultant should conduct a careful review of available or new CCTV video inspection data to verify that there is a defect requiring mitigation and to establish a detailed scope of the remedial work prior to construction.

Table 7.8 Lift Station Condition Survey Results
Wastewater Collection System Master Plan Update
City of Fresno

Lift Station	Existing Liner	New Liner or Rehabilitate Existing Liner Required	Dedicated Upstream Bypass Quick Connection	Dedicated Downstream Bypass Quick Connection	Adequate Site Lighting	History of Odor Control Complaints	Approximate Wet Well Area (ft^2)
LS-01	Y	N	N	N	Y	N	428
LS-02	Y	N	N	N	Y	N	226
LS-03	Y	N	Y	N	N	N	214
LS-04	N	Y	Y	N	Y	N	754
LS-05	N	Y	N	N	Y	N	892
LS-06	Y	Y	Y	Y	Y	N	892
LS-10	N	Y	N	N	Y	N	339
LS-11	Y	Y	N	N	N	N	352
LS-12	Y	N	Y	N	Y	N	434
LS-13	Y	Y	N	N	N	N	310
LS-14	Y	Y	N	N	Y	N	434
LS-15	Y	Y	Y	N	N	N	343
LS-16	Y	Y	N	Y	Y	N	452
LS-18	Y	Y	N	Y	Y	N	561
LS-20	Y	Y	N	N	N	N	855

Notes:
Y = Yes; N = No

7.4.1 Primary Recommendations

7.4.1.1 High Priority Point Repairs

Sewer system defects requiring high priority point repairs, as described in Sections 7.3.1.1 and 7.3.2.1, pose a threat to the sewer system operations and should be the first projects undertaken by the City. The high priority repairs are generally expected to consist of excavation via conventional open cut methods to gain access to the area of defective pipe, removal and replacement of a small section of pipe, followed by trench backfill and resurfacing. For pipe segments that have several significant point defects in proximity to each other, it may be prudent to install a CIPP liner in lieu of removal and replacement of multiple sections of pipe.

High priority repairs described in Sections 7.3.2 and 7.3.3 should be repaired as outlined in Chapter 8.

7.4.1.2 Sewer Rehabilitation - High MOSR

Sewer mains with a MOSR greater than or equal to 100 should be rehabilitated in order of severity. It is anticipated that the pipe segment rehabilitation would be accomplished with a CIPP liner, but other options such as a slip liner or a high-density polyethylene (HDPE) solid wall pipe liner may be considered.

Sewer rehabilitation using a CIPP liner consists of installing a fabric tube that is impregnated with a thermosetting resin, either by hydrostatic inversion methods or by pulling it into the host pipe and expanding it under hydrostatic head, followed by thermal curing. For pipe diameters less than 12-inches, an air inversion process may be used in lieu of a hydrostatic inversion. The air inversion process is faster and more cost effective. No insertion pit excavation is required under most circumstances, and service connection reinstatement may be done by remote internal methods.

CIPP liner installation is usually a completely trenchless process, requiring no excavation. However, open cut excavation is sometimes required in localized areas for placement of temporary wastewater bypass pipelines, for manhole construction if the project includes it, or for repair of localized sewer defects.

Sewer mains with a high MOSR as described in Sections 7.3.1.2 and 7.3.2.2 should be rehabilitated as outlined in Chapter 8.

7.4.1.3 Previously Identified Rehabilitation Projects

Sewers previously identified as requiring rehabilitation as described in Section 7.3.2.3 should be rehabilitated.

7.4.2 Secondary Recommendations

7.4.2.1 Sewer Lift Station Rehabilitation

For all lift stations other than Lift Stations Nos. 1, 2, 3 and 12, lift station facilities should be rehabilitated by repair or removal and replacement of distressed liners and coatings. Where necessary, as indicated in Table 7.9, lift station rehabilitation should include lighting improvements to provide adequate lift station lighting. Lift Station No. 11 is in failing condition and requires replacement of the entire lift station.

Table 7.9 Proposed Lift Station Improvements Wastewater Collection System Master Plan City of Fresno

Lift Station	Existing Wet Well Coating	Failure of Existing Coating	Apply New Wet Well Coating	Install Site Lighting
LS-01	Y	N	N	Y
LS-02	Y	N	Y	Y
LS-03	Y	N	N	N
LS-04	N	N/A	Y	Y
LS-05	N	N/A	Y	Y
LS-06	Y	Y	Y	Y
LS-10	N	N/A	Y	Y
LS-11	Y	Y	N/A	N
LS-12	Y	N/A	N	Y
LS-13	Y	Y	Y	N
LS-14	Y	Y	Y	Y
LS-15	Y	Y	Y	N
LS-16	Y	Y	Y	Y
LS-18	Y	Y	Y	Y
LS-20	Y	N	N	N

Notes:
Y = Yes; N = No; N/A = Not Applicable

7.4.2.2 Unlined Sewer Pipe

Certain pipe materials once commonly used in sanitary sewer systems, such as asbestos cement pipe (ACP), reinforced concrete pipe (RCP), standard (non-reinforced) concrete pipe (SCP), and cast iron pipe (CIP), are susceptible to sulfide-related corrosion, often referred to as microbially-induced corrosion (MIC), if they are not otherwise protected against MIC. MIC can ultimately result in complete pipe wall penetration and sewer collapse, particularly in partly full pipes where wastewater chemistry is conducive to MIC

processes. The rate at which MIC occurs can be highly variable, ranging from none at all where the sewer environment is not conducive to MIC processes, to very rapid in an aggressive sewer environment.

Existing sewers where MIC has resulted in a MOSR greater than 100 are included under the corresponding recommendations of this report. Wherever other sewers exist that are susceptible to MIC, the sewer condition should be carefully evaluated during regular or special sewer inspection efforts to determine the extent to which MIC processes are affecting sewer conditions, and the extent to which sewer rehabilitation may be required to halt MIC processes and preserve sewer main integrity. In general, whenever MIC results in an MOSR greater than 100, the affected sewer should be rehabilitated or replaced.

7.4.2.3 Low MOSR

Low MOSR sewers shall be evaluated on a case by case basis by City personnel to determine the correct action necessary. Sewers that have a “poor” rating in Table 7.4 should be evaluated for rehabilitation following the completion of all primary recommendations.

7.4.3 Prioritization and Scheduling

The sewer system rehabilitation work should generally be prioritized such that the most critical defective areas can be addressed first. The scheduling recommendations were derived from the available PACP records provided by the City, on-site inspections and previous reports. Scheduling for the priority repairs and rehabilitation can be seen in Table 7.10 by the appropriate fiscal years. Projects are further divided into phases which are detailed in Chapter 8.

Table 7.10 Rehabilitation Project Prioritization
Wastewater Collection System Master Plan
City of Fresno

Priority	Project	Fiscal Year
1	High Priority Point Repairs	2015-2020
2	Rehabilitation of Sewer with High MOSR	2015-2020
3	Previously Recommend Rehab Projects	2015-2020
4	Sewer Lift Station Rehabilitation	2015-2020

7.4.4 Recommended Sewer Inspection Plan

7.4.4.1 Background

Approximately 57 percent (916.0 miles) of the City’s sewers have not been inspected via CCTV and evaluated using the PACP coding system. These areas are shown on Figure 7.1. To properly assess a sewer system, an initial baseline inspection is required. The baseline inspection together with subsequent inspections enables users to monitor the

changing conditions of each sewer segment. Areas of the sewer systems that have not been inspected should be a high priority and scheduled for video inspection.

The City currently owns three CCTV trucks which are dedicated to sewer system inspections. The current target productivity rate for all three trucks is 60,300 feet per month which is roughly 0.71 percent of the entire system. At this rate, it would take approximately 11 years to survey the entire system. This target requires that all three trucks be in working order and the appropriate staff be available to operate the equipment. The City also has secured funds to purchase an additional CCTV truck that will be dedicated to sewer system inspections. The purchase of this new CCTV truck is imminent. Once the additional truck is secured the City's productivity rate for four trucks would be 80,400 feet per month, which is roughly 0.95 percent of the entire system.

Prior to CCTV inspection, sewer pipelines should be cleaned of debris to provide a relatively clear path for the tractor mounted camera and potentially uncover any underlying defects. Two cleaning trucks specifically dedicated to aid sewer man inspections are dispatched with the CCTV trucks.

Sewer main inspections can be used to estimate the amount of time needed before pipeline rehabilitation or replacement is required. This can only be accomplished by observing and monitoring the changes between successive inspections. The majority of uninspected pipelines are near the end of their design life or currently exceeding that period. Some of these pipes are probably already in a deteriorated condition and may require immediate maintenance, rehabilitation, repair or replacement.

7.4.4.2 Sewer Inspection: Phase 1 Scheduling

Scheduling for the inspection of sewers is divided into two phases. Phase 1 includes scheduling of work to inspect all sewers that have not had an initial PACP coding system inspection. Once Phase 1 inspections are completed, sewer inspection work should be in accordance with the Phase 2 scheduling. Figure 7.5 includes the limits of uninspected sewers and distinguishes sewers that are susceptible to corrosion from sewers that are not susceptible to corrosion.

For Phase 1 inspections, sewers that are susceptible to corrosions should be inspected first. Sewers that are not susceptible to corrosion should be given second priority in the schedule. Table 7.11 summarizes the length of sewers that have not been inspected. Based on the City's expected productivity rate of 80,400 feet per month, the time to complete an initial inspection of sewers that are susceptible to corrosion and not susceptible to corrosion is 0.54 and 4.47 years, respectively.

GRANTLAND
BRYAN
HAYES
POLK
CORNELIA
BLYTHE
BRAWLEY
VALENTINE
MARKS
VAN NESS
WEST
FRUIT
PALM
MAROA
BLACKSTONE
FRESNO
FIRST
MILLBROOK
CEDAR
MAPLE
CHESTNUT
WILLOW
PEACH
MINNEWAWA
CLOVIS
SUNNYSIDE
FOWLER
ARMSTRONG
TEMPERANCE
LOGAN

COPPER
INTERNATIONAL
BEHYMER
PERRIN
SHEPHERD
TEAGUE
NEES
ALLUVIAL
HERNDON
SIERRA
BULLARD
BARSTOW
SHAW
GETTYSBURG
ASHLAN
DAKOTA
SHIELDS
CLINTON
McKINLEY
OLIVE
BELMONT
NIELSEN
WHITESBRIDGE
KEARNEY
CALIFORNIA
CHURCH
JENSEN
ANNANDALE
NORTH

CALIFORNIA STATE UNIVERSITY, FRESNO

CLOVIS

FRESNO YOSEMITE INTERNATIONAL AIRPORT

DOWNTOWN FRESNO

FRESNO/CLOVIS REGIONAL WASTEWATER RECLAMATION FACILITY

41
99
180
168
190

LEGEND

- UNINSPECTED SEWER PIPE SUSCEPTIBLE TO CORROSION
- UNINSPECTED SEWER PIPES NOT SUSCEPTIBLE TO CORROSION
- STREETS
- CITY LIMITS

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

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CITY OF FRESNO

WASTEWATER MASTER PLAN
UNINSPECTED CORROSION POTENTIAL
FIGURE 7.5

DR. BY JRS
CH. BY MDG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_UninspectedCorrosionSusceptible.DWG; 11x17 Plot by: mgraham Jul 11, 2014 - 4:56pm

Table 7.11 Phase 1 Sewer Inspection Schedule Wastewater Collection System Master Plan City of Fresno		
Sewer Description	**Length (miles)**	**Time to Complete[1] (Years)**
Susceptible to Corrosion, Not Inspected	98.9	0.54
Not Susceptible to Corrosion, Not Inspected	817.1	4.47
Total	**916.0**	**5.01**

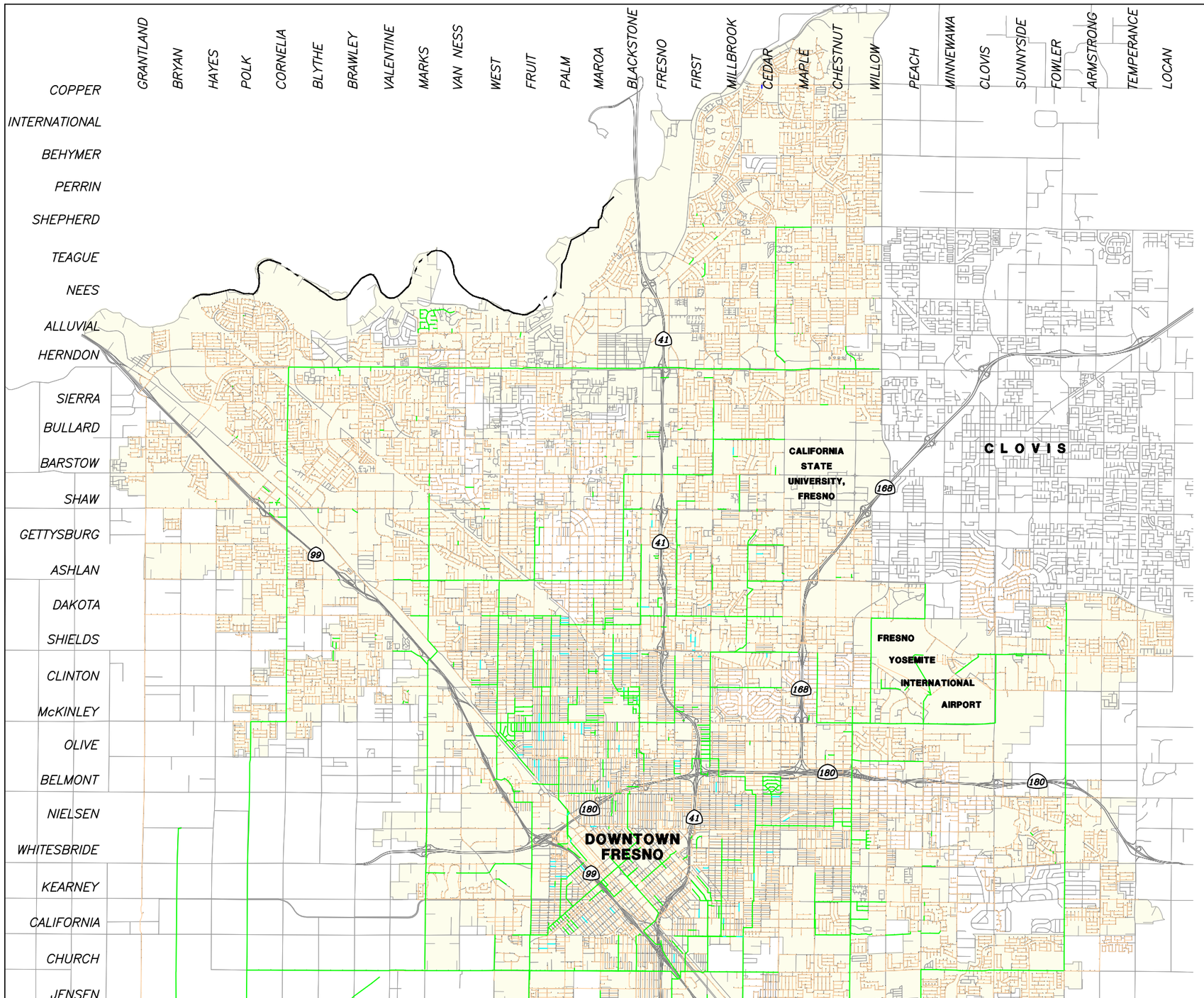
Notes:
(1) Based on an inspection rate of 80,400 feet per month.

7.4.4.3 Sewer Inspection: Phase 2 Scheduling

The second phase includes scheduling to provide subsequent inspection of all sewers and should be in accordance with Table 7.12.

Sewer systems shall also be inspected based upon their MOSR as show in Table 7.12. Elevated MOSR sections shall be monitored to observe existing problems and changing conditions. If a CCTV inspection reveals a section of pipe that has an MOSR greater than 100, the section of pipe should be rehabilitated. Figure 7.6 represents the recommended sewer inspection phasing.

Table 7.12 Inspection Frequency Wastewater Collection System Master Plan City of Fresno	
Sewer Description	**Maximum Inspection Frequency Interval (Years)**
Pipe Materials Susceptible to Corrosion	5
Sewers with a MOSR between 50 and 100	5
Pipe Materials Not Susceptible to Corrosion	10



LEGEND

- PIPES SUSCEPTIBLE TO CORROSION
- PIPES NOT SUSCEPTIBLE TO CORROSION
- POOR MOSR SEWERS (50 ≤ MOSR < 100)
- STREETS
- CITY LIMITS

SCALE: N 1"=8000'

0 4000 8000 16000
SCALE IN FEET

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CITY OF FRESNO

WASTEWATER MASTER PLAN
INSPECTION FREQUENCY
FIGURE 7.6

DR. BY JRS
CH. BY MDG
DATE 7-3-14
SCALE: AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\213-0242\Site\Exhibits\213242_PipeCorrosion.dwg; 11x17 Plot by: mgraham Jul 22, 2014 - 10:07am

CAPITAL IMPROVEMENT PLAN

This chapter describes the development of the Capital Improvement Plan (CIP). This CIP is a comprehensive plan that incorporates recommended improvements identified in Chapters 6 and 7 of this report.

8.1 CAPITAL IMPROVEMENT PROJECT COSTS

The capital improvement project costs are based on City of Fresno (City) bid results for wastewater projects, previous cost studies, interviews with local contractors and our project experience with similar wastewater infrastructure projects throughout the Central Valley. The costs have been adjusted to the Engineering News Record Construction Cost Index 20 City Average of 9,800 for June 2014.

8.2 COST ESTIMATING ACCURACY

Cost estimates have been developed to help the City prepare budgeting and scheduling for these projects. The cost estimates included in this master plan are Class 5 estimates as defined by the Association for the Advancement of Cost Engineering (AACE) International publication entitled *Recommend Practice No. 56R-08*. Class 5 estimates are generally prepared on limited design information and subsequently have wide accuracy ranges. A typical Class 5 estimate for a civil engineering project may have an accuracy range as broad as -30 percent to +50 percent, or as narrow as -20 percent to +30 percent. Class 5 estimates are typically used for evaluation of resource needs, budgeting and capital planning.

8.3 CONSTRUCTION UNIT COSTS

The construction unit costs for sewer infrastructure projects are based on a normal bidding environment and normal construction schedules. Costs for new projects and rehabilitation projects are included.

8.3.1 Rehabilitation Unit Costs

One goal in developing unit costs for pipe rehabilitation was to develop “loaded” unit costs which, when applied to the key elements of the capital improvement projects, would result in an estimated project cost inclusive of all necessary associated incidental and ancillary work. Recent City bid tabulations for sewer rehabilitation projects were primarily used to develop rehabilitation unit costs.

8.3.1.1 Point Repairs

Point repairs costs include temporary wastewater handling, traffic control, excavation, removal and replacement of up to 15 feet of sewer pipe, backfill, video inspection of repaired line, and surface restoration. Nearly all defects requiring point repairs occur on sewer mains ranging in size from 6 to 15 inches. Between August 2013 and March 2014, the City completed 4 point repair projects for pipe sizes ranging from 4-to 12-inches. The cost for the point repair projects ranged from $15,250 to $16,650 with an average cost of approximately $16,000. Based on these results it appears that the pipe size has little effect on the cost of point repairs for small to medium sized sewer mains. As a result, a cost of $16,000 per point repair is used for point repairs on pipe sizes ranging from 6 to 15 inches.

8.3.1.2 Sewer Main Rehabilitation

For sewer mains with moderate defects throughout, rehabilitation of the entire sewer main is necessary. Sewer main rehabilitation is commonly accomplished via the installation of an internal liner. Sewer main rehabilitation costs are based on cured-in-place pipe (CIPP) liner methods, which is the most common type of liner used for City projects. Bid summaries for 17 recent City CIPP sewer rehabilitation projects, for sewers ranging in size from 6- to 45-inches in diameter, were used to help develop unit costs. See Table 8.1 for estimated sewer main rehabilitation unit costs.

Table 8.1 Cured-in-Place Pipe Rehabilitation Unit Costs
Wastewater Collection System Master Plan Update
City of Fresno

Item No.	Item Description	Cost Per Foot ($)
1	6" CIPP Sewer Rehabilitation	100
2	8" CIPP Sewer Rehabilitation	113
3	10" CIPP Sewer Rehabilitation	126
5	12" CIPP Sewer Rehabilitation	140
6	15" CIPP Sewer Rehabilitation	160
7	18" CIPP Sewer Rehabilitation	180
8	21" CIPP Sewer Rehabilitation	200
9	24" CIPP Sewer Rehabilitation	220
10	27" CIPP Sewer Rehabilitation	240
11	30" CIPP Sewer Rehabilitation	260
12	36" CIPP Sewer Rehabilitation	300
13	42" CIPP Sewer Rehabilitation	400
14	45" CIPP Sewer Rehabilitation	470

8.3.1.3 Lift Station Rehabilitation

Lift Station rehabilitation includes removal and replacement of failed existing wet well coatings or application of wet well coatings to uncoated wet wells. Recent construction cost data for wet well rehabilitation is not available but interviews with two coating contractors were conducted to help determine construction costs. Wet well rehabilitation costs include bypass pumping, interior wet well surface preparation, coating application, and non destructive testing. Estimated wet well rehabilitation unit costs are summarized in Table 8.2.

Table 8.2 Lift Station Rehabilitation Unit Costs
Wastewater Collection System Master Plan Update
City of Fresno

Item No.	Item Description	Cost per square foot ($)
1	Removal of Existing Liner	25
2	Install New Liner	40
3	Bypass Pumping	Site Specific

8.3.2 New or Replacement Unit Costs

Unit costs for new or replacement infrastructure are “loaded” unit costs which, when applied to the key elements of the capital improvement projects, would result in an estimated project cost inclusive of all necessary associated incidental and ancillary work. Recent City bid tabulations for new sewer construction projects were primarily used to develop unit costs.

8.3.2.1 New or Replacement Sewer Mains

New or replacement sewer mains range in size from 8- to 60-inches. Bid summaries for 7 recent City new or replacement sewer main projects for sewers ranging in size from 8- to 72-inches in diameter were used to help develop unit costs. See Table 8.3 for estimated sewer main installation unit costs.

Table 8.3 Pipe Construction Unit Costs
Wastewater Collection System Master Plan Update
City of Fresno

Item No.	Item Description	Cost per Foot ($)
1	6" PVC Sewer Pipe	185
2	8" PVC Sewer Pipe	195
3	10" PVC Sewer Pipe	210
5	12" PVC Sewer Pipe	225

Table 8.3 Pipe Construction Unit Costs Wastewater Collection System Master Plan Update City of Fresno		
Item No.	**Item Description**	**Cost per Foot ($)**
6	15" PVC Sewer Pipe	245
7	18" PVC Sewer Pipe	265
8	21" PVC Sewer Pipe	285
9	24" PVC Sewer Pipe	305
10	27" PVC Sewer Pipe	335
11	30" PVC Sewer Pipe	370
12	36" PVC Sewer Pipe	440
13	42" PVC Lined RCP Sewer Pipe	485
14	48" PVC Lined RCP Sewer Pipe	530
15	54" PVC Lined RCP Sewer Pipe	570
16	60" PVC Lined RCP Sewer Pipe	615
17	66" PVC Lined RCP Sewer Pipe	655

8.3.2.2 Lift Station Replacement

As described in Chapter 7, Lift Station No. 11 is slated for a complete removal and replacement. A unit cost of $110,000 was used for the lift station based on a recently constructed lift station of comparable size and complexity.

8.4 PROJECT COSTS AND CONTINGENCIES

8.4.1 Baseline Construction Costs

Baseline construction costs were developed for all rehabilitation and replacement/new projects. The baseline construction costs for each type of project were developed according to the methods described below.

Rehabilitation Projects:

1. Point Repairs: Determined by multiplying the unit cost by the number of point repairs.
2. Sewer Main Rehabilitation: Determined by multiplying the pipeline length by the CIPP liner unit costs.
3. Pump Station Wet Well Coating (Remove and Replace): Determined by multiplying the wet well interior area by the unit cost for coating removal and replacement together with the unit costs for bypass pumping.

4. Pump Station Wet Well Coating (Bare Concrete): Determined by multiplying the wet well interior area by the unit cost for wet well coating together with the unit costs for bypass pumping.

New or Replacement Projects:

1. New or Replacement Pipeline: Determined by multiplying the pipeline length by the unit costs for new or replacement pipe.
2. Replacement Lift Station: Determined by using the unit cost described in Section 8.3.2.2.

8.4.2 Construction Costs Contingency

Development of the recommended wastewater construction projects is limited to a master planning level of detail. As such, a 25 percent contingency has been added to all construction project costs to help account for unknown conditions, fluctuations in material prices, changes in the bidding climate and unexpected changes to the scope of the projects.

8.5 CAPITAL IMPROVEMENT COSTS

8.5.1 Capital Improvement Cost Summary

The Capital Improvement Cost is the total estimated cost for each project and includes the baseline construction costs (BCC), contingency, engineering, and management costs. The composition of the baseline construction cost is detailed in Section 8.4.1 of this report. Contingencies are calculated as 25 percent of the baseline construction cost to help account for unknown or changed conditions. The engineering portion of the estimate is 10 percent of the BCC and includes all services normally required to produce construction documents and provide engineering support during bidding and construction phases. This includes the production of plans, specifications, and construction support for each project. Management is the final portion of the Capital Improvement Cost and is calculated at 10 percent of the BCC. Management costs encompass all administrative expenditures, legal fees, financing, and environmental documents required for construction. The summation of all these components covers the total cost for each project.

8.5.2 Capital Improvement Implementation

The CIP Scheduling assigns a fiscal year for each project as a target date for construction. The CIP scheduling was developed with consideration given to the following:

- Project Prioritization
- Anticipated City Growth Rates and Patterns
- Cost Distribution and Budgeting

- City Direction

Short term projects are phased by year through the year 2020 and long-term projects are phased in five year increments beginning in 2020 through 2035.

Rehabilitation projects and capacity projects are given the highest priority needs are and are all scheduled as short term projects to be completed between 2015 and 2020. Each project is itemized by phase in Table 8.5. Appendix J includes a large format figure showing all CIP projects. Appendix F includes detailed project summary sheets for CIP projects scheduled to be completed between 2015 and 2020.

8.6 EXISTING VERSUS FUTURE USER COST SHARE

The CIP includes projects that will benefit existing users and future users. An initial estimate of the project benefit for existing and future users is included in Table 8.4.

Table 8.4 Summary of Capital Improvement Costs
Wastewater Collection System Master Plan Update
City of Fresno

	Implementation Phase				
Reimbursement Category	**2015-20 ($, mill.)**	**2021-25 ($, mill.)**	**2026-30 ($, mill.)**	**2031-35 ($, mill.)**	**Total ($, mill.)**
Existing User	46.3	55.6	6.1	0	108.0
Future User	0.1	0.2	1.1	202.9	204.3
Total	**46.4**	**55.8**	**7.2**	**202.9**	**312.3**

Notes:
(1) Costs are based on ENR CCI 20-City Average of 9,800 (June 2014).

Table 8.5 Capital Improvement Projects
Wastewater Collection System Master Plan
City of Fresno

Job No.	Project Type	Description / Limits		Existing Diameter (in)	New Diameter (in)	Rehab, Replace, or New	Length (ft)	Improvement Cost ($)	Capital Improvement Phasing				Future User Benefit (%)	Reimbursement Category	
									Phase 1 2015-2020 ($)	Phase 2 2021-2025 ($)	Phase 3 2026-2030 ($)	Phase 4 2031-2035 ($)		Existing Improvements	Future Improvements
Existing Improvements															
C-1A	Gravity	Hammond Avenue	Between Blackstone Ave. and Abby St.	20	**24**	Replace	390	$ 412,000	$ 412,000				7%	$ 383,160	$ 28,840
C-1B	Gravity	Abby Street	From Hammond Ave. to La Salle Ave.	20	**24**	Replace	1,322	$ 868,000	$ 868,000				7%	$ 807,240	$ 60,760
C-2A	Gravity	Glenn Avenue	From Bremer Ave. to Thomas Ave.	24	**27**	Replace	391	$ 430,000	$ 430,000				7%	$ 399,900	$ 30,100
C-2B	Gravity	Glenn Avenue	From HWY 180 to Voorman Ave.	24	**27**	Replace	2,580	$ 1,580,000		$ 1,580,000			14%	$ 1,358,800	$ 221,200
C-3	Gravity	Glenn Avenue / N Street	From Voorman Ave. to Tuolumne St.	27	**30**	Replace	1,530	$ 1,148,000			$ 1,148,000		19%	$ 929,880	$ 218,120
C-4	Gravity	Monterey Street	From Fulton Street to N Street	6	**10**	Replace	1,812	$ 683,000			$ 683,000		0%	$ 683,000	$ -
C-5A	Gravity	Eighth Street	From Ventura St. to Woodward Ave.	36	**42**	Replace	4,717	$ 3,825,000			$ 3,825,000		17%	$ 3,174,750	$ 650,250
C-5B	Gravity	Woodward Avenue	From Eighth St. to Orange Ave.	36	**42**	Replace	629	$ 733,000			$ 733,000		17%	$ 608,390	$ 124,610
C-5C	Gravity	Orange Avenue	From Woodward Ave. to California Ave.	36	**42**	Replace	693	$ 778,000			$ 778,000		17%	$ 645,740	$ 132,260
C-6	Gravity	Safford Avenue	From Producers Dairy to H Street	6	**8**	Replace	930	$ 329,000		$ 329,000			0%	$ 329,000	$ -
							Existing Improvement Totals	**$ 10,786,000**	**$ 1,710,000**	**$ 1,909,000**	**$ 7,167,000**	**$ -**		**$ 9,319,860**	**$ 1,466,140**
Build-Out Improvements															
C-7	Gravity	Tuolumne Street/ Van Ness Avenue	From N Street to Merced St.	27	**30**	Replace	1,679	$ 1,228,000				$ 1,228,000	100%	$ -	$ 1,228,000
C-8	Gravity	North Avenue	From Polk Ave. Alignment to Fruit Ave.	-	**60**	New	20,857	$ 19,615,000				$ 19,615,000	100%	$ -	$ 19,615,000
C-9	Gravity	North Avenue	From Fruit Ave. to Orange Ave.	60	**60**	Rehab	15,514	$ 15,376,000				$ 15,376,000	100%	$ -	$ 15,376,000
D-1	Gravity	Temperance Avenue	From North Ave. to Jensen Ave.	-	**48**	New	5,875	$ 4,805,000				$ 4,805,000	100%	$ -	$ 4,805,000
D-2	Gravity	Temperance Avenue	From Jensen Ave. to Tulare St.	-	**42**	New	13,352	$ 10,224,000				$ 10,224,000	100%	$ -	$ 10,224,000
D-3	Gravity	Temperance Avenue	From Tulare St. to Olive Ave.	-	**36**	New	4,987	$ 3,508,000				$ 3,508,000	100%	$ -	$ 3,508,000
D-4	Gravity	Temperance/McKinley/DeWolf	From Olive Ave. to Shields Ave.	-	**30**	New	13,300	$ 7,970,000				$ 7,970,000	100%	$ -	$ 7,970,000
D-5	Gravity	Shields Ave./Leonard Ave.	From DeWolf Ave. to Dakota Ave.	-	**27**	New	4,575	$ 2,397,000				$ 2,397,000	100%	$ -	$ 2,397,000
D-6A	Gravity	Jensen Avenue	From Temperance Ave. to DeWolf Ave.	-	**15**	New	5,228	$ 2,053,000				$ 2,053,000	100%	$ -	$ 2,053,000
D-6B	Gravity	Jensen Avenue	From DeWolf Ave. to Leonard Ave.	-	**12**	New	2,732	$ 964,000				$ 964,000	100%	$ -	$ 964,000
D-7A	Gravity	Church Avenue	From Temperance Ave. to Locan Ave.	-	**15**	New	2,552	$ 1,016,000				$ 1,016,000	100%	$ -	$ 1,016,000
D-7B	Gravity	Church Avenue	From Locan Ave. to DeWolf Ave.	-	**12**	New	2,729	$ 963,000				$ 963,000	100%	$ -	$ 963,000
D-7C	Gravity	Church Avenue	From DeWolf Ave. to Leonard Ave.	-	**8**	New	2,673	$ 829,000				$ 829,000	100%	$ -	$ 829,000
D-8A	Gravity	California Avenue	From Temperance Ave to Locan Ave.	-	**18**	New	2,676	$ 1,137,000				$ 1,137,000	100%	$ -	$ 1,137,000
D-8B	Gravity	California Avenue	From Locan Ave. to DeWolf Ave.	-	**15**	New	2,670	$ 1,058,000				$ 1,058,000	100%	$ -	$ 1,058,000
D-8C	Gravity	California Avenue	From DeWolf Ave. to Leonard Ave.	-	**10**	New	2,617	$ 870,000				$ 870,000	100%	$ -	$ 870,000
D-9A	Gravity	Butler Avenue	From Temperance Ave to Locan Ave.	-	**18**	New	2,617	$ 1,115,000				$ 1,115,000	100%	$ -	$ 1,115,000
D-9B	Gravity	Butler Avenue	From Locan Ave. to DeWolf Ave.	-	**15**	New	2,611	$ 1,037,000				$ 1,037,000	100%	$ -	$ 1,037,000
D-9C	Gravity	Butler Avenue	From DeWolf Ave. to Leonard Ave.	-	**8**	New	2,789	$ 862,000				$ 862,000	100%	$ -	$ 862,000
D-10A	Gravity	Tulare Street	From Temperance Ave. to Locan Ave.	-	**21**	New	2,730	$ 1,237,000				$ 1,237,000	100%	$ -	$ 1,237,000
D-10B	Gravity	Tulare Street/DeWolf Avenue	From Locan Ave. to Laurel Ave. Alignment	-	**15**	New	4,035	$ 1,586,000				$ 1,586,000	100%	$ -	$ 1,586,000
D-10C	Gravity	Laurel Avenue Alignment	From DeWolf Ave. to Leonard Ave.	-	**8**	New	2,729	$ 845,000				$ 845,000	100%	$ -	$ 845,000
D-10D	Gravity	Locan Ave/ Belmont Ave.	From Tulare St. to DeWolf Ave.	-	**12**	New	4,926	$ 1,738,000				$ 1,738,000	100%	$ -	$ 1,738,000
D-10E	Gravity	Belmont Avenue	From DeWolf Ave. to Leonard Ave.	-	**10**	New	2,554	$ 851,000				$ 851,000	100%	$ -	$ 851,000
D-11A	Gravity	Olive Avenue	From Temperance Ave. to Locan Ave.	-	**15**	New	2,671	$ 1,058,000				$ 1,058,000	100%	$ -	$ 1,058,000
D-11B	Gravity	Olive Avenue	From Locan Ave. to DeWolf Ave.	-	**12**	New	2,613	$ 926,000				$ 926,000	100%	$ -	$ 926,000
D-11C	Gravity	Olive Avenue	From DeWolf Ave. to Leonard Ave.	-	**8**	New	2,617	$ 813,000				$ 813,000	100%	$ -	$ 813,000
D-12A	Gravity	McKinley Avenue	From DeWolf Ave. to Leonard Ave.	-	**21**	New	2,729	$ 1,237,000				$ 1,237,000	100%	$ -	$ 1,237,000
D-12B	Gravity	McKinley Avenue	From Leonard Ave. to Thompson Ave.	-	**18**	New	5,103	$ 2,157,000				$ 2,157,000	100%	$ -	$ 2,157,000
D-12C	Gravity	Thompson Avenue	From McKinley Ave. to Clinton Ave.	-	**15**	New	2,730	$ 1,079,000				$ 1,079,000	100%	$ -	$ 1,079,000
D-13	Gravity	Clinton Avenue	From DeWolf Ave. to Leonard Ave.	-	**10**	New	2,492	$ 832,000				$ 832,000	100%	$ -	$ 832,000
D-14	Gravity	North Avenue	From Peach Ave. to Temperance Ave.	-	**36**	New	15,787	$ 11,051,000				$ 11,051,000	100%	$ -	$ 11,051,000

Table 8.5 Capital Improvement Projects
Wastewater Collection System Master Plan
City of Fresno

Job No.	Project Type	Description / Limits		Existing Diameter (in)	New Diameter (in)	Rehab, Replace, or New	Length (ft)	Improvement Cost ($)	Capital Improvement Phasing: Phase 1 2015-2020 ($)	Phase 2 2021-2025 ($)	Phase 3 2026-2030 ($)	Phase 4 2031-2035 ($)	Future User Benefit (%)	Reimbursement Category: Existing Improvements	Reimbursement Category: Future Improvements
D-15	Gravity	Minnewawa Avenue	From North Ave. to Annadale Ave.	-	**12**	New	2,730	$ 964,000				$ 964,000	100%	$ -	$ 964,000
D-16	Gravity	Sunnyside Avenue	From North Ave. to Annadale Ave.	-	**15**	New	2,611	$ 1,037,000				$ 1,037,000	100%	$ -	$ 1,037,000
D-17	Gravity	Fowler Avenue	From North Ave. to Annadale Ave.	-	**10**	New	2,789	$ 922,000				$ 922,000	100%	$ -	$ 922,000
D-18	Gravity	Armstrong Avenue	From North Ave. to Annadale Ave.	-	**8**	New	2,671	$ 828,000				$ 828,000	100%	$ -	$ 828,000
D-19A	Gravity	Valentine Avenue	From Church Ave. to Kearney Frontage	-	**12**	New	3,945	$ 1,389,000				$ 1,389,000	100%	$ -	$ 1,389,000
D-19B	Gravity	Valentine Avenue	From Kearney Frontage to Madison Ave.	-	**10**	New	1,312	$ 444,000				$ 444,000	100%	$ -	$ 444,000
D-20	Gravity	Brawley Avenue	From Church Ave. to Madison Ave.	-	**8**	New	5,303	$ 1,630,000				$ 1,630,000	100%	$ -	$ 1,630,000
D-21A	Gravity	Whitesbridge Avenue	From Polk Ave. to Blythe Ave.	-	**12**	New	5,271	$ 1,851,000				$ 1,851,000	100%	$ -	$ 1,851,000
D-21B	Gravity	Whitesbridge/Brawley Avenue	From Blythe Ave. to Nielsen Ave.	-	**10**	New	5,392	$ 1,773,000				$ 1,773,000	100%	$ -	$ 1,773,000
D-22A	Gravity	Belmont Avenue	From Polk Ave. to Cornelia Ave.	-	**12**	New	2,716	$ 959,000				$ 959,000	100%	$ -	$ 959,000
D-22B	Gravity	Belmont Avenue	From Cornelia Ave. to Blythe Ave.	-	**10**	New	2,675	$ 887,000				$ 887,000	100%	$ -	$ 887,000
D-22C	Gravity	Belmont Avenue	From Blythe Ave. to Brawley Ave.	-	**8**	New	2,640	$ 819,000				$ 819,000	100%	$ -	$ 819,000
D-23A	Gravity	Olive Avenue	From Polk Ave. to Blythe Ave.	-	**12**	New	5,260	$ 1,847,000				$ 1,847,000	100%	$ -	$ 1,847,000
D-23B	Gravity	Olive Avenue	From Blythe Ave. to Brawley Ave.	-	**8**	New	2,675	$ 829,000				$ 829,000	100%	$ -	$ 829,000
D-24A	Gravity	Olive Avenue	From Grantland Ave. to Bryan Ave.	-	**12**	New	2,649	$ 937,000				$ 937,000	100%	$ -	$ 937,000
D-24B	Gravity	Olive Avenue	From Bryan Ave. to Hayes Ave.	-	**10**	New	1973	$ 659,000				$ 659,000	100%	$ -	$ 659,000
D-25	Gravity	McKinley Avenue	From Grantland Ave. to Ring Ave.	-	**10**	New	3,603	$ 1,199,000				$ 1,199,000	100%	$ -	$ 1,199,000
D-26A	Gravity	Clinton Avenue	From Grantland Ave. to Bryan Ave.	-	**12**	New	2,645	$ 936,000				$ 936,000	100%	$ -	$ 936,000
D-26B	Gravity	Clinton Avenue	From Bryan Ave. to Hayes Ave.	-	**10**	New	2,592	$ 862,000				$ 862,000	100%	$ -	$ 862,000
D-27A	Gravity	Shields Avenue	From Grantland Ave. to Bryan Ave.	-	**15**	New	2,627	$ 1,042,000				$ 1,042,000	100%	$ -	$ 1,042,000
D-27B	Gravity	Shields Avenue	From Bryan Ave. to Hayes Ave.	-	**12**	New	2,592	$ 919,000				$ 919,000	100%	$ -	$ 919,000
							Build-Out Improvement Totals	**$ 125,170,000**	**$ -**	**$ -**	**$ -**	**$ 125,170,000**		**$ -**	**$ 125,170,000**
New Facilities															
NCFWRF-1	Treatment	Cedar/Dakota, Scalping Plant at Vacant Field Behind Granite Park		-	**6 mgd**	New	-	$ 51,106,000		$ 51,106,000			0%	$ 51,106,000	$ -
NCFWRF-2	Gravity	Dakota, From Treatment Facility to Millbrook Ave.		-	**36**	New	4,042	$ 2,833,000		$ 2,833,000			0%	$ 2,833,000	$ -
SEGA	Treatment	Temperance, Scalping Plant On Corner of Temperance and North Ave.		-	**15 mgd**	New	-	$ 77,760,000				$ 77,760,000	100%	$ -	$ 77,760,000
							New Facilities Totals	**$ 131,699,000**	**$ -**	**$ 53,939,000**	**$ -**	**$ 77,760,000**		**$ 53,939,000**	**$ 77,760,000**
Lift Stations															
LS-1	Lift Station	West of Jensen and Walnut Avenues		-	-	-	-	$ 15,000	$ 15,000					$ 15,000	$ -
LS-2	Lift Station	Kearney Boulevard and Marks Avenue		-	-	-	-	$ 39,000	$ 39,000					$ 39,000	$ -
LS-3	Lift Station	North of Shield and Wilson Avenues		-	-	-	-	$ 15,000	$ 15,000					$ 15,000	$ -
LS-4	Lift Station	Riverview Drive and Bluff Avenue		-	-	-	-	$ 200,000	$ 200,000					$ 200,000	$ -
LS-5	Lift Station	Fort Washington Road and Champlain Drive		-	-	-	-	$ 96,000	$ 96,000					$ 96,000	$ -
LS-6	Lift Station	Southeast of Perrin Avenue and Champlain Drive		-	-	-	-	$ 114,000	$ 114,000					$ 114,000	$ -
LS-10	Lift Station	Stratford and Woodlawn Drives		-	-	-	-	$ 49,000	$ 49,000					$ 49,000	$ -
LS-11	Lift Station	East of Cedar and Copper Avenues		-	-	-	-	$ 160,000	$ 160,000					$ 160,000	$ -
LS-12	Lift Station	Carnegie and Bullard Avenues		-	-	-	-	$ -	$ -					$ -	$ -
LS-13	Lift Station	North of Jackson and University Avenues		-	-	-	-	$ 59,000	$ 59,000					$ 59,000	$ -
LS-14	Lift Station	East of Carnegie and Alluvial Avenues		-	-	-	-	$ 70,000	$ 70,000					$ 70,000	$ -
LS-15	Lift Station	North of Haston Avenue and Fountain Way		-	-	-	-	$ 128,000	$ 128,000					$ 128,000	$ -
LS-16	Lift Station	Northwest of Santa Fe and El Paso Avenues		-	-	-	-	$ 72,000	$ 72,000					$ 72,000	$ -
LS-18	Lift Station	South of Nielsen and Hughes Avenues		-	-	-	-	$ 82,000	$ 82,000					$ 82,000	$ -
LS-20	Lift Station	North of Cherry and Muscat Avenues		-	-	-	-	$ 15,000	$ 15,000					$ 15,000	$ -
							Lift Station Totals	**$ 1,114,000**	**$ 1,114,000**	**$ -**	**$ -**	**$ -**		**$ 1,114,000**	**$ -**
Point Repairs															
HPPR-1	Point Repair	250 Priority Point Repairs as determined by City of Fresno personnel		Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -

Table 8.5 Capital Improvement Projects
Wastewater Collection System Master Plan
City of Fresno

Job No.	Project Type	Description / Limits	Existing Diameter (in)	New Diameter (in)	Rehab, Replace, or New	Length (ft)	Improvement Cost ($)	Capital Improvement Phasing: Phase 1 2015-2020 ($)	Phase 2 2021-2025 ($)	Phase 3 2026-2030 ($)	Phase 4 2031-2035 ($)	Future User Benefit (%)	Reimbursement Category: Existing Improvements	Future Improvements
HPPR-2	Point Repair	250 Priority Point Repairs as determined by City of Fresno personnel	Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -
HPPR-3	Point Repair	250 Priority Point Repairs as determined by City of Fresno personnel	Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -
HPPR-4	Point Repair	250 Priority Point Repairs as determined by City of Fresno personnel	Varies	Varies	Replace	Varies	$ 5,800,000	$ 5,800,000					$ 5,800,000	$ -
HPPR-5	Point Repair	249 Priority Point Repairs as determined by City of Fresno personnel	Varies	Varies	Replace	Varies	$ 5,777,000	$ 5,777,000					$ 5,777,000	$ -
						Point Repair Totals	**$ 28,977,000**	**$ 28,977,000**	**$ -**	**$ -**	**$ -**		**$ 28,977,000**	**$ -**
Pipe Rehabilitation														
R-1A	Rehabilitation	16 high MOSR segments	Varies	Varies	Rehab	Varies	$ 2,488,000	$ 2,488,000					$ 2,488,000	$ -
R-1B	Rehabilitation	18 high MOSR segments	Varies	Varies	Rehab	Varies	$ 2,571,000	$ 2,571,000					$ 2,571,000	$ -
R-1C	Rehabilitation	23 high MOSR segments	Varies	Varies	Rehab	Varies	$ 2,631,000	$ 2,631,000					$ 2,631,000	$ -
R-2	Rehabilitation	2006 Master Plan Project RS03A	24	24	Rehab	3,118	$ 1,126,000	$ 1,126,000					$ 1,126,000	$ -
R-3	Rehabilitation	2006 Master Plan Project RS06B	15	15	Rehab	300	$ 92,000	$ 92,000					$ 92,000	$ -
R-4	Rehabilitation	2006 Master Plan Project RL02	48	48	Rehab	2,644	$ 2,101,000	$ 2,101,000					$ 2,101,000	$ -
R-5	Rehabilitation	2006 Master Plan Project RL11	54	54	Rehab	3,992	$ 3,561,000	$ 3,561,000					$ 3,561,000	$ -
						Pipe Rehabilitation Totals	**$ 14,570,000**	**$ 14,570,000**	**$ -**	**$ -**	**$ -**		**$ 14,570,000**	**$ -**
						Capitol Improvement Projects Totals	**$ 312,316,000**	**$ 46,371,000**	**$ 55,848,000**	**$ 7,167,000**	**$ 202,930,000**		**$ 107,919,860**	**$ 204,396,140**

APPENDIX A – GENERAL PLAN LAND USE DESCRIPTIONS

- *Walls and fences that separate related uses or isolate neighborhoods;*
- *Over reliance on cul-de-sacs and dead end streets that cut off access within neighborhoods;*
- *Disconnected bike and pedestrian paths;*
- *Wide streets that lack pedestrian support, such as sidewalks, median strips, and a landscaped strip that separates pedestrians from the street;*
- *Street front parking lots that separate pedestrian from commercial operations;*
- *Retail centers that are exclusively auto-oriented;*
- *Transit stops that are not easily accessible from an individual's starting point and destination; and*
- *Long blocks that discourage walking.*

UF-14-b **Local Street Connectivity.** Design local roadways to connect throughout neighborhoods and large private developments with adjacent major roadways and pathways of existing adjacent development. Create access for pedestrians and bicycles where a local street must dead end or be designed as a cul-de-sac to adjoining uses that provide services, shopping, and connecting pathways for access to the greater community area.

UF-14-c **Block Length.** Create development standards that provide desired and maximum block lengths in residential, retail, and mixed-use districts in order to enhance walkability.

Commentary: *When preparing such standards the City should assess the desirability of varying maximum block length requirements between single family residential, multi-family residential, mixed use, and commercial districts.*

3.5 LAND USE

The following sections provide the General Plan's required land use information with use classifications, maximum densities and intensities on Figure LU-1: Fresno General Plan Land Use Diagram.

The City has reviewed those areas covered by the General Plan that are subject to flooding identified by flood plain mapping prepared by the Federal Emergency Management Agency (FEMA), which can be found at Figure NS-7: Floodplains. The City

will annually review those areas covered by the Plan as set out in the Implementation Element.

Land Use Diagram

The Land Use Diagram is the City's master designation of land uses for Fresno including the City's SOI. The Land Use Diagram includes the Downtown Planning Area, shown in an inset, and its designations are anticipated to be further refined and implemented through specific and community plans, such as the proposed FCSP and the DNCP. Land use designations for the Downtown Planning Area are generalized to facilitate implementation by providing some flexibility for the detailed plans.

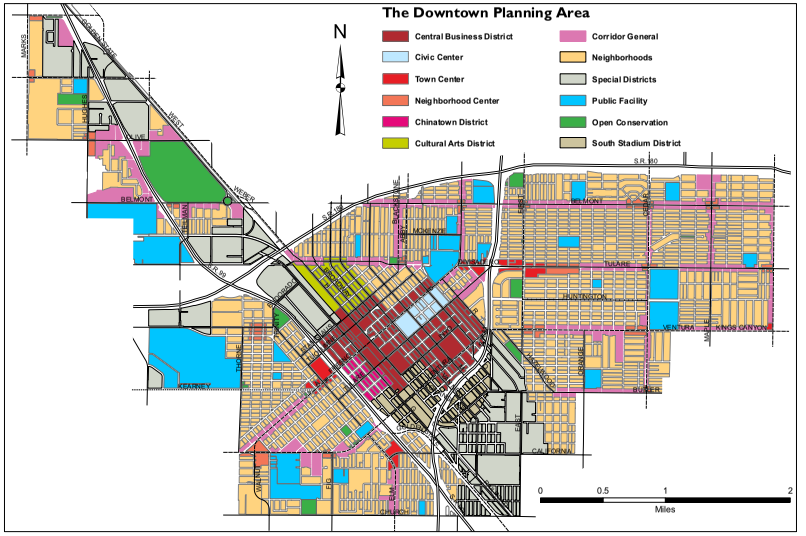
Dual Designations

All new parks, open space, and public facilities (such as school sites) carry dual land use designations, so that if that facility is not needed, private and public development consistent with zoning and development standards may be approved. These dual land use designations are shown in Figure LU-2: Dual Designation.

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City of Fresno General Plan Land Use and Circulation Map

PLAN ADOPTION	
Resolution Number	Date
2014 - 226	18-Dec-14
2014 - 227	18-Dec-14
PLAN AMMENDMENTS	
Resolution Number	Date
2015 - 133	16-Jul-15
2016 - 21	4-Feb-16
2016 - 23	4-Feb-16



(Proposed downtown land use and circulation classifications are anticipated to be further refined through specific and community plans such as the proposed Fulton Corridor Specific Plan and the Downtown Neighbohoods Community Plan.)

LEGEND

RESIDENTIAL
- Low Density (1-3.5 D.U./acre)
- Medium Low Density (3.5-6 D.U./acre)
- Medium Density (5.0-12 D.U./acre)
- Medium High Density (12-16 D.U./acre)
- Urban Neighborhood (16-30 D.U./acre)
- High Density (30-45 D.U./acre)

COMMERCIAL
- Main Street
- Community
- Recreation
- General
- Highway & Auto
- Regional

EMPLOYMENT
- Office
- Business Park
- Regional Business Park
- Light Industrial
- Heavy Industrial

MIXED USE
- Corridor/Center Mixed Use
- Regional Mixed Use
- Neighborhood Mixed Use

OPEN SPACE
- Clear Zone
- Commercial-Recreational
- Community Park
- Flood Control Project
- Golf Course
- Lake, Pond
- Multi-Use
- Neighborhood Park
- Outdoor Environmental Education Area
- Open Space
- Park
- Ponding Basin
- Ponding Basin (Park use)
- Regional Park

PUBLIC FACILITIES
- Public/Quasi-public Facility
- Special School
- Elementary School
- Elementary & Middle School
- Elementary, Middle & High School
- Middle School
- High School
- College
- School with Park
- Airport
- Cemetery
- Church
- Community Activity Center
- Convalescent Hospital
- Fairgrounds
- Fire Station
- Government Offices
- Hospital
- Medical Center
- Neighborhood Center
- PG & E Substation
- Police Dressing Station
- Water Recharge Basin
- Waste Water Treatment Facility

BUFFER
- Buffer

BOUNDARIES
- Existing Fresno Sphere of Influence
- Fresno Planning Boundary
- Downtown Neighborhoods
- Southeast Development Area (SEDA)

Date: 2/29/2016

Circulation Legend

Freeway	Super Arterial	Scenic Drive
Expressway	Arterial	Collector
Scenic Expressway	Scenic Arterial	Scenic Collector

0 0.5 1 2 3 4 5 Miles

Dual land use designations for public facilities and open space are shown on a supplemental map.

This map is believed to be an accurate representation of the City of Fresno GIS data. However, we make no warranties either expressed or implied for the correctness of this data.

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City of Fresno
Development and Resource Management
Planning Division

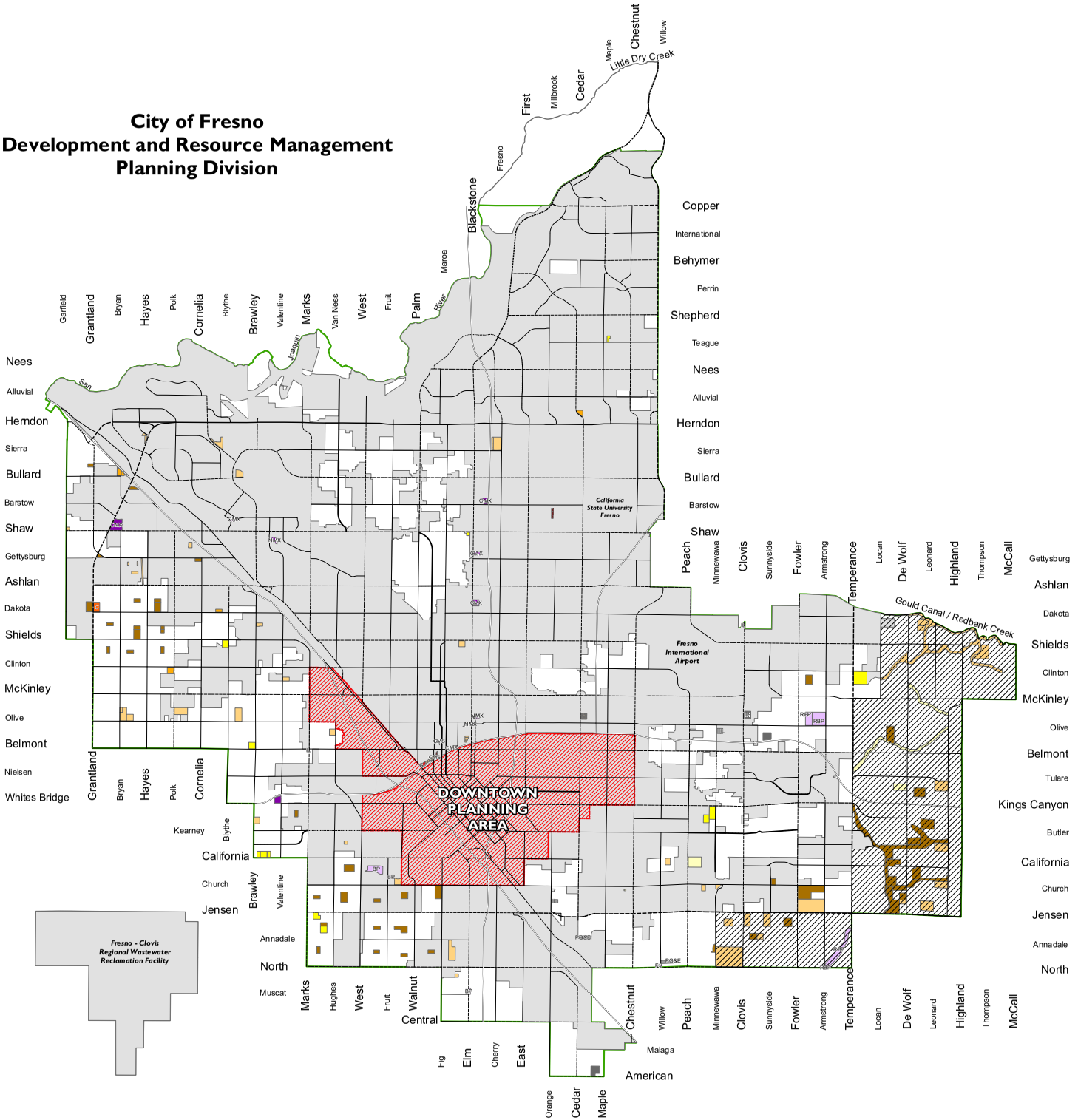


Figure LU - 2:
Dual Designation Diagram

Residential
- Low Desnisty (1-3.5 D. U./Acre)
- Medium Low Desnisty (3.5-6 D. U./Acre)
- Medium Desnisty (5-12 D. U./Acre)
- Medium High Desnisty (12-16 D. U./Acre)
- Urban Neighborhood (16-30 D. U./Acre)
- High Density (30-45 D. U./Acre)

Commercial
- C Community
- M Main Street
- G General

Employment
- Office
- BP Business Park
- RBP Regional Business Park
- Light Industrial
- Heavy Industrial

Mixed Use
- CMX Corridor/Center Mixed Use
- RMX Regional Mixed Use
- NMX Neighborhood Mixed Use

Boundaries
- Fresno Planning Boundary
- Existing Sphere of Influence
- City Limit
- Downtown Neighborhoods
- Southeast Development Area (SEDA)

Date: 1/4/2016

Circulation Legend

Freeway	Super Arterial	Scenic Drive
Expressway	Arterial	Collector
Scenic Expressway	Scenic Arterial	Scenic Collector
Ramp		

0 1 2 4 6 Miles

N

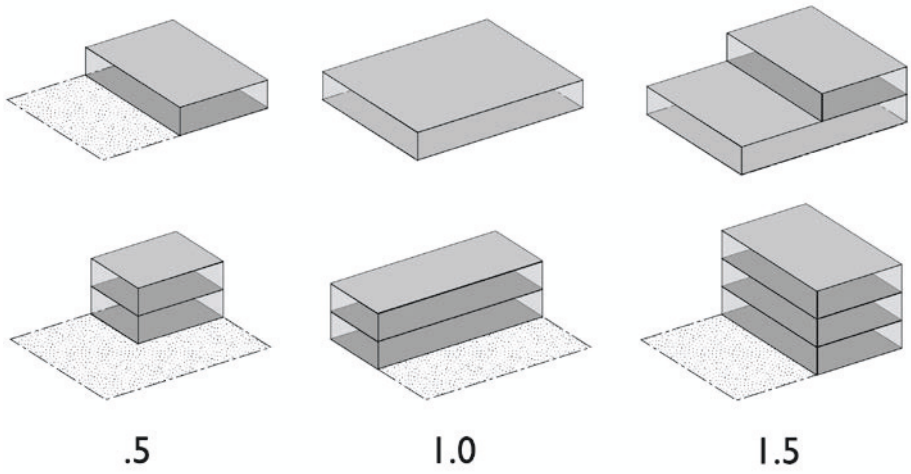
Note: All planned land uses for future parks, open space, ponding basins, schools (e.g. special, elementary, middle, high, and colleges) and schools with parks carry dual planned land use designations so that if that facility is not needed private and public development consistent with zoning and development standards may be approved. This map shows the additional land use designations.

Source: City of Fresno, DARM Dept., Planned Land Use, 2015.

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Density and Intensity

The General Plan calculates density on net acreage, defined as the land area of a lot remaining after dedication of all areas for major streets, schools, regional trails, certified wetlands or floodplains, and land underneath electric transmission lines. For residential uses, the density and intensity standards are expressed as the number of housing units per net acre. For non-residential uses, a measure known as Floor Area Ratio (FAR) is specified. FAR is defined as the permitted ratio of gross floor area to site area. It is a measure of building bulk that controls both visual prominence and traffic generation, as shown in the diagram below.



The citywide density and intensity standards, established in Table 3-1, are intended to establish minimum and maximum densities per net acre allowed in each General Plan land use category, exclusive of the Downtown Planning Area. Minimum and maximum densities, intensities, and required land use mixes will be more precisely defined within the Development Code for purposes of determining the consistency of a proposed zone district and a property development entitlement with an applicable land use designation.

Minimum lot/parcel sizes (and corresponding lot frontage minimums and other lot design requirements) will be defined in the Development Code for each zone district. The Development Code will also provide procedures and criteria for preparing and implementing "planned development" for a given area to allow for limited reconfiguration of the planned land uses for that area and variations from base zoning district development standard, while maintaining the equivalent densities, intensities and mix of uses. Finally, the General Plan land use designation may provide overlap in the defined densities, intensities and land uses described for various land uses.

TABLE 3-1: CITYWIDE STANDARDS FOR DENSITY AND DEVELOPMENT INTENSITY

Land Use	Minimum to Maximum Residential Density (du/net acre)[1,2,3]	Maximum Floor Area Ratio
Buffer	Max = 0.05 (1 unit per 20 net acres)	-
Residential		
Low Density	Min = 1 unit per 5 acres Max = 3.5 units per acre	-
Medium Low Density	Min = 3.5 units per acre Max = 6 units per acre	-
Medium Density	Min = 5 units per acre Max = 12 units per acre	-
Medium High Density	Min = 12 units per acre Max = 16 units per acre	-
Urban Neighborhood Density	Min = 16 units per acre Max = 30 units per acre	-
High Density	Min = 30 units per acre Max = 45 units per acre	-
Commercial		
Main Street		1.0
Community		1.0
Recreation		0.5
General		2.0
Highway & Auto		0.75
Regional		1.0
Mixed-Use		
Neighborhood Mixed-Use	Min = 12 units per acre Max = 16 units per acre	1.5
Corridor/Center Mixed-Use	Min = 16 units per acre Max = 30 units per acre	1.5
Regional Mixed-Use	Min = 30 units per acre Max = 45 units per acre	2.0
Employment		
Office	-	2.0
Business Park	-	1.0
Regional Business Park	-	1.0
Light Industrial	-	1.5
Heavy Industrial	-	1.5

1. Based on Net Acreage.
2. Residential density refers to the ratio of residential dwelling units per acre (43,560 square feet) of land which is calculated by dividing the number of existing or proposed residential dwelling units by the land area of the property designated for, or proposed for development with, a residential use. The residential land area includes property upon which the residential and ancillary structures are located, together with yards and other private or common open spaces, and includes vehicle access drives and parking areas together with public and private roadways. The residential land area does not include major streets or State Routes designated by Figure MT-1: General Plan Circulation Diagram, and does not include schools or regional trails.
3. Additional density may be allowed for affordable housing or provision of community benefits (pursuant to California Government Code Sections 65915 – 65918, as may be amended).

Table 3-2 provides density and intensity standards specific to the Downtown Planning Area.

TABLE 3-2: DOWNTOWN PLANNING AREA STANDARDS FOR DENSITY AND DEVELOPMENT INTENSITY		
Land Use	Maximum Residential Density (du/net acre)[1,2]	Maximum Floor Area Ratio
Central Business District (CBD)	60 units per acre[3]	7.5
Civic Center	-	5.0
Town Center	45 units per acre	4.0
Neighborhood Center	30 units per acre	2.0
Chinatown District	45 units per acre	3.0
Cultural Arts District		
Corridor General	30 units per acre	2.5
Neighborhoods	16 units per acre	-
Special Districts[4]	-	2.5
Public Facility	-	-
Open Conservation	-	-
South Stadium District	60 units per acre	5.0

1. Based on Net Acreage.
2. Additional density may be allowed for affordable housing or provision of community benefits (pursuant to California Government Code Sections 65915 – 65918, as may be amended).
3. Maximum density in CBD provided for capacity analysis and is considered an average for the district. Industrial projects may be allowed to exceed this density.
4. Additional FAR may be granted for hospitals and related uses, up to 5.0.

Land Use Classifications

These land use classifications cover the entire Planning Area, with the exception of the Downtown Planning Area. The land use classifications for the Downtown Planning Area are described later in this element.

Residential

Residential land uses provide for a wide range of neighborhoods and housing types.

LOW DENSITY

This designation is intended to provide for large lot residential development. Low Density residential allows one to 3.5 housing units per acre. The resulting land use pattern is large lot residential in nature, such as rural residential, ranchettes, or estate homes.

MEDIUM LOW DENSITY

The Medium Low Density designation is intended to provide for single family detached housing with densities of 3.5 to 6 units per acre.

MEDIUM DENSITY

Medium Density residential covers developments of 5 to 12 units per acre and is intended for areas with predominantly single-family residential development, but can

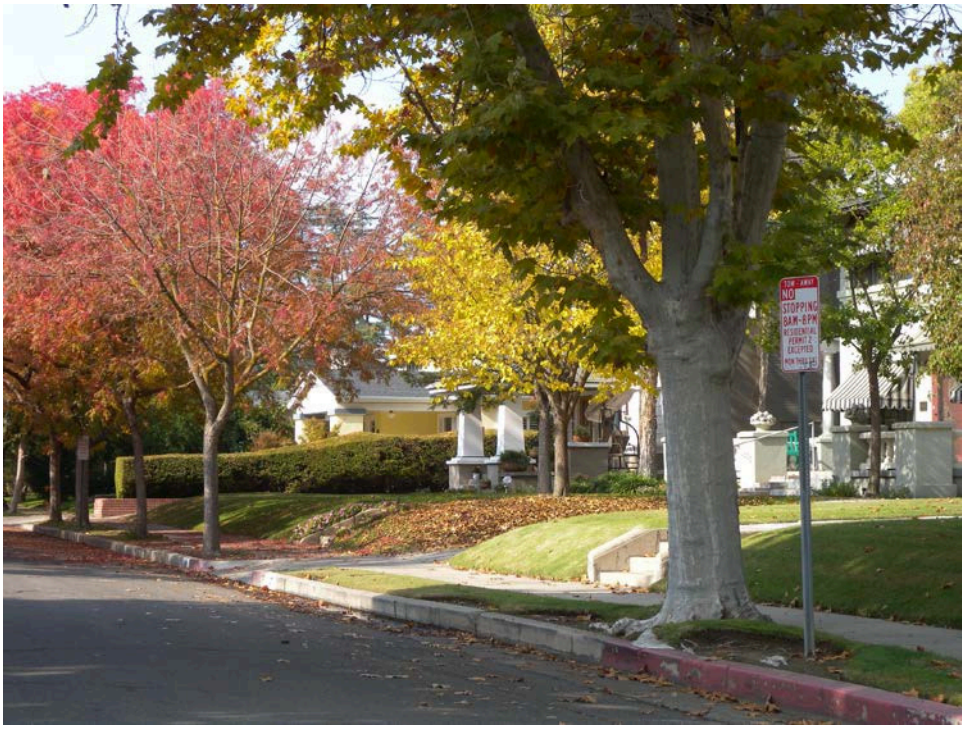
also accommodate a mix of housing types, including small-lot starter homes, zero-lot-line developments, duplexes, and townhouses. Much of the City's established neighborhoods fall within this designation.

MEDIUM HIGH

Medium High Density residential is intended for neighborhoods with a mix of single-family residences, townhomes, garden apartments, and multi-family units intended to support a fine-grain, pedestrian scale. This land use accommodates densities from 12 to 16 units per acre overall.

URBAN NEIGHBORHOOD

Urban Neighborhood residential covers densities from 16 to 30 units per acre, which will require multi-family dwellings but still allows for a mix of housing types including single-family houses. This land use is intended to provide for a compact community that includes community facilities and walkable access to parkland and commercial services; it also supports efficient, frequent transit service. Urban Neighborhood is designated for targeted areas with complementary land uses adjacently located.



An example of Fresno's established residential neighborhoods, with wide streets, sidewalks, and large trees.

HIGH DENSITY

High Density residential is intended to accommodate attached homes, two- to four-plexes, and apartment buildings, and it will be supported by walkable access to frequent transit, retail and services, and community facilities such as parks and schools. High Density allows for 30 to 45 units per acre.

Commercial

Commercial land use designations allow a wide range of retail and service establishments intended to serve local and regional needs.

MAIN STREET

Main Street Commercial encourages a traditional Main Street character with active storefronts, outdoor seating and pedestrian-oriented design. This designation promotes primarily one to two story retail uses. It also preserves small-scale, fine-grain character in neighborhoods where single-family residential and townhomes are predominant. The maximum FAR is 1.0.

COMMUNITY

Community Commercial is intended for commercial development that primarily serves local needs such as convenience shopping and small offices. Many of the city's current commercial districts fall into this designation. Specific uses allowed include medium-scale retail, office, civic and entertainment uses, supermarkets, drug stores and supporting uses. The maximum FAR is 1.0.

RECREATION

The Recreation designation is intended for areas of private commercial recreation uses, such as bowling alleys and golf driving ranges. The maximum FAR is 0.5.

GENERAL

The General Commercial designation is intended for a range of retail and service uses that are not appropriate in other areas because of higher volumes of vehicle traffic and potential adverse impacts on other uses. Development such as strip malls fall into this designation. Examples of allowable uses include: building materials, storage facilities with active storefronts, equipment rental, wholesale businesses, and specialized retail not normally found in shopping centers. The maximum FAR is 2.0.

HIGHWAY & AUTO

The Highway & Auto designation is intended for limited areas near State Route 99 to accommodate uses that depend on or are supported by freeway access but do not generate a large volume of traffic. Hotels, restaurants, and auto malls are typical land uses. The maximum FAR is 0.75.

REGIONAL

The Regional Commercial designation is intended to meet local and regional retail demand, such as large-scale retail, office, civic and entertainment uses; shopping malls, with large format or "big-box" retail allowed; and supporting uses such as gas stations, and hotels. Buildings typically have relatively large footprints. Development and design standards will create a pedestrian orientation within centers and along major corridors. The maximum FAR is 1.0.

Employment

OFFICE

The Office designation is intended for administrative, financial, business, professional, medical, and public offices. This designation is mainly intended to apply to existing office uses on smaller lots, generally located on arterial roadways. This designation is also considered compatible with existing residential neighborhoods given the smaller level of noise and traffic generated compared to commercial uses. Retail uses would be limited to business services, food services, and convenience goods for those who work in the area. The maximum FAR is 2.0.

BUSINESS PARK

The Business Park designation provides for office/business parks in campus-like settings that are well suited for large offices or multi-tenant buildings. This designation is intended to accommodate and allow for the expansion of small businesses. Given its proximity to residential uses, only limited outdoor storage will be permitted, while adequate landscaping is imperative to minimize the visual impacts. Typical land uses include research and development, laboratories, administrative and general offices, medical offices and clinics, professional offices, prototype manufacturing, testing, repairing, packaging, and printing. No free-standing retail is permitted, except for small uses serving businesses and employees. The maximum FAR is 1.0.

REGIONAL BUSINESS PARK

The Regional Business Park designation is intended for large or campus-like office and technology development that includes office, research and development, manufacturing, and other large-scale, professional uses, with limited and properly screened outdoor storage. Permitted uses include incubator-research facilities, prototype manufacturing,

testing, repairing, packaging, and printing, as well as offices and research facilities. Small-scale retail and service uses serving local employees and visitors are permitted as secondary uses. The maximum FAR is 1.0.

LIGHT INDUSTRIAL

The Light Industrial designation accommodates a diverse range of light industrial uses, including limited manufacturing and processing, research and development, fabrication, utility equipment and service yards, wholesaling, warehousing, and distribution activities. Small-scale retail and ancillary office uses are also permitted. Light Industrial areas may serve as buffers between Heavy Industrial and other land uses and otherwise are generally located in areas with good transportation access, such as along railroads and State Routes. The maximum FAR is 1.5.

HEAVY INDUSTRIAL

The Heavy Industrial designation accommodates the broadest range of industrial uses including manufacturing, assembly, wholesaling, distribution, and storage activities that are essential to the development of a balanced economic base. Small-scale commercial services and ancillary office uses are also permitted. The maximum FAR is 1.5.

Mixed-Use[5]

Mixed-use designations are based on commercial uses and also require a residential or upper-floor office component.

NEIGHBORHOOD MIXED-USE

This designation allows a minimum of 50 percent residential uses and provides for mixed-use districts of local-serving, pedestrian-oriented commercial development, such as convenience shopping and professional offices in two- to three-story buildings. Development is expected to include ground-floor neighborhood retails uses and upper-level housing or offices, with a mix of small lot single family houses, townhomes, and multi-family dwelling units on side streets, in a horizontal or vertical mixed-use orientation. The built form will have a scale and character that is consistent with pedestrian-orientation, to attract and promote a walk-in clientele, with small lots and frequent roadway and pedestrian connections permitting convenient access from residences to commercial space. Automobile-oriented uses are not permitted.

[5] The General Plan is long-term in nature, and recognizes the importance of providing for an orderly evolution of existing, legal non-conforming uses during the planning period in a manner that acknowledges their current economic contributions while providing for a transition into conforming uses consistent with applicable land use designations.

Residential densities range between 12 and 16 units per acre and the maximum FAR is 1.5.

CORRIDOR/CENTER MIXED-USE

The Corridor/Center Mixed-Use designation is higher intensity than Neighborhood Mixed-Use, and is intended to allow for horizontal and vertical mixed-use development in multiple story buildings along key circulation corridors where height and density can be easily accommodated. Ground-floor retail and upper-floor residential or offices are the primary uses, with personal and business services and public and institutional space as supportive uses. Development will facilitate the transformation of existing transportation corridors into vibrant, highly walkable areas with broad, pedestrian-friendly sidewalks, trees, landscaping, and local-serving uses with new buildings that step down in relationship to the scale and character of adjacent neighborhoods. This designation will largely apply along major roadways, at targeted locations between regional Activity Centers. Residential densities range between 16 and 30 units per acre with a minimum 40 percent residential uses, and the maximum FAR is 1.5.

REGIONAL MIXED-USE

The Regional Mixed-Use land use designation is intended to accommodate mixed-use development in urban-scale buildings and retail establishments that serve residents and businesses of the region at large. Medium-scale retail, residential, office, civic and entertainment uses, and shopping malls (with large format or "big-box" retail) are allowed, as are supporting uses such as gas stations and hotels in mixed-use or single use buildings. Design standards will support a pedestrian orientation within centers and along major corridors, with parking on the side or rear in general, but automobile-oriented uses also will be accommodated on identified streets and frontages. Residential densities range between 30 and 45 units per acre with a minimum 30 percent residential uses, and the maximum FAR is 2.0.

Open Space

The Open Space designations (Parks and Recreational Facilities; Other Public Open Space) apply to open space areas that are not parks or trails, such as riparian corridors, the clear zone around Fresno-Yosemite International Airport, and the San Joaquin River bottom, which is primarily designated as open space even though it includes a limited number of existing homes.

Public Facilities

This designation applies to public facilities, such as City Hall, county buildings, schools, colleges, the municipal airports, and hospitals. It also includes public facilities, such as fire and police stations, City-operated recycling centers, sewage treatment plants, neighborhood, community and regional parks, recreational centers, and golf courses.

Finally, it applies to multi-purpose trails that serve both regional and neighborhood needs.

Buffer

This designation is intended to separate urban uses from long-term agricultural uses in order to preserve long-term viable agricultural areas and intensive farming operations adjoining but outside the Planning Area. The Buffer designation will serve to prevent urban residential and related uses from developing near agricultural operations and infringing on full operation of important farmland. A variety of uses are compatible with the purpose of the Buffer, which will be defined in detail in the Development Code. General categories include environmental habitats; water conveyance, retention and recharge; preservation and preparation of gravel resources for beneficial uses related to permanent water resource facilities; limited agriculture and necessary supportive uses, such as agricultural processing, excluding animal processing or uses that have the potential to create nuisances; and residential uses with 20 acres of land required per residence.

Downtown Land Use Classifications

These land use classifications are specific only to the Downtown Planning Area portion of the Planning Area, as depicted in the inset to Figure LU-1: General Plan Land Use Diagram. It is anticipated the land use classifications may be further refined in community or Specific Plans, such as the proposed DNCP and FCSP. The following are general descriptions of the Land Use classifications within the Downtown Planning Area.

Central Business District

The Central Business District (CBD) is the cultural, civic, shopping, and transit center of Fresno and the region. This designation is applied to areas of the Downtown Planning Area bounded by Stanislaus Street, the Union Pacific tracks, Inyo Street, and the alley between Van Ness Avenue and L Street. New buildings will be at least 2 to 15 stories in height and located at or near the sidewalk. Buildings will be occupied with ground floor commercial, retail, multi-family housing, and office activity to support active streetscapes and walking. Upper floors and the floor area behind storefronts will accommodate a wide variety of office, civic, lodging, housing, or additional commercial uses.

Civic Center

The Civic Center is intended for civic and office uses, including numerous public buildings containing City, County, State, and federal uses. This land use designation is applied to properties currently fronting Mariposa Street, the south side of Fresno Street, and the north side of Tulare Street between Van Ness Avenue and Q Street.

New buildings will be block-scale, up to 10 stories in height, and set back from the sidewalk along a continuous build-to line to maintain a formal alignment and arrangement of building frontages. Upper stories will be expressed in volumes that enhance and support the civic presence of buildings along these streets. A full range of civic and office uses, including ground floor retail, are envisioned to support active streetscapes and walking. Upper floors will have office and civic uses.

Chinatown District

The Chinatown District designation is applied to the areas bounded by the Union Pacific Railroad tracks, State Route 99, Stanislaus Street, and Inyo Street. Chinatown's close proximity to State Route 99 and Downtown Core create the unique opportunity to introduce buildings and uses that serve both the region and the surrounding neighborhoods. F Street is preserved and developed as Chinatown's "Main Street." New buildings will be block-scale, up to three stories in height and located at the sidewalk to activate the street with pedestrian-oriented commercial activity. Most upper stories will be expressed in single volumes to enhance the small scale of this urban neighborhood and historic main street. Ground floor uses will include commercial, retail, civic, or office uses to support active streetscapes and walking. Upper floors and the space behind storefronts will have offices, housing, or additional commercial uses.

Cultural Arts District

This designation is applied to the area immediately north of the CBD bounded by Divisadero Street to the north, Van Ness Avenue to the east, Stanislaus Street to the south and Union Pacific railroad tracks to the west. This designation is intended to spur the area's transformation by encouraging mixed-use buildings comprised primarily of small-scale retail, office, industrial, and multi-family residential uses. New buildings will be block scale, up to five stories tall, and located at or near the sidewalk to generate an active public realm and support walking. Buildings will have ground floor retail, live-work, and uses such as art galleries on key streets.

South Stadium / South Van Ness

This designation is applied to the areas immediately to south of the Central Business District, including the Monterey and Los Angeles Street areas. It is intended for small-scale retail, office, and industrial uses. New buildings will be block-scale, with non-industrial buildings up to five stories in height, and located at or near the sidewalk to generate an active public realm. Secondary streets and upper floors will have residential and office uses. Industrial buildings may have larger footprints and may be up to two stories tall.

Town Center

The Town Center designation is applied to nodes at major intersections along major roadway corridors. It is intended for medium-scale retail, housing, office, civic, and entertainment uses that serve several neighborhoods. New buildings will be block-scale, up to five stories in height and located at or near the sidewalk to generate focused and active, commercial activity along corridors. Most upper stories will be expressed in single volumes along the corridor and in multiple volumes with significant setbacks when adjacent to neighborhoods. Ground floor uses will include commercial, retail, and office uses to support active streetscapes and walking. Upper floors and the floor area behind storefronts will have office, civic, residential, or additional commercial uses.

Neighborhood Center

The Neighborhood Center designation is applied to nodes at secondary intersections and along corridors and is comprised of primarily small-scale neighborhood uses such as retail, office, civic, entertainment, and housing. New buildings will be block and house-scale, up to three stories in height, completely compatible in scale with adjacent single-family houses, and located at or near the sidewalk to generate pedestrian activity. Upper stories will be expressed in volumes compatible with adjacent houses. Buildings will have ground floor commercial, retail, and office uses to support active streetscapes and walking. Upper floors and the floor area behind shop fronts will have office, civic, residential or additional commercial uses.



Neighborhood Centers support surrounding neighborhoods with a mix of uses, including retail, office, civic, housing, and entertainment.

Corridor General

This designation is applied to areas fronting on corridors including Belmont Avenue, Kings Canyon Road, Blackstone Avenue, Abby Street, and North Fresno Street. It is intended for moderate intensity housing and neighborhood services, while also accommodating automobile-oriented commercial uses. New buildings will be block-scale and house-scale, up to three stories in height, and located at or near the sidewalk to generate more pedestrian activity. Buildings will vary in size and type, but be compatible in massing and scale with adjacent buildings. Most upper stories will be expressed in single volumes along the corridor and in multiple volumes with significant setbacks when adjacent to neighborhoods. Living rooms, dining rooms, and other formal rooms will face the street. Ground floor uses will include housing, as well as commercial, retail and office uses. Upper floors will be for housing, office, or additional commercial uses.

Neighborhood (General, General Preservation, General Revitalization, Edge)

The Neighborhood designations are applied to areas outside of the Downtown CBD. These areas include the Lowell neighborhood; much of the southwest and southeast neighborhoods; the L Street area and the Huntington Boulevard area east of Downtown Core; the Jefferson Neighborhood; areas south of Elm and B Streets in southwest; several southeast neighborhoods adjacent to State Route 180; and areas west of State Route 99, including the Jane Addams area. New buildings will be house-scale, up to two stories in height, and some buildings may be up to two and one-half stories. All buildings will set back from the sidewalk to provide a buffer between the sidewalk and the dwellings. Living rooms, dining rooms, and other formal rooms will face and activate the street. Other house-scale buildings are compatible in these neighborhoods when scaled and massed in relation to the predominant single-family houses. Buildings will be occupied with residential uses, limited live/work uses, and home occupation activity.

Special Districts

The Special Districts designation is applied to areas that are best suited for a variety of moderate to intense industrial and manufacturing activity. These areas are comprised primarily of large and varied building sizes with substantial activity from large cargo vehicles. New buildings will be block-scale, up to eighteen stories in height (hospitals), and located with a portion, or all, of their frontage at or near the sidewalk. Ground floor activity will range from industrial and manufacturing uses and outdoor assembly to offices. Included in the Special Districts designation are General Industrial (1 & 2); Fresno Chandler Executive Airport between Kearney Boulevard, and Thorne Avenue and Whitesbridge Road; and Downtown Hospital that includes the hospital campus and

surrounding streets with Diana Street / railroad tracks on the west and south, McKenzie Avenue on the north and Fresno Street on the east and south.

Open Conservation

This designation is intended to provide for permanent open spaces, and does not include neighborhood and community parks and recreational center. This applies only to parcels zoned Open Conservation (FMC 12-204) prior to the adoption of the DNCP.

General Plan and Zoning Consistency

Table 3-3 summarizes the proposed zoning districts that will contain detailed development guidelines and regulations for the land uses in the General Plan.

TABLE 3-3: GENERAL PLAN LAND USE DESIGNATIONS AND ZONING DISTRICTS CONSISTENCY

General Plan Land Use Designation	Development Code Zoning District	
Buffer	B	Buffer
Residential		
Low Density	RE	Residential Estate
	RS-1	Residential Single Family, Extremely Low Density
	RS-2	Residential Single Family, Very Low Density
	RS-3	Residential Single Family, Low Density
Medium Low Density	RS-4	Residential Single Family, Medium Low Density
Medium Density	RS-5	Residential Single Family, Medium Density
Medium High Density	RM-MH	Mobile Home Park
	RM-1	Residential Multi-Family, Medium High Density
Urban Neighborhood	RM-2	Residential Multi-Family, Urban Neighborhood
High Density	RM-3	Residential Multi-Family, High Density
Mixed-Use		
Neighborhood	NMX	Neighborhood Mixed Use
Corridor/Center	CMX	Corridor/Center Mixed Use
Regional	RMX	Regional Mixed Use
Commercial		
Main Street	CMS	Commercial - Main Street
Community	CC	Commercial - Community
Regional	CR	Commercial - Regional
General	CG	Commercial - General
Highway and Auto	CH	Commercial - Highway and Auto
Recreation	CRC	Commercial - Recreation

Employment		
Office	O	Office
Business Park	BP	Business Park
Regional Business Park	RBP	Regional Business Park
Light Industrial	IL	Light Industrial
Heavy Industrial	IH	Heavy Industrial
Other		
Open Space	OS	Open Space
	PR	Parks and Recreation
Public Facilities	PI	Public and Institutional
Downtown Planning Area Anticipated Zoning Districts		
Central Business District	DTC	Downtown Core
	DTG	Downtown General
Civic Center	DTG	Downtown General
Town Center	DTN	Downtown Neighborhood
Chinatown		
Cultural Arts		
South Stadium		
Neighborhood Center	NMX	Neighborhood Mixed Use
Corridor General		
Neighborhoods	RS-5	Residential Single Family, Medium Density
	RS-4	Residential Single Family, Medium Low Density
Special Districts	IL	Light Industrial
Public Facility	PI	Public and Institutional
Open Conservation	OS	Open Space
	PR	Parks and Recreation

Local Plans

The City has adopted a number of plans that apply to defined areas throughout Fresno. Under the City's Local Planning and Procedures Ordinance (LPPO), Specific and Community Plans prevail when inconsistent with the General Plan. As a practical matter, this means full implementation of the General Plan may require certain Specific or Community plans to be either repealed or amended to allow consistency. As part of this process, policies and portions from certain plans have been considered in developing the General Plan, essentially resulting in a consolidation and update of planning documents through this repeal and amendment of plans. See Implementing Policy D-7-a for the list of plans being amended or repealed.

Annexation

As specified by Policy LU-1-g, this General Plan promotes the principle that the SOI not be expanded. The one exception to SOI expansion is to allow for the siting of a

maintenance yard proximate to and south of the SOI boundary associated with the California High Speed Train project.

Regional Cooperation

Fresno is part of an eight-county region, each with its own Metropolitan Planning Organization. Collectively, they have approved the San Joaquin Valley Blueprint along with the Smart Growth principles listed below, which have been integrated into the General Plan. The adopted San Joaquin Valley Blueprint 12 Smart Growth principles:

1. Create a range of housing opportunities and choices;
2. Create walkable neighborhoods;
3. Encourage community and stakeholder collaboration;
4. Foster distinctive, attractive communities with a strong sense of place;
5. Make development decisions predictable, fair, and cost-effective;
6. Mix land uses;
7. Preserve open space, farmland, natural beauty, and critical environmental areas;
8. Provide a variety of transportation choices;
9. Strengthen and direct development towards existing communities;
10. Take advantage of compact building design;
11. Enhance the economic vitality of the region; and
12. Support actions that encourage environmental resource management.

The City of Fresno is also partnering with 13 of the other 15 federally defined Urbanized Areas in the San Joaquin Valley as part of the Smart Valley Places network, to plan and implement smart growth, livability, and sustainability through revised land use and transportation systems in the respective cities within all the Urbanized Areas in the eight-county Valley region. The City of Fresno also seeks to develop a regional cooperative planning and development strategy with all the city, county, and special district jurisdictions in Fresno, Madera, Tulare, and Kings counties in order to better achieve increased air quality, lower greenhouse gas emissions, farmland preservation, water and energy conservation, increased regional transportation infrastructure and economic development, and sustainable fiscal resource and mutual quality-of-life goals in the region.

APPENDIX B – BASE WASTEWATER FLOW CALIBRATION

Table 1 Base Wastewater Flow Calibration Results
Wastewater Collection System Master Plan Update
City of Fresno

		Weekday Base Wastewater Flow												Weekend Base Wastewater Flow										Base Wastewater Flow[4]		
		Measured Data[1]				Modeled Data[2]				Percent Error[3]				Measured Data[1]				Modeled Data[2]				Percent Error[3]						
Meter Number	Pipe Diameter (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)	Measured BWF (mgd)	Modeled BWF (mgd)	Percent Difference (%)
FR01	45	3.701	5.507	3.36	9.3	3.704	5.212	3.06	10.0	0.1%	-5.4%	-8.9%	7.1%	3.904	5.939	3.39	9.5	3.927	5.766	3.09	10.2	0.6%	-2.9%	-8.7%	7.3%	3.759	3.768	0.2%
FR02	45	8.049	10.996	3.52	15.9	7.726	10.331	3.59	15.1	-4.0%	-6.0%	2.0%	-4.5%	8.135	12.465	3.51	15.9	7.777	11.659	3.57	15.1	-4.4%	-6.5%	1.7%	-4.9%	8.074	7.741	-4.1%
FR06	36	4.132	5.207	2.59	14.2	4.131	5.050	2.57	13.6	0.0%	-3.0%	-0.7%	-4.0%	4.089	5.758	2.54	14.2	4.118	5.630	2.56	13.5	0.7%	-2.2%	1.1%	-4.7%	4.120	4.128	0.2%
FR08	48	7.661	9.894	4.59	12.3	7.672	10.070	4.24	13.0	0.2%	1.8%	-7.7%	5.9%	7.131	9.883	4.52	11.7	7.336	10.727	4.16	12.6	2.9%	8.5%	-7.8%	8.1%	7.509	7.576	0.9%
FR09	39	5.025	6.285	3.41	12.8	4.860	6.020	3.23	12.4	-3.3%	-4.2%	-5.4%	-2.8%	4.673	6.466	3.31	12.3	4.556	6.325	3.16	12.0	-2.5%	-2.2%	-4.5%	-2.8%	4.925	4.773	-3.1%
FR10	0	1.491	2.750	1.16	10.4	1.464	2.697	1.19	10.3	-1.8%	-1.9%	2.3%	-1.4%	1.496	3.201	1.11	10.0	1.469	3.103	1.15	10.0	-1.8%	-3.1%	3.4%	-0.7%	1.492	1.465	-1.8%
FR11	66	3.582	5.199	2.23	10.3	3.609	4.851	2.16	10.8	0.8%	-6.7%	-3.3%	4.3%	3.483	5.471	2.24	10.0	3.665	5.539	2.16	10.7	5.2%	1.2%	-3.7%	7.0%	3.554	3.625	2.0%
FR12	33	1.578	2.513	1.89	8.6	1.579	2.502	1.93	8.5	0.0%	-0.4%	1.9%	-1.6%	1.590	2.673	1.84	8.7	1.592	2.671	1.91	8.4	0.1%	-0.1%	3.9%	-2.9%	1.582	1.582	0.0%
FR13	51	8.526	10.118	3.29	15.8	8.329	9.611	3.31	16.2	-2.3%	-5.0%	0.6%	2.3%	7.951	10.072	3.24	15.2	7.902	9.556	3.26	15.7	-0.6%	-5.1%	0.6%	3.6%	8.362	8.207	-1.9%
FR14	36	4.058	4.998	2.40	14.4	4.022	4.819	2.25	14.8	-0.9%	-3.6%	-6.1%	2.9%	4.017	5.367	2.39	14.3	3.762	4.806	2.21	14.2	-6.3%	-10.4%	-7.8%	-0.1%	4.046	3.948	-2.4%
FR15	48	6.194	7.184	2.19	18.2	6.071	6.949	2.25	17.5	-2.0%	-3.3%	2.7%	-3.5%	5.939	7.337	2.17	17.7	5.850	7.075	2.22	17.2	-1.5%	-3.6%	2.5%	-3.1%	6.121	6.008	-1.9%
FR16	30	3.724	4.692	3.34	11.5	3.702	4.463	3.26	11.5	-0.6%	-4.9%	-2.5%	0.3%	3.708	5.104	3.32	11.5	3.667	4.664	3.24	11.4	-1.1%	-8.6%	-2.3%	-0.5%	3.720	3.692	-0.7%
FR19	66	23.147	27.598	4.52	24.1	23.071	27.048	4.89	22.7	-0.3%	-2.0%	8.2%	-5.8%	20.907	26.800	4.35	22.8	22.057	28.163	4.81	22.1	5.5%	5.1%	10.6%	-3.2%	22.507	22.781	1.2%
FR20	66	29.854	34.806	4.60	28.6	26.961	31.643	4.71	26.2	-9.7%	-9.1%	2.3%	-8.3%	26.650	34.503	4.48	26.6	25.500	31.954	4.62	25.4	-4.3%	-7.4%	3.1%	-4.6%	28.939	26.544	-8.3%
FR21	42	4.403	5.596	2.11	15.3	4.451	5.716	2.11	15.4	1.1%	2.1%	0.0%	0.9%	4.454	6.167	2.10	15.4	4.541	6.199	2.11	15.6	1.9%	0.5%	0.7%	0.7%	4.418	4.477	1.3%
FR22	45	7.461	9.611	2.90	17.5	7.471	9.230	2.88	17.5	0.1%	-4.0%	-0.8%	0.0%	7.615	10.754	2.90	17.6	7.650	10.427	2.88	17.6	0.5%	-3.0%	-0.5%	0.1%	7.505	7.522	0.2%
FR23	27	1.251	1.638	2.08	7.5	1.262	1.521	2.20	7.4	0.9%	-7.2%	5.5%	-1.5%	0.762	1.032	1.94	5.5	0.827	1.469	1.93	5.9	8.5%	42.4%	-0.6%	7.6%	1.111	1.138	2.4%
FR24	72	8.120	10.599	2.60	16.1	8.987	11.826	2.63	17.3	10.7%	11.6%	0.9%	7.5%	8.216	11.913	2.61	16.1	9.103	13.093	2.63	17.3	10.8%	9.9%	0.8%	7.5%	8.147	9.021	10.7%
FR25	15	0.082	0.121	1.11	2.1	0.082	0.121	1.12	2.1	0.1%	0.1%	1.1%	1.0%	0.079	0.134	1.12	2.0	0.079	0.134	1.10	2.1	0.2%	-0.1%	-2.0%	3.0%	0.081	0.081	0.1%
FR26	0	0.190	0.311	0.92	4.9	0.192	0.308	0.91	5.1	1.4%	-1.0%	-1.1%	2.6%	0.195	0.321	0.93	5.0	0.198	0.322	0.91	5.1	1.3%	0.4%	-1.9%	3.3%	0.191	0.194	1.3%
FR27	27	1.900	2.558	1.82	12.1	1.900	2.546	1.86	11.1	0.0%	-0.5%	2.6%	-8.4%	1.935	2.786	1.86	12.1	1.935	2.783	1.86	11.2	0.0%	-0.1%	0.1%	-7.4%	1.910	1.910	0.0%

Notes:

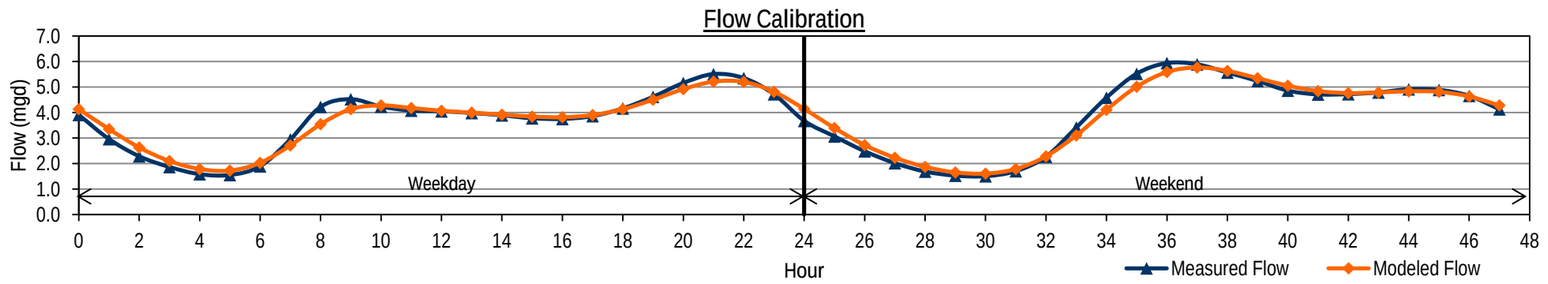
1. Source: City of Fresno Permanent Flow Monitoring Data
2. Average flow, level, and velocity are calculated from weekday/weekend dry weather flow monitoring data. Maximum flow values are hourly peaks corresponding to either weekend or weekday confitions, as appropriate.
3. Percent Difference = (Modeled - Measured)/Measured*100.
4. Base Wastewater Flow = (5*Weekday Base Wastewater Flow + 2*Weekend Base Wastewater Flow)/7

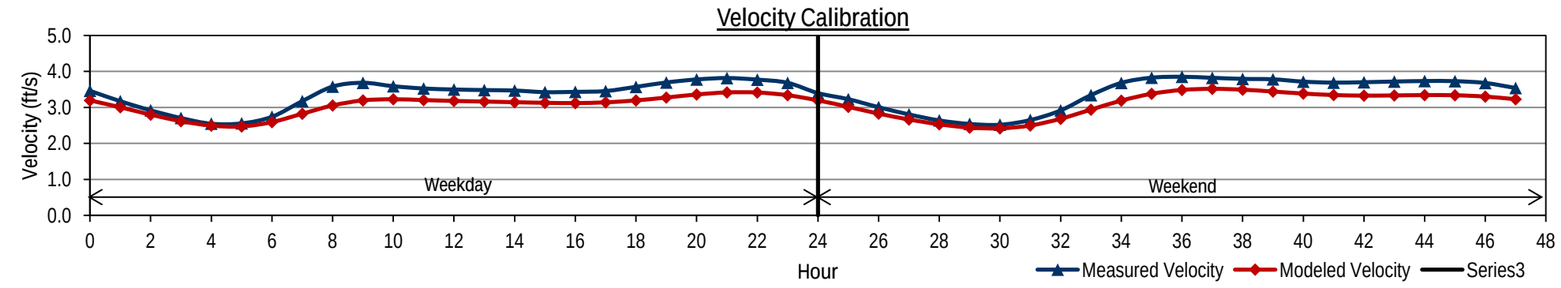
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR01 BASE WASTEWATER FLOW CALIBRATION

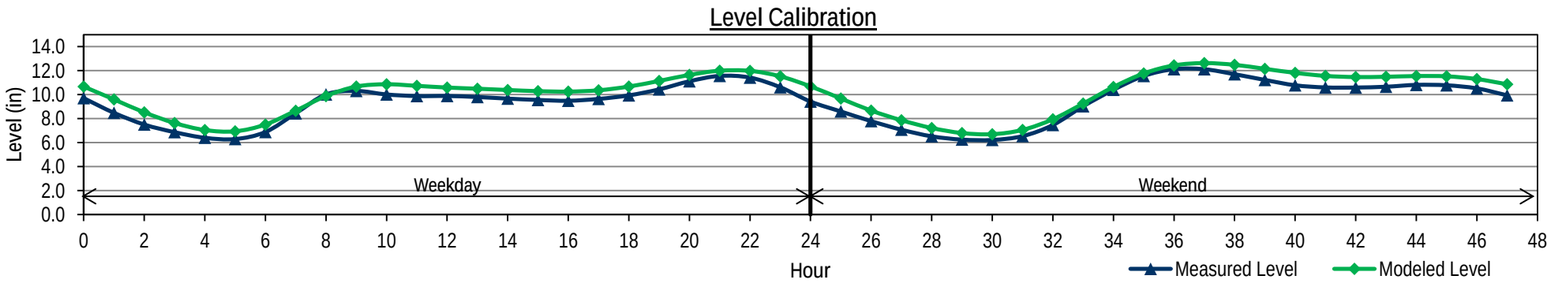
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	3.908	9.7	3.46	4.134	10.7	3.19	0.61
	1	2.958	8.5	3.17	3.350	9.6	3.00	0.49
	2	2.282	7.5	2.92	2.629	8.5	2.80	0.42
	3	1.863	6.9	2.71	2.096	7.6	2.62	0.41
	4	1.581	6.4	2.55	1.783	7.0	2.49	0.50
	5	1.549	6.3	2.56	1.724	6.9	2.47	0.78
	6	1.892	6.9	2.74	2.027	7.5	2.59	1.12
	7	2.945	8.4	3.18	2.710	8.7	2.82	1.20
	8	4.222	10.0	3.58	3.543	9.9	3.05	1.13
	9	4.522	10.3	3.68	4.134	10.7	3.19	1.08
	10	4.230	10.0	3.59	4.280	10.9	3.23	1.08
	11	4.075	9.9	3.53	4.177	10.7	3.20	1.06
	12	4.047	9.9	3.50	4.069	10.6	3.18	1.03
	13	3.981	9.8	3.48	3.995	10.5	3.16	1.00
	14	3.890	9.7	3.47	3.916	10.4	3.14	1.00
	15	3.773	9.6	3.42	3.841	10.3	3.13	1.03
	16	3.747	9.5	3.43	3.815	10.2	3.12	1.11
	17	3.860	9.6	3.45	3.900	10.4	3.14	1.23
	18	4.161	9.9	3.57	4.132	10.7	3.19	1.37
	19	4.616	10.4	3.69	4.502	11.1	3.27	1.47
	20	5.158	11.1	3.78	4.918	11.6	3.36	1.42
	21	5.507	11.6	3.81	5.212	12.0	3.41	1.26
	22	5.351	11.4	3.77	5.202	12.0	3.41	1.04
	23	4.718	10.6	3.68	4.815	11.5	3.34	0.79
Weekend	24	3.672	9.4	3.40	4.141	10.7	3.19	0.66
	25	3.063	8.6	3.23	3.393	9.7	3.01	0.54
	26	2.480	7.8	3.01	2.722	8.7	2.83	0.45
	27	2.014	7.1	2.81	2.227	7.9	2.66	0.40
	28	1.684	6.5	2.64	1.869	7.2	2.53	0.40
	29	1.524	6.3	2.54	1.651	6.8	2.44	0.45
	30	1.502	6.2	2.52	1.605	6.7	2.42	0.60
	31	1.700	6.6	2.65	1.786	7.1	2.50	0.91
	32	2.267	7.5	2.92	2.281	7.9	2.68	1.22
	33	3.409	9.0	3.34	3.102	9.3	2.94	1.47
	34	4.582	10.4	3.68	4.109	10.6	3.19	1.58
	35	5.522	11.6	3.82	5.013	11.8	3.38	1.57
	36	5.939	12.1	3.85	5.589	12.4	3.48	1.48
	37	5.889	12.1	3.82	5.766	12.6	3.51	1.39
	38	5.568	11.7	3.79	5.634	12.5	3.49	1.29
	39	5.235	11.2	3.78	5.347	12.1	3.44	1.25
	40	4.858	10.8	3.72	5.053	11.8	3.38	1.26
	41	4.709	10.6	3.69	4.842	11.6	3.34	1.27
	42	4.721	10.6	3.70	4.763	11.5	3.33	1.31
	43	4.788	10.7	3.72	4.787	11.5	3.33	1.30
	44	4.911	10.8	3.73	4.834	11.5	3.34	1.24
	45	4.887	10.8	3.73	4.813	11.5	3.34	1.10
	46	4.654	10.5	3.68	4.632	11.3	3.30	0.98
	47	4.126	9.9	3.54	4.281	10.9	3.23	0.82
Average								
	Weekday	3.701	9.3	3.36	3.704	10.0	3.06	0.98
	Weekend	3.904	9.5	3.39	3.927	10.2	3.09	1.04
	BWF[1]	3.759	9.4	3.37	3.768	10.1	3.07	1.00
% Error								
	Weekday				0.1%	7.1%	-8.9%	
	Weekend				0.6%	7.3%	-8.7%	

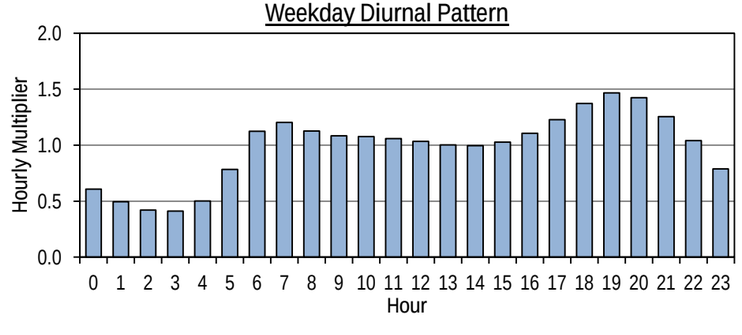
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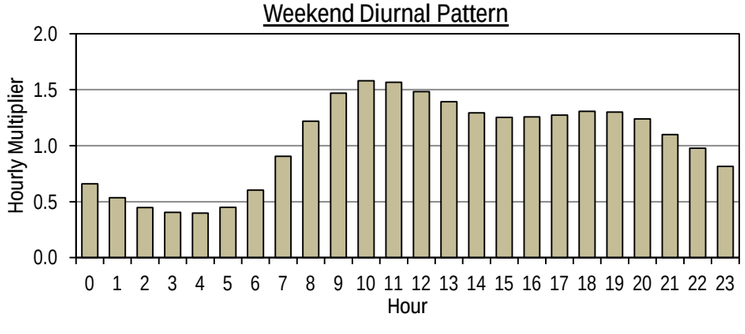
1. BWF = (5xWeekday Average + 2xWeekend Average)/7







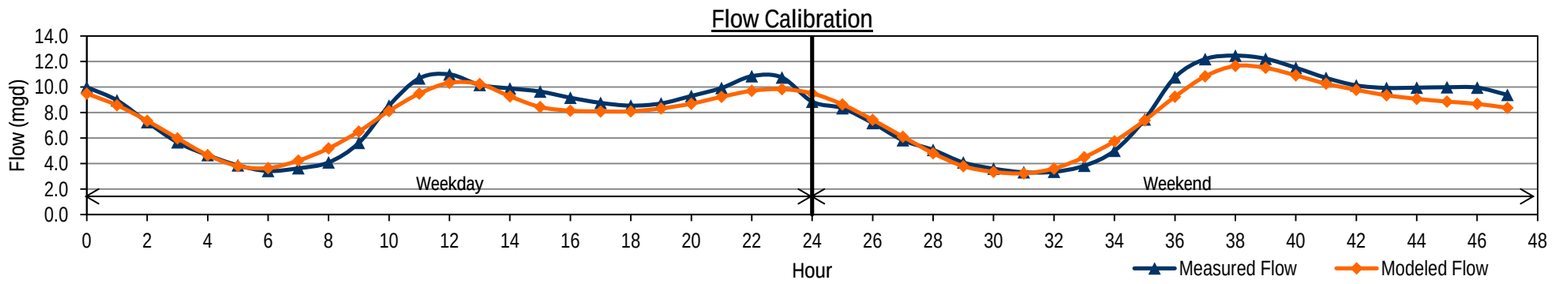


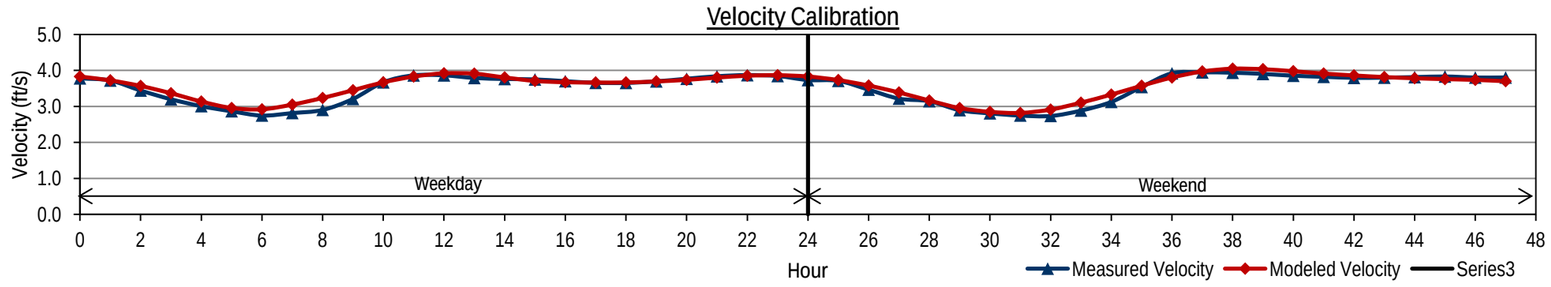


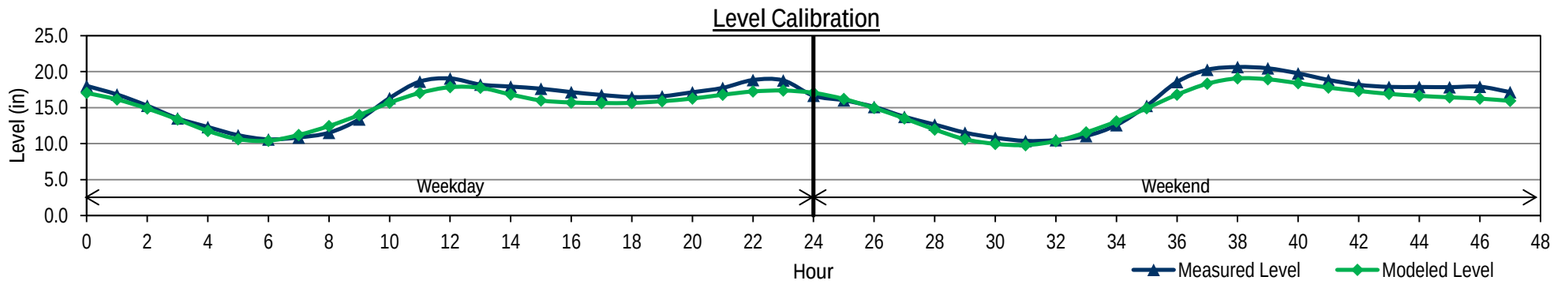
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR02 BASE WASTEWATER FLOW CALIBRATION

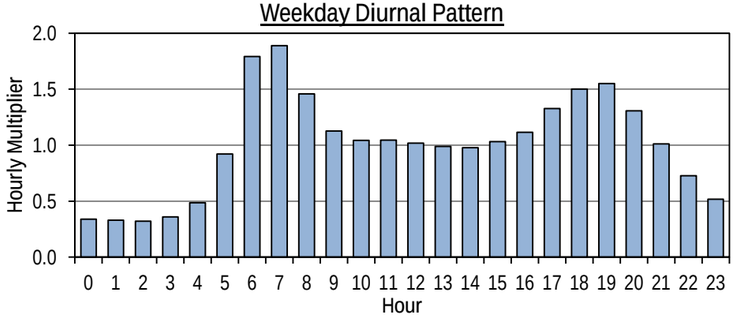
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	9.994	18.0	3.78	9.489	17.0	3.83	0.34
	1	8.962	16.8	3.72	8.573	16.1	3.73	0.33
	2	7.253	15.3	3.44	7.353	14.9	3.57	0.32
	3	5.672	13.5	3.20	5.977	13.4	3.37	0.36
	4	4.670	12.3	3.01	4.657	11.8	3.14	0.48
	5	3.865	11.2	2.87	3.800	10.6	2.96	0.92
	6	3.425	10.6	2.75	3.642	10.4	2.92	1.79
	7	3.639	10.8	2.82	4.231	11.2	3.05	1.89
	8	4.097	11.5	2.90	5.191	12.4	3.24	1.46
	9	5.629	13.4	3.21	6.512	14.0	3.45	1.13
	10	8.545	16.3	3.67	8.123	15.7	3.67	1.04
	11	10.685	18.6	3.86	9.487	17.0	3.83	1.05
	12	10.996	19.1	3.86	10.331	17.8	3.92	1.02
	13	10.170	18.2	3.79	10.241	17.8	3.91	0.99
	14	9.894	17.9	3.76	9.272	16.8	3.81	0.98
	15	9.652	17.6	3.75	8.434	16.0	3.71	1.03
	16	9.166	17.1	3.70	8.145	15.7	3.67	1.12
	17	8.763	16.8	3.65	8.085	15.6	3.67	1.33
	18	8.547	16.5	3.65	8.095	15.6	3.67	1.50
	19	8.718	16.6	3.70	8.325	15.9	3.70	1.55
	20	9.305	17.1	3.77	8.692	16.3	3.74	1.31
	21	9.930	17.7	3.84	9.233	16.8	3.80	1.01
	22	10.856	18.8	3.87	9.706	17.2	3.85	0.73
	23	10.753	18.8	3.84	9.837	17.4	3.87	0.52
Weekend	24	8.855	16.6	3.73	9.500	17.1	3.83	0.46
	25	8.345	16.0	3.71	8.637	16.2	3.73	0.34
	26	7.183	15.1	3.47	7.428	15.0	3.58	0.33
	27	5.834	13.7	3.22	6.103	13.5	3.39	0.33
	28	5.075	12.6	3.15	4.809	12.0	3.17	0.34
	29	4.089	11.5	2.90	3.792	10.6	2.96	0.44
	30	3.607	10.8	2.81	3.345	10.0	2.85	0.69
	31	3.324	10.4	2.75	3.227	9.8	2.82	1.17
	32	3.361	10.5	2.74	3.606	10.3	2.91	1.86
	33	3.834	11.1	2.89	4.497	11.6	3.10	1.91
	34	5.008	12.6	3.13	5.741	13.1	3.33	1.71
	35	7.467	15.2	3.54	7.388	14.9	3.58	1.46
	36	10.763	18.6	3.92	9.242	16.8	3.80	1.31
	37	12.197	20.3	3.95	10.846	18.3	3.97	1.20
	38	12.465	20.6	3.93	11.659	19.1	4.05	1.12
	39	12.224	20.5	3.90	11.510	18.9	4.04	1.12
	40	11.518	19.8	3.85	10.919	18.4	3.98	1.16
	41	10.722	18.8	3.82	10.270	17.8	3.91	1.20
	42	10.133	18.2	3.79	9.781	17.3	3.86	1.21
	43	9.934	17.9	3.80	9.357	16.9	3.82	1.12
	44	9.956	17.9	3.81	9.075	16.6	3.78	0.99
	45	9.989	17.8	3.83	8.860	16.4	3.76	0.88
	46	9.960	17.9	3.80	8.680	16.2	3.74	0.68
	47	9.393	17.1	3.80	8.372	15.9	3.70	0.51
Average								
Weekday		8.049	15.9	3.52	7.726	15.1	3.59	1.01
Weekend		8.135	15.9	3.51	7.777	15.1	3.57	0.98
ADWF[1]		8.074	15.9	3.51	7.741	15.1	3.58	1.00
% Error								
Weekday					-4.0%	-4.5%	2.0%	
Weekend					-4.4%	-4.9%	1.7%	

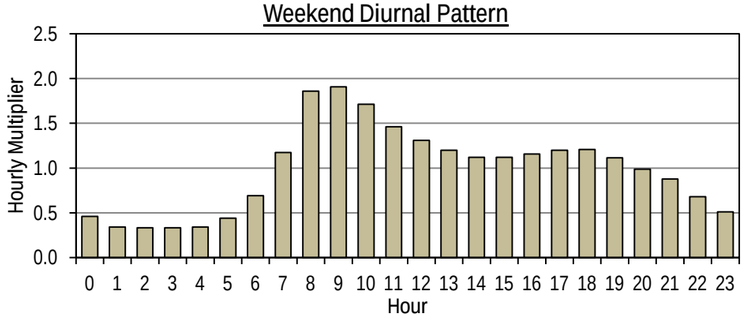
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







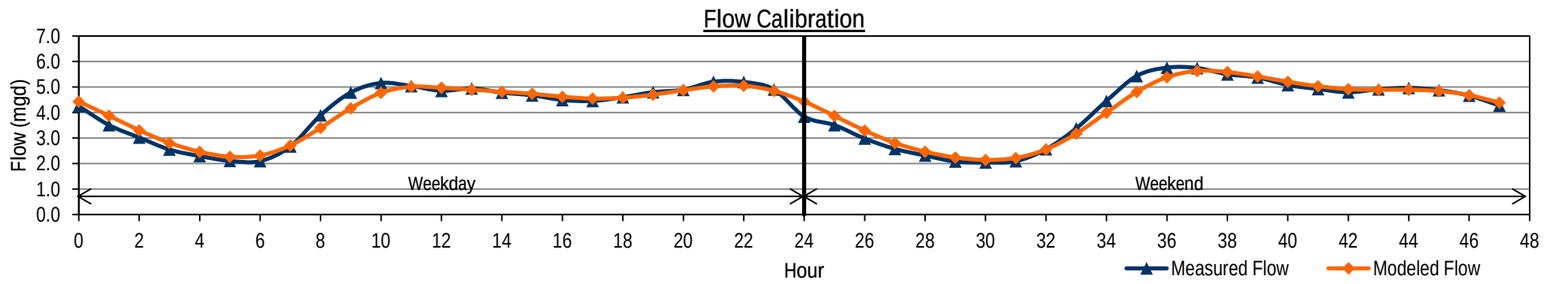


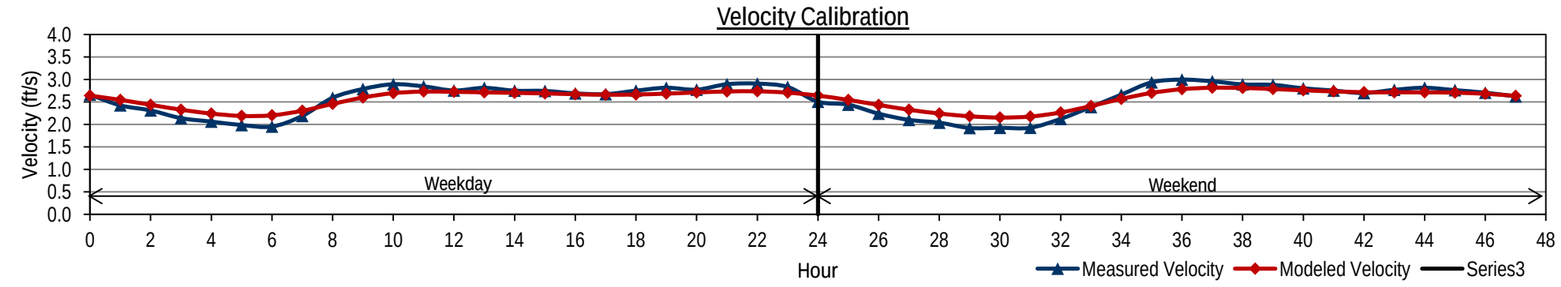


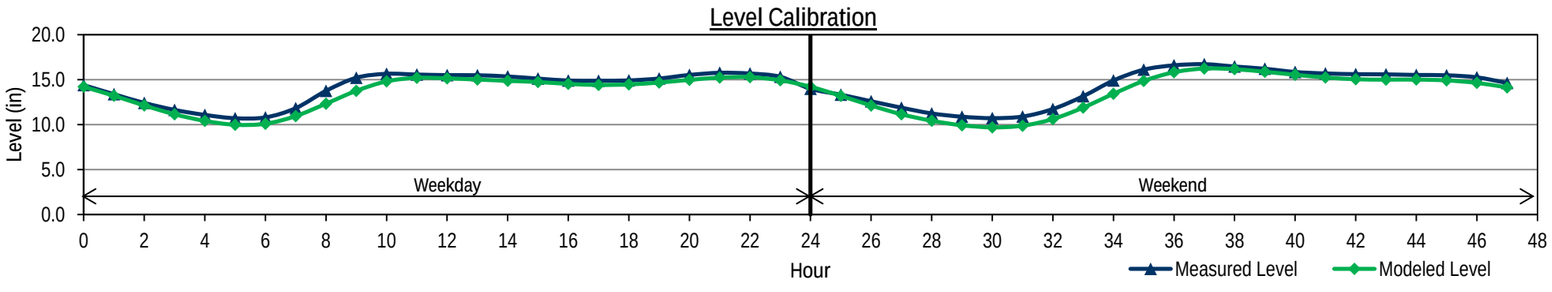
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR06 BASE WASTEWATER FLOW CALIBRATION

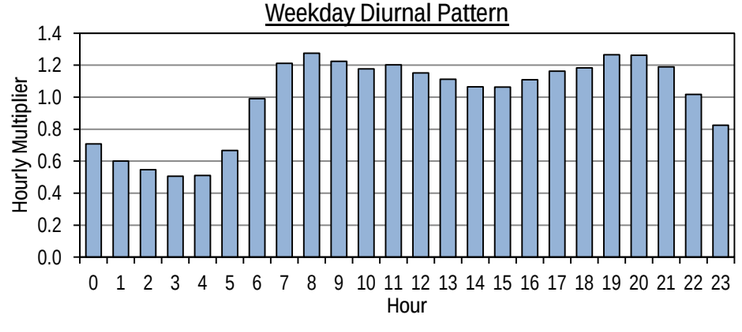
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	4.250	14.4	2.66	4.429	14.2	2.64	0.71
	1	3.507	13.4	2.42	3.873	13.2	2.55	0.60
	2	3.020	12.4	2.31	3.300	12.1	2.44	0.55
	3	2.551	11.6	2.14	2.807	11.1	2.33	0.51
	4	2.294	11.1	2.06	2.458	10.4	2.24	0.51
	5	2.105	10.7	1.99	2.264	10.0	2.19	0.67
	6	2.097	10.8	1.95	2.312	10.1	2.20	0.99
	7	2.672	11.8	2.19	2.705	10.9	2.31	1.21
	8	3.894	13.8	2.59	3.399	12.3	2.46	1.27
	9	4.787	15.2	2.79	4.167	13.8	2.60	1.22
	10	5.159	15.7	2.89	4.774	14.8	2.70	1.18
	11	5.038	15.6	2.85	5.012	15.2	2.73	1.20
	12	4.849	15.5	2.75	4.971	15.1	2.73	1.15
	13	4.946	15.5	2.81	4.896	15.0	2.71	1.11
	14	4.781	15.4	2.75	4.813	14.9	2.70	1.06
	15	4.673	15.1	2.75	4.736	14.7	2.69	1.06
	16	4.490	14.9	2.69	4.618	14.5	2.67	1.11
	17	4.454	14.9	2.67	4.546	14.4	2.66	1.16
	18	4.601	14.9	2.75	4.578	14.5	2.67	1.18
	19	4.799	15.1	2.82	4.699	14.7	2.69	1.27
	20	4.890	15.5	2.77	4.874	15.0	2.71	1.26
	21	5.207	15.8	2.89	5.024	15.2	2.73	1.19
	22	5.197	15.7	2.91	5.050	15.3	2.74	1.02
	23	4.906	15.3	2.83	4.849	14.9	2.71	0.82
Weekend	24	3.842	14.0	2.50	4.428	14.2	2.64	0.70
	25	3.508	13.3	2.44	3.867	13.2	2.55	0.61
	26	2.983	12.6	2.24	3.292	12.1	2.44	0.55
	27	2.576	11.9	2.10	2.804	11.1	2.33	0.49
	28	2.316	11.2	2.04	2.463	10.4	2.24	0.49
	29	2.083	10.9	1.92	2.235	9.9	2.18	0.51
	30	2.044	10.7	1.93	2.138	9.7	2.16	0.64
	31	2.095	10.9	1.93	2.216	9.9	2.18	0.85
	32	2.562	11.7	2.12	2.552	10.6	2.27	1.13
	33	3.380	13.2	2.39	3.171	11.9	2.41	1.37
	34	4.454	14.9	2.66	3.991	13.4	2.57	1.44
	35	5.432	16.1	2.94	4.806	14.9	2.70	1.42
	36	5.758	16.6	3.00	5.386	15.8	2.78	1.35
	37	5.745	16.7	2.96	5.630	16.2	2.82	1.31
	38	5.496	16.5	2.89	5.588	16.2	2.81	1.24
	39	5.374	16.2	2.88	5.414	15.9	2.79	1.20
	40	5.077	15.9	2.80	5.207	15.5	2.76	1.17
	41	4.921	15.7	2.75	5.032	15.2	2.73	1.20
	42	4.791	15.6	2.70	4.914	15.0	2.72	1.21
	43	4.911	15.6	2.77	4.889	15.0	2.71	1.18
	44	4.965	15.5	2.82	4.894	15.0	2.71	1.13
	45	4.876	15.5	2.76	4.840	14.9	2.71	1.02
	46	4.664	15.3	2.71	4.680	14.6	2.68	0.91
	47	4.274	14.6	2.62	4.390	14.1	2.64	0.82
Average								
Weekday		4.132	14.2	2.59	4.131	13.6	2.57	1.00
Weekend		4.089	14.2	2.54	4.118	13.5	2.56	1.00
ADWF[1]		4.120	14.2	2.58	4.128	13.6	2.57	1.00
% Error								
Weekday					0.0%	-4.0%	-0.7%	
Weekend					0.7%	-4.7%	1.1%	

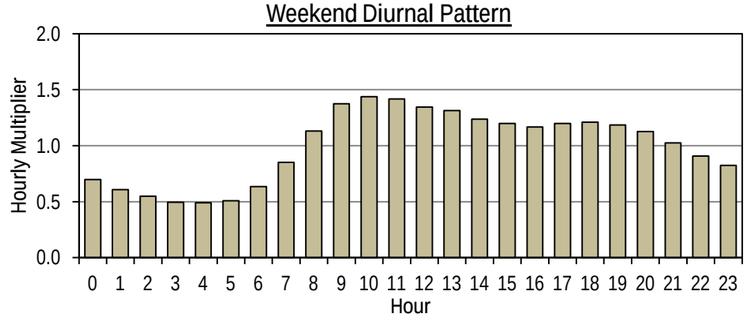
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









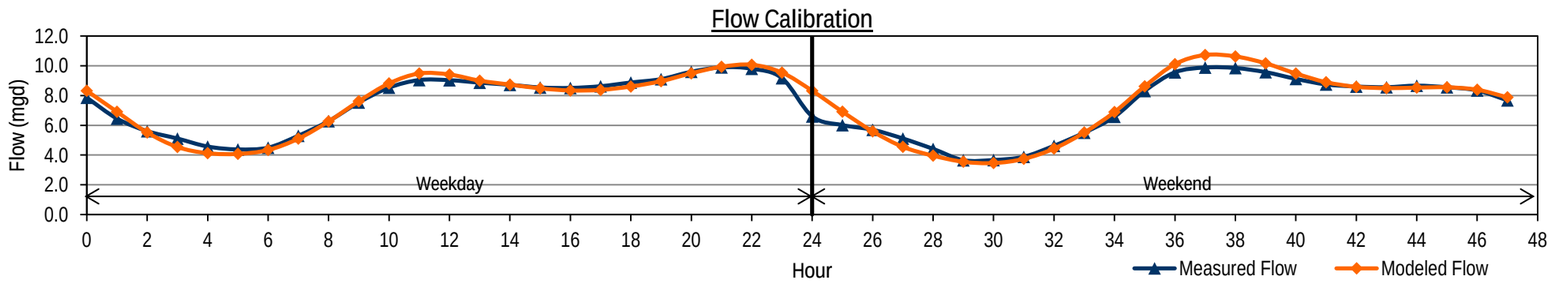


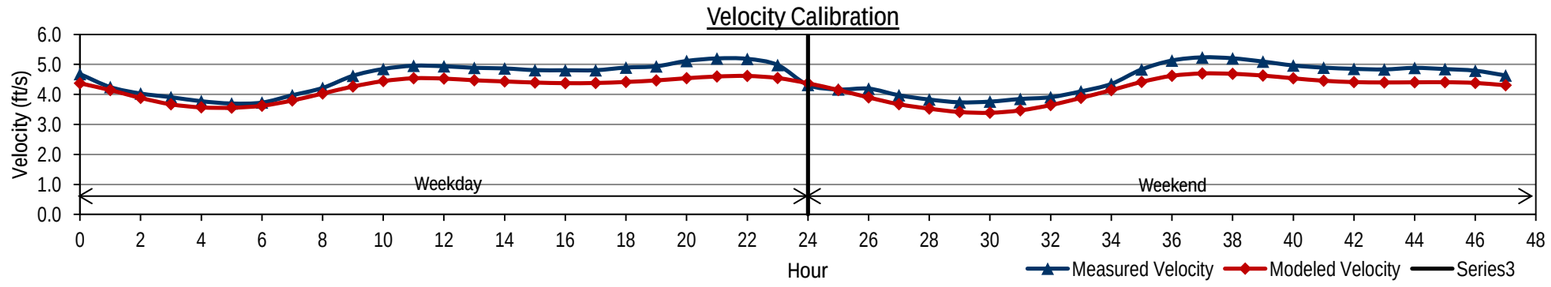
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR08 BASE WASTEWATER FLOW CALIBRATION

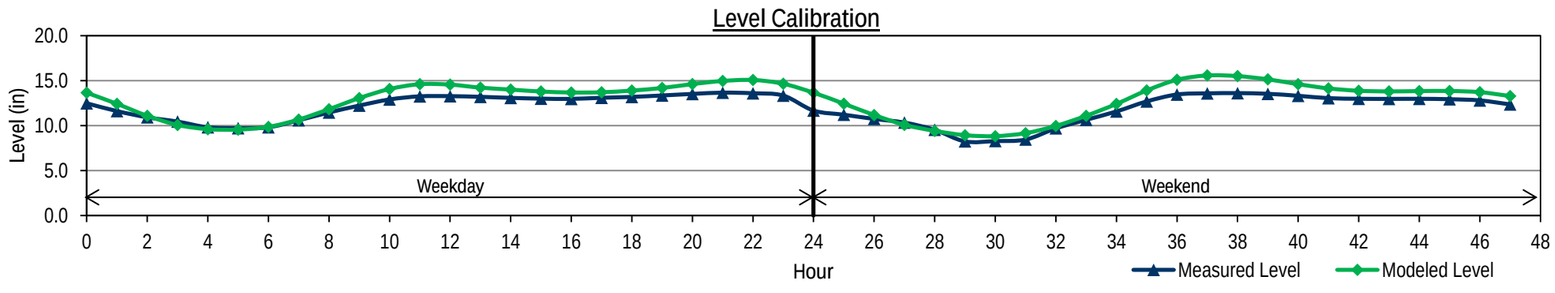
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	7.854	12.5	4.68	8.322	13.7	4.37	0.23
	1	6.447	11.6	4.25	6.911	12.4	4.15	0.15
	2	5.604	10.9	4.03	5.519	11.1	3.88	0.27
	3	5.106	10.5	3.91	4.546	10.1	3.67	0.37
	4	4.567	9.8	3.78	4.130	9.6	3.57	0.48
	5	4.376	9.7	3.70	4.085	9.6	3.56	0.63
	6	4.494	9.8	3.73	4.347	9.9	3.62	0.97
	7	5.296	10.6	3.97	5.108	10.7	3.80	1.25
	8	6.277	11.5	4.22	6.265	11.8	4.03	1.50
	9	7.532	12.2	4.62	7.620	13.1	4.26	1.56
	10	8.531	12.9	4.85	8.817	14.1	4.44	1.39
	11	9.041	13.2	4.95	9.485	14.6	4.54	1.19
	12	9.030	13.3	4.94	9.414	14.6	4.53	1.13
	13	8.864	13.2	4.89	9.000	14.2	4.47	1.04
	14	8.720	13.1	4.87	8.736	14.0	4.43	0.94
	15	8.540	13.0	4.81	8.484	13.8	4.40	0.94
	16	8.510	13.0	4.81	8.344	13.7	4.38	1.01
	17	8.624	13.1	4.81	8.381	13.7	4.38	1.16
	18	8.875	13.2	4.89	8.608	13.9	4.42	1.27
	19	9.101	13.3	4.94	8.967	14.2	4.47	1.44
	20	9.598	13.5	5.11	9.497	14.6	4.54	1.54
	21	9.894	13.7	5.20	9.934	15.0	4.60	1.41
	22	9.801	13.6	5.18	10.070	15.1	4.62	1.11
	23	9.168	13.3	4.98	9.543	14.7	4.55	0.55
Weekend	24	6.597	11.7	4.32	8.322	13.7	4.37	0.23
	25	6.011	11.2	4.17	6.917	12.4	4.15	0.20
	26	5.697	10.7	4.19	5.596	11.2	3.90	0.32
	27	5.109	10.3	3.97	4.556	10.1	3.67	0.43
	28	4.411	9.5	3.83	3.965	9.4	3.53	0.33
	29	3.651	8.3	3.74	3.556	8.9	3.42	0.47
	30	3.663	8.3	3.76	3.469	8.8	3.39	0.64
	31	3.881	8.5	3.85	3.749	9.2	3.47	1.02
	32	4.620	9.7	3.91	4.440	10.0	3.65	1.36
	33	5.502	10.7	4.10	5.518	11.1	3.88	1.60
	34	6.573	11.6	4.35	6.894	12.4	4.14	1.97
	35	8.307	12.7	4.83	8.620	13.9	4.42	2.07
	36	9.560	13.5	5.13	10.111	15.1	4.62	1.85
	37	9.883	13.6	5.23	10.727	15.6	4.70	1.61
	38	9.850	13.6	5.20	10.629	15.5	4.69	1.38
	39	9.572	13.5	5.09	10.165	15.1	4.63	1.20
	40	9.119	13.3	4.96	9.482	14.6	4.54	1.12
	41	8.746	13.0	4.89	8.898	14.1	4.46	1.12
	42	8.605	13.0	4.85	8.588	13.9	4.41	1.14
	43	8.558	13.0	4.83	8.500	13.8	4.40	1.25
	44	8.662	13.0	4.88	8.536	13.8	4.40	1.23
	45	8.555	12.9	4.84	8.555	13.8	4.41	1.19
	46	8.343	12.8	4.79	8.393	13.7	4.38	0.94
	47	7.678	12.4	4.63	7.884	13.3	4.31	0.52
Average								
	Weekday	7.661	12.3	4.59	7.672	13.0	4.24	0.98
	Weekend	7.131	11.7	4.52	7.336	12.6	4.16	1.05
	ADWF[1]	7.509	12.1	4.57	7.576	12.9	4.22	1.00
% Error								
	Weekday				0.2%	5.9%	-7.7%	
	Weekend				2.9%	8.1%	-7.8%	

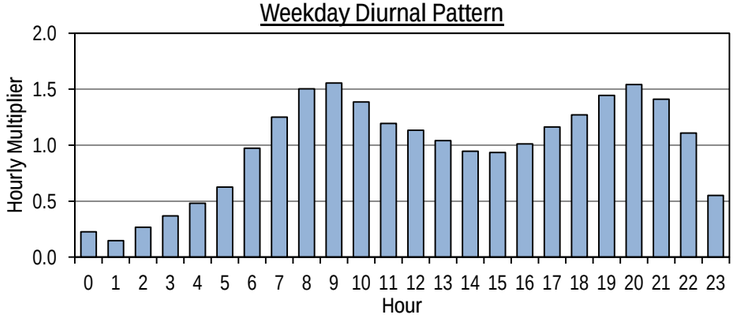
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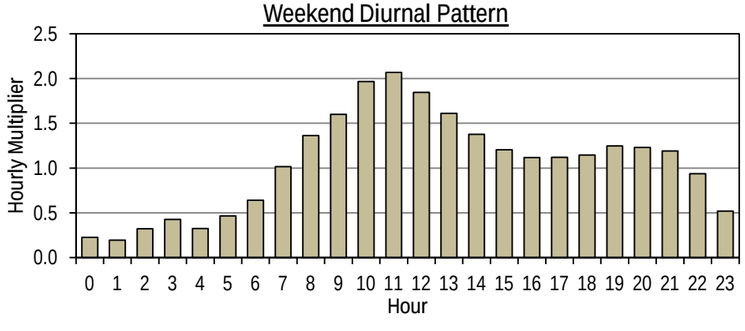
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









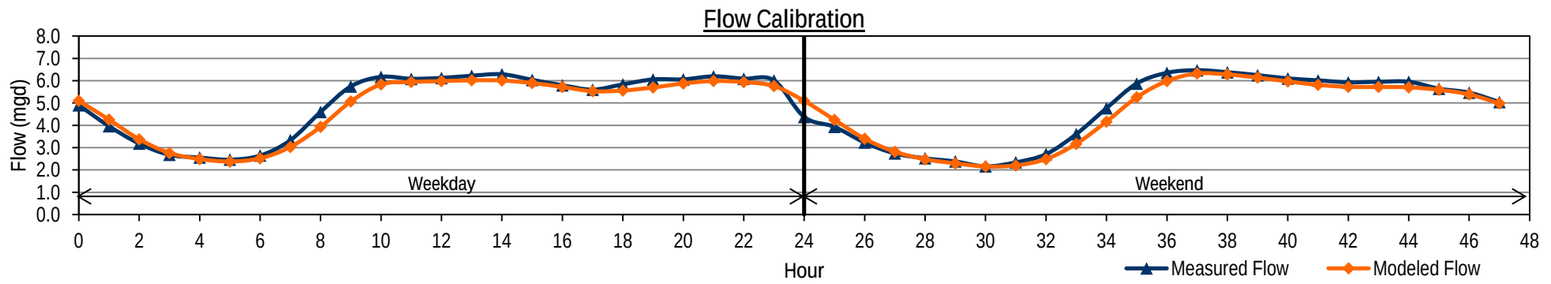


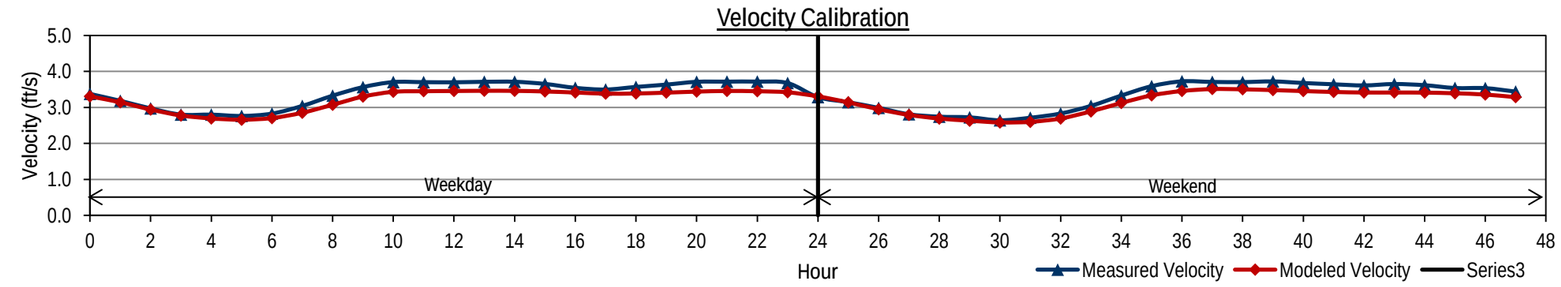
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR09 BASE WASTEWATER FLOW CALIBRATION

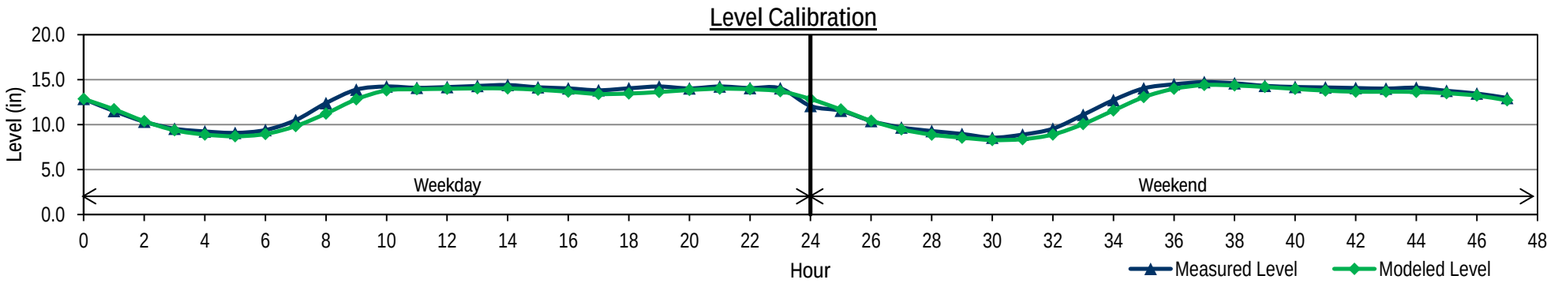
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	4.899	12.9	3.38	5.098	12.9	3.31	0.66
	1	3.962	11.5	3.19	4.255	11.7	3.14	0.52
	2	3.182	10.3	2.97	3.371	10.4	2.94	0.46
	3	2.679	9.5	2.80	2.757	9.4	2.78	0.48
	4	2.559	9.2	2.80	2.485	8.9	2.69	0.49
	5	2.465	9.1	2.76	2.374	8.7	2.66	0.56
	6	2.647	9.4	2.83	2.518	9.0	2.70	0.77
	7	3.335	10.5	3.04	3.028	9.8	2.85	1.12
	8	4.599	12.4	3.33	3.930	11.2	3.07	1.33
	9	5.742	13.9	3.57	5.068	12.8	3.30	1.32
	10	6.168	14.2	3.71	5.834	13.8	3.43	1.26
	11	6.082	14.1	3.70	5.944	13.9	3.45	1.25
	12	6.121	14.2	3.70	5.981	14.0	3.46	1.26
	13	6.220	14.3	3.71	6.020	14.0	3.46	1.30
	14	6.285	14.4	3.71	6.008	14.0	3.46	1.22
	15	6.035	14.2	3.65	5.896	13.9	3.44	1.15
	16	5.792	14.0	3.55	5.720	13.7	3.42	1.12
	17	5.599	13.8	3.50	5.528	13.4	3.38	1.22
	18	5.832	14.0	3.57	5.559	13.5	3.39	1.29
	19	6.055	14.2	3.64	5.697	13.6	3.41	1.25
	20	6.057	14.0	3.71	5.876	13.9	3.44	1.26
	21	6.191	14.2	3.72	5.987	14.0	3.46	1.22
	22	6.087	14.1	3.72	5.937	13.9	3.45	1.20
	23	6.010	14.0	3.68	5.759	13.7	3.42	0.88
Weekend	24	4.375	12.1	3.29	5.094	12.9	3.31	0.65
	25	3.933	11.5	3.15	4.245	11.7	3.14	0.53
	26	3.230	10.4	2.99	3.398	10.4	2.95	0.46
	27	2.742	9.7	2.81	2.812	9.5	2.79	0.47
	28	2.524	9.3	2.74	2.473	8.9	2.69	0.47
	29	2.383	9.0	2.73	2.291	8.6	2.63	0.43
	30	2.162	8.6	2.64	2.150	8.3	2.58	0.52
	31	2.344	8.9	2.71	2.198	8.4	2.60	0.64
	32	2.711	9.6	2.83	2.481	8.9	2.69	0.89
	33	3.606	11.1	3.04	3.167	10.1	2.89	1.17
	34	4.767	12.7	3.33	4.164	11.6	3.12	1.36
	35	5.870	14.0	3.59	5.254	13.1	3.34	1.37
	36	6.349	14.5	3.73	5.983	14.0	3.46	1.30
	37	6.466	14.7	3.71	6.325	14.4	3.51	1.24
	38	6.377	14.6	3.71	6.281	14.4	3.50	1.19
	39	6.246	14.3	3.72	6.139	14.2	3.48	1.17
	40	6.099	14.2	3.68	5.969	14.0	3.46	1.19
	41	6.012	14.1	3.64	5.812	13.8	3.43	1.20
	42	5.925	14.1	3.61	5.724	13.7	3.42	1.22
	43	5.947	14.0	3.65	5.721	13.7	3.42	1.23
	44	5.950	14.1	3.62	5.702	13.6	3.41	1.11
	45	5.639	13.8	3.54	5.590	13.5	3.39	1.06
	46	5.463	13.5	3.54	5.387	13.2	3.36	0.95
	47	5.044	13.0	3.44	4.982	12.7	3.29	0.69
Average								
Weekday		5.025	12.8	3.41	4.860	12.4	3.23	1.02
Weekend		4.673	12.3	3.31	4.556	12.0	3.16	0.94
ADWF[1]		4.925	12.6	3.38	4.773	12.3	3.21	1.00
% Error								
Weekday					-3.3%	-2.8%	-5.4%	
Weekend					-2.5%	-2.8%	-4.5%	

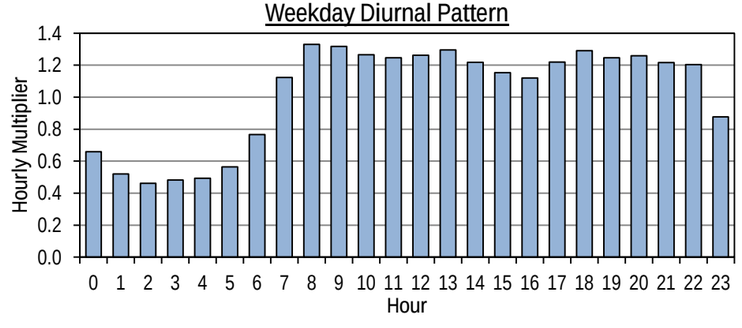
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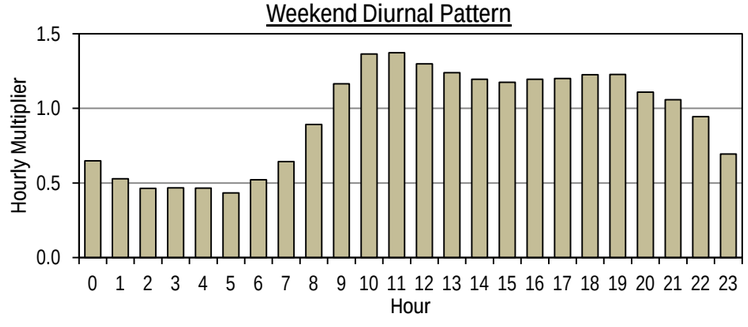
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







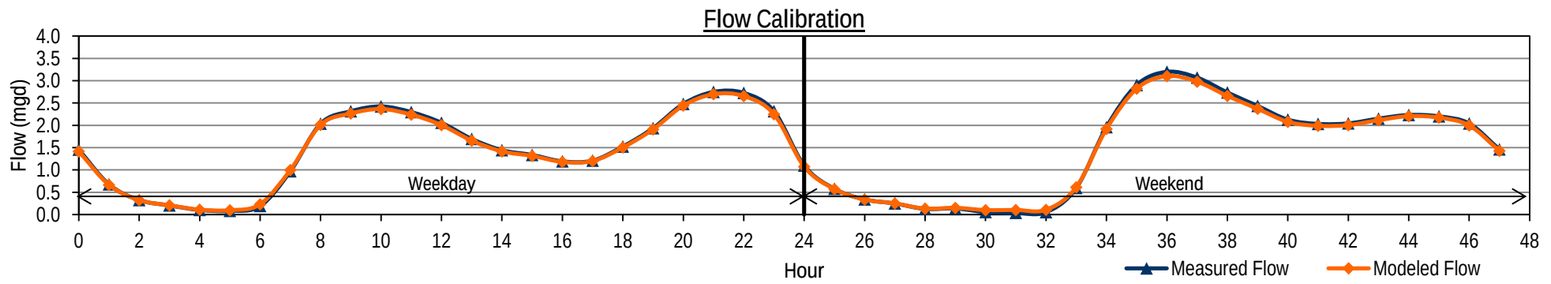


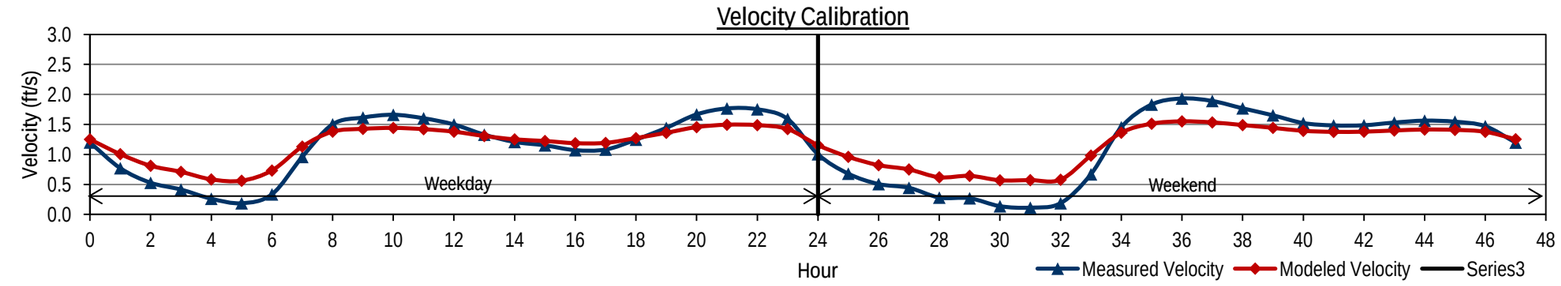


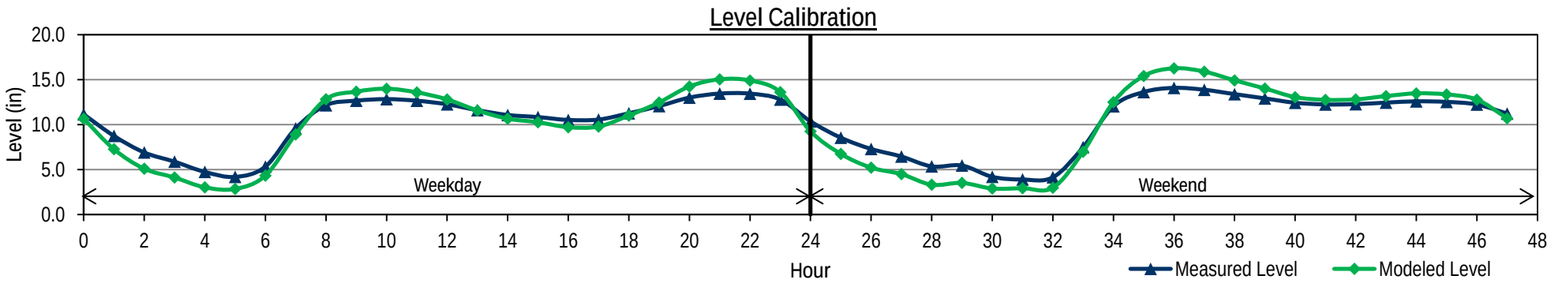
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR10 BASE WASTEWATER FLOW CALIBRATION

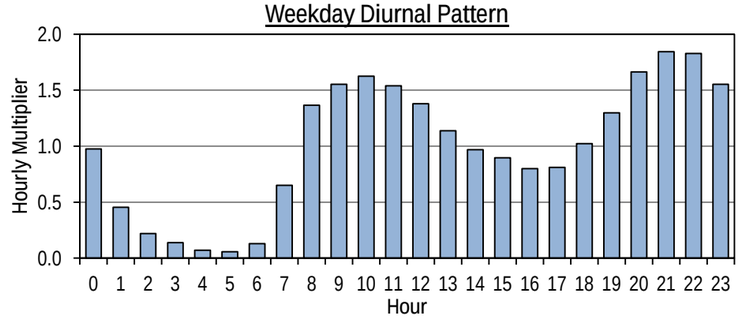
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	1.456	11.1	1.20	1.415	10.7	1.25	0.98
	1	0.678	8.8	0.77	0.663	7.3	1.00	0.45
	2	0.326	6.9	0.53	0.321	5.1	0.81	0.22
	3	0.206	5.9	0.41	0.205	4.1	0.71	0.14
	4	0.105	4.8	0.26	0.108	3.0	0.58	0.07
	5	0.084	4.2	0.19	0.095	2.9	0.56	0.06
	6	0.193	5.3	0.33	0.228	4.3	0.73	0.13
	7	0.972	9.6	0.96	0.997	8.9	1.13	0.65
	8	2.038	12.2	1.50	2.010	12.8	1.38	1.37
	9	2.317	12.7	1.61	2.264	13.7	1.43	1.55
	10	2.425	12.8	1.66	2.364	14.0	1.44	1.63
	11	2.298	12.7	1.60	2.238	13.6	1.42	1.54
	12	2.058	12.3	1.50	2.004	12.8	1.38	1.38
	13	1.696	11.6	1.33	1.656	11.6	1.31	1.14
	14	1.444	11.1	1.21	1.415	10.7	1.25	0.97
	15	1.337	10.8	1.15	1.313	10.3	1.22	0.90
	16	1.194	10.5	1.07	1.178	9.7	1.19	0.80
	17	1.210	10.6	1.08	1.197	9.8	1.19	0.81
	18	1.526	11.3	1.25	1.503	11.0	1.27	1.02
	19	1.937	12.1	1.44	1.908	12.5	1.36	1.30
	20	2.481	13.0	1.67	2.442	14.2	1.45	1.66
	21	2.750	13.4	1.77	2.697	15.0	1.49	1.84
	22	2.728	13.4	1.75	2.655	14.9	1.49	1.83
	23	2.317	12.8	1.59	2.248	13.6	1.42	1.55
Weekend	24	1.100	10.4	1.00	1.072	9.3	1.15	0.74
	25	0.578	8.5	0.68	0.568	6.7	0.96	0.39
	26	0.341	7.3	0.51	0.335	5.2	0.82	0.23
	27	0.250	6.5	0.44	0.247	4.5	0.75	0.17
	28	0.129	5.4	0.28	0.131	3.3	0.62	0.09
	29	0.139	5.5	0.27	0.148	3.5	0.64	0.09
	30	0.058	4.2	0.14	0.098	2.9	0.57	0.04
	31	0.039	3.9	0.11	0.101	2.9	0.57	0.03
	32	0.055	4.2	0.19	0.105	3.0	0.58	0.04
	33	0.596	7.5	0.67	0.611	7.0	0.98	0.40
	34	1.960	12.0	1.45	1.918	12.5	1.36	1.31
	35	2.904	13.6	1.83	2.820	15.4	1.51	1.95
	36	3.201	14.1	1.93	3.103	16.2	1.55	2.15
	37	3.070	13.9	1.89	2.977	15.9	1.53	2.06
	38	2.737	13.4	1.77	2.658	14.9	1.49	1.83
	39	2.437	12.9	1.65	2.370	14.0	1.44	1.63
	40	2.129	12.4	1.52	2.077	13.0	1.39	1.43
	41	2.033	12.2	1.48	1.988	12.7	1.38	1.36
	42	2.045	12.3	1.49	2.004	12.8	1.38	1.37
	43	2.152	12.4	1.53	2.114	13.2	1.40	1.44
	44	2.233	12.6	1.56	2.204	13.5	1.41	1.50
	45	2.202	12.5	1.55	2.171	13.3	1.41	1.48
	46	2.042	12.2	1.47	1.997	12.8	1.38	1.37
	47	1.462	11.2	1.20	1.427	10.7	1.25	0.98
Average								
Weekday		1.491	10.4	1.16	1.464	10.3	1.19	1.00
Weekend		1.496	10.0	1.11	1.469	10.0	1.15	1.00
ADWF[1]		1.492	10.3	1.15	1.465	10.2	1.17	1.00
% Error								
Weekday					-1.8%	-1.4%	2.3%	
Weekend					-1.8%	-0.7%	3.4%	

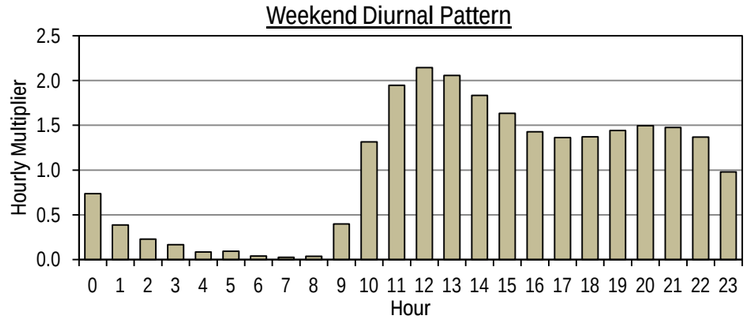
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







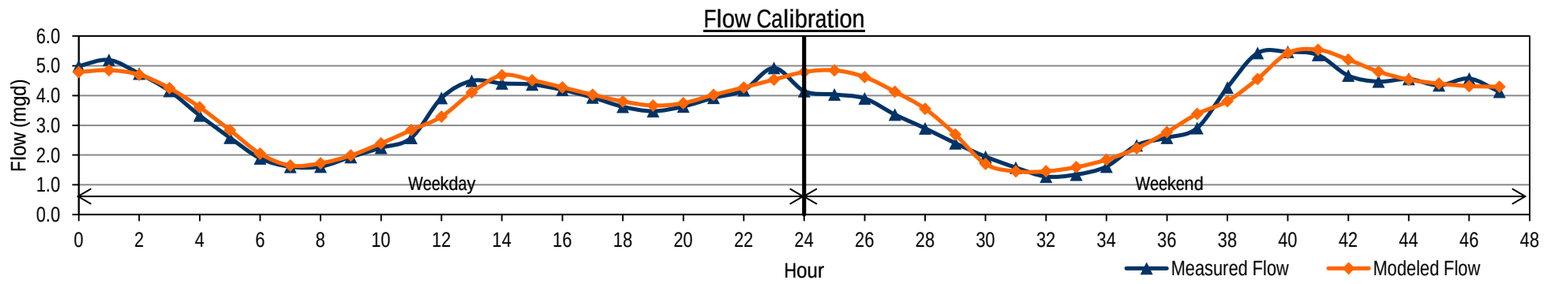


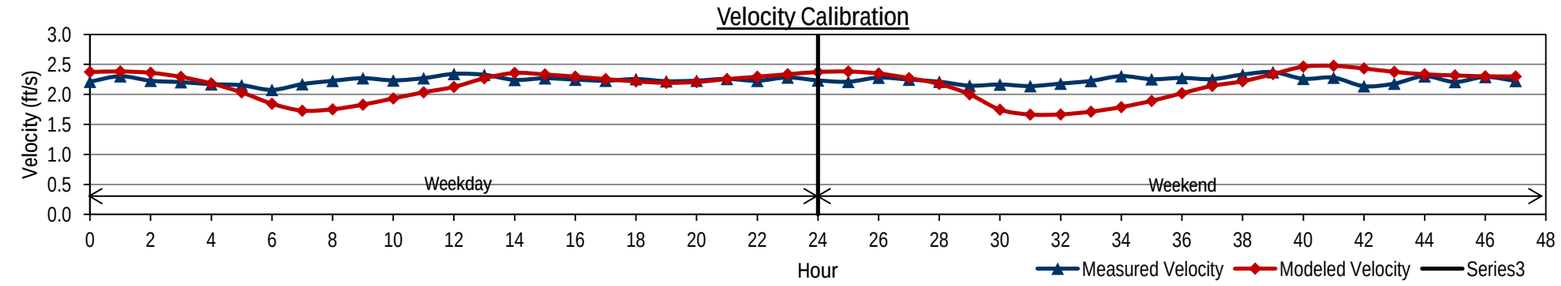


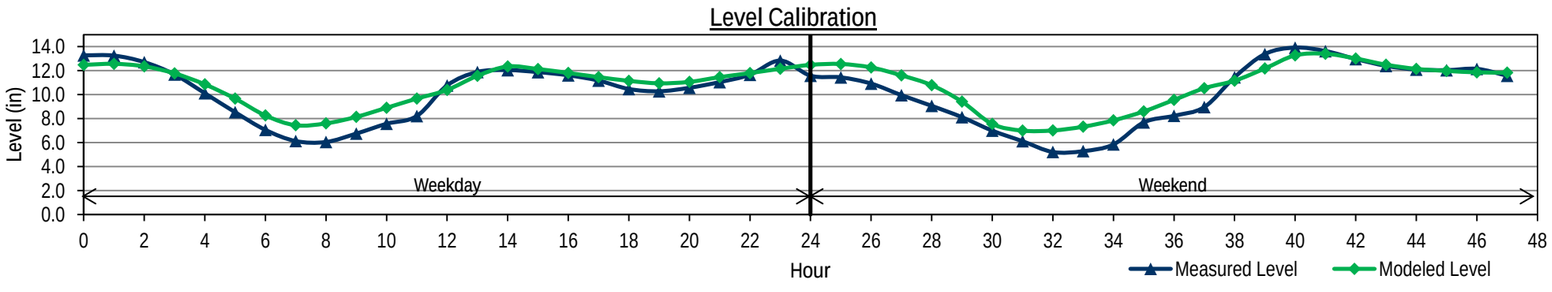
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR11 BASE WASTEWATER FLOW CALIBRATION

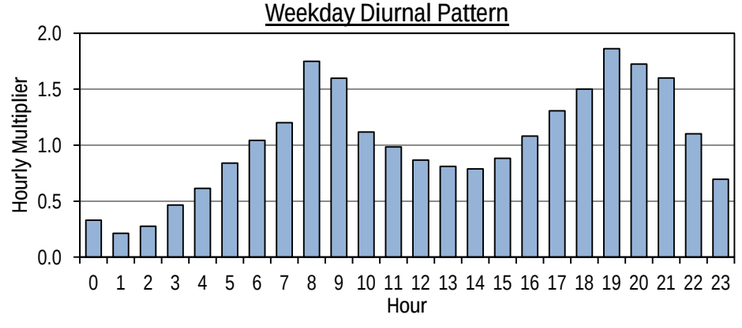
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	4.997	13.3	2.21	4.790	12.5	2.37	0.33
	1	5.199	13.2	2.30	4.851	12.6	2.38	0.21
	2	4.738	12.7	2.23	4.700	12.4	2.36	0.28
	3	4.157	11.7	2.20	4.249	11.8	2.29	0.47
	4	3.330	10.1	2.17	3.607	10.9	2.18	0.61
	5	2.583	8.5	2.15	2.839	9.7	2.03	0.84
	6	1.889	7.1	2.08	2.047	8.3	1.84	1.04
	7	1.605	6.1	2.17	1.650	7.5	1.73	1.20
	8	1.612	6.1	2.23	1.725	7.6	1.75	1.75
	9	1.932	6.8	2.27	1.989	8.1	1.83	1.60
	10	2.244	7.6	2.23	2.394	8.9	1.93	1.12
	11	2.578	8.2	2.27	2.841	9.7	2.03	0.98
	12	3.920	10.8	2.34	3.292	10.4	2.13	0.87
	13	4.496	11.9	2.33	4.106	11.6	2.27	0.81
	14	4.410	12.0	2.24	4.683	12.3	2.36	0.79
	15	4.374	11.9	2.27	4.516	12.1	2.33	0.88
	16	4.195	11.6	2.25	4.275	11.8	2.30	1.08
	17	3.937	11.2	2.23	4.028	11.5	2.26	1.31
	18	3.625	10.5	2.26	3.802	11.1	2.22	1.50
	19	3.477	10.3	2.22	3.664	10.9	2.19	1.86
	20	3.634	10.6	2.23	3.744	11.1	2.21	1.72
	21	3.926	11.0	2.26	4.023	11.5	2.26	1.60
	22	4.181	11.7	2.23	4.271	11.8	2.30	1.10
	23	4.929	12.8	2.28	4.536	12.2	2.34	0.70
Weekend	24	4.149	11.6	2.23	4.790	12.5	2.37	0.09
	25	4.037	11.4	2.21	4.846	12.6	2.38	0.16
	26	3.904	10.9	2.28	4.623	12.3	2.35	0.46
	27	3.362	10.0	2.25	4.129	11.6	2.27	0.49
	28	2.897	9.1	2.21	3.556	10.8	2.17	0.42
	29	2.396	8.1	2.15	2.691	9.4	2.00	0.50
	30	1.944	7.0	2.17	1.703	7.6	1.75	0.68
	31	1.576	6.1	2.14	1.453	7.0	1.66	1.06
	32	1.275	5.2	2.18	1.457	7.0	1.67	1.21
	33	1.341	5.3	2.22	1.596	7.3	1.71	1.37
	34	1.611	5.9	2.30	1.846	7.9	1.79	2.04
	35	2.327	7.7	2.25	2.228	8.6	1.89	2.28
	36	2.581	8.2	2.27	2.773	9.6	2.02	1.65
	37	2.907	9.0	2.25	3.383	10.5	2.14	1.19
	38	4.270	11.4	2.33	3.810	11.2	2.22	0.73
	39	5.432	13.4	2.37	4.557	12.2	2.34	0.72
	40	5.471	13.9	2.26	5.428	13.3	2.46	0.94
	41	5.366	13.6	2.28	5.539	13.4	2.48	0.98
	42	4.673	13.0	2.14	5.207	13.0	2.43	1.24
	43	4.472	12.4	2.18	4.803	12.5	2.38	1.04
	44	4.558	12.1	2.30	4.534	12.1	2.34	1.26
	45	4.345	12.0	2.21	4.403	12.0	2.32	0.97
	46	4.574	12.1	2.29	4.317	11.9	2.30	0.65
	47	4.129	11.6	2.22	4.297	11.8	2.30	0.26
Average								
	Weekday	3.582	10.3	2.23	3.609	10.8	2.16	1.03
	Weekend	3.483	10.0	2.24	3.665	10.7	2.16	0.93
	ADWF(1)	3.554	10.2	2.24	3.625	10.8	2.16	1.00
% Error								
	Weekday				0.8%	4.3%	-3.3%	
	Weekend				5.2%	7.0%	-3.7%	

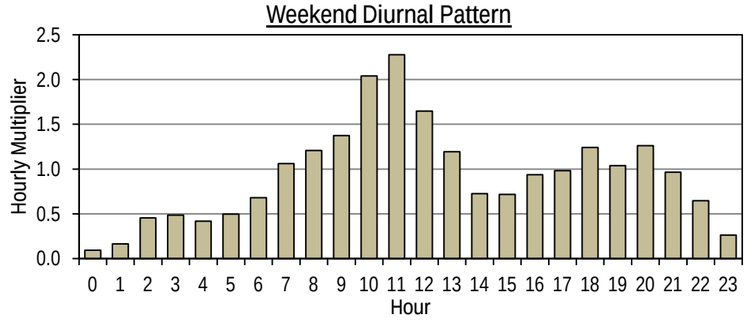
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







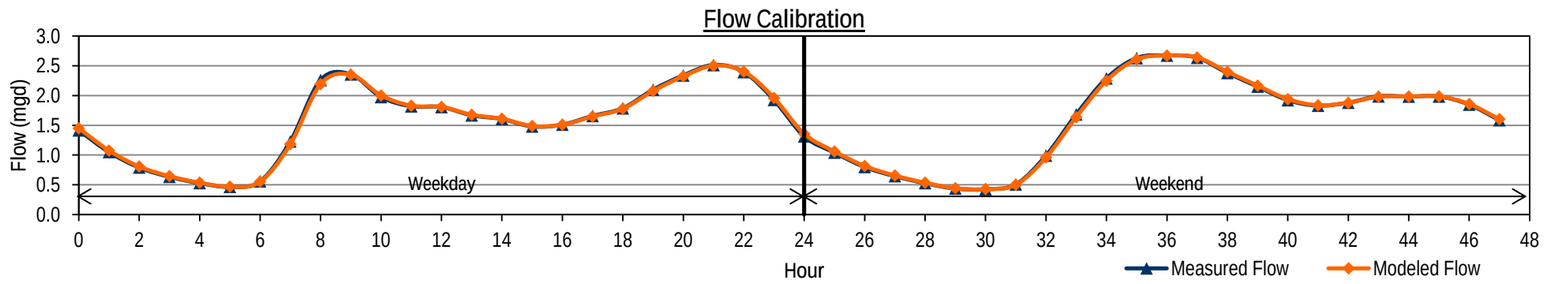


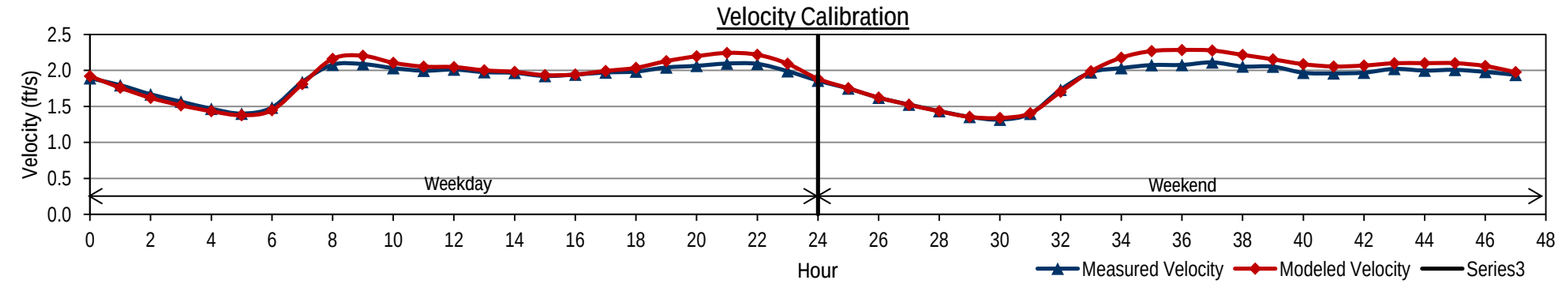


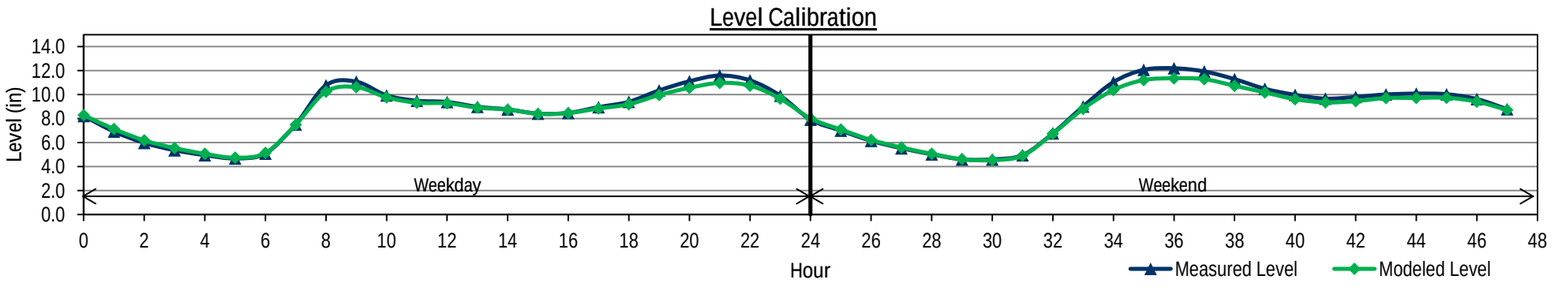
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR12 BASE WASTEWATER FLOW CALIBRATION

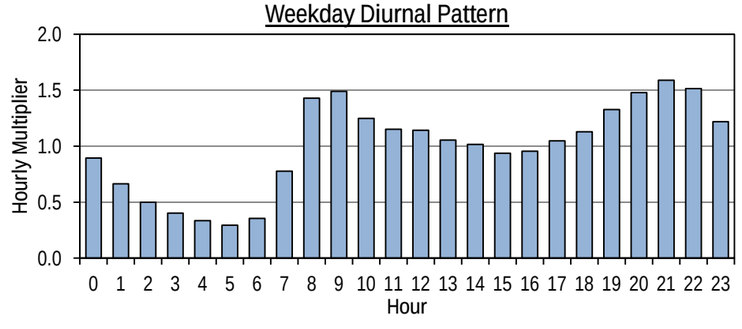
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	1.415	8.2	1.89	1.450	8.3	1.92	0.89
	1	1.051	6.9	1.80	1.076	7.1	1.76	0.66
	2	0.791	6.0	1.67	0.808	6.2	1.62	0.50
	3	0.635	5.4	1.57	0.646	5.6	1.52	0.40
	4	0.530	5.0	1.47	0.537	5.1	1.43	0.33
	5	0.466	4.7	1.40	0.469	4.8	1.38	0.29
	6	0.559	5.1	1.48	0.554	5.1	1.45	0.35
	7	1.229	7.5	1.84	1.185	7.5	1.81	0.78
	8	2.260	10.8	2.08	2.192	10.2	2.16	1.43
	9	2.356	11.1	2.09	2.351	10.6	2.20	1.49
	10	1.975	9.9	2.03	2.001	9.8	2.11	1.25
	11	1.819	9.5	2.00	1.830	9.3	2.05	1.15
	12	1.807	9.4	2.01	1.809	9.3	2.05	1.14
	13	1.667	9.0	1.98	1.677	8.9	2.00	1.05
	14	1.606	8.8	1.97	1.611	8.7	1.98	1.02
	15	1.481	8.4	1.92	1.489	8.4	1.93	0.94
	16	1.512	8.5	1.94	1.510	8.5	1.94	0.96
	17	1.658	9.0	1.97	1.648	8.8	1.99	1.05
	18	1.786	9.4	1.98	1.778	9.2	2.04	1.13
	19	2.098	10.3	2.04	2.077	10.0	2.13	1.33
	20	2.338	11.1	2.06	2.324	10.6	2.20	1.48
	21	2.513	11.6	2.10	2.502	11.0	2.24	1.59
	22	2.395	11.2	2.09	2.403	10.7	2.22	1.51
	23	1.928	9.9	1.99	1.960	9.7	2.09	1.22
Weekend	24	1.315	7.9	1.86	1.356	8.0	1.88	0.83
	25	1.042	7.0	1.75	1.061	7.1	1.75	0.66
	26	0.800	6.1	1.62	0.817	6.2	1.62	0.51
	27	0.646	5.5	1.53	0.657	5.6	1.52	0.41
	28	0.529	5.0	1.44	0.536	5.1	1.43	0.33
	29	0.438	4.6	1.35	0.444	4.6	1.36	0.28
	30	0.427	4.6	1.32	0.428	4.5	1.34	0.27
	31	0.507	5.0	1.40	0.502	4.9	1.41	0.32
	32	0.992	6.8	1.73	0.960	6.7	1.70	0.63
	33	1.683	9.0	1.97	1.637	8.8	1.99	1.06
	34	2.289	11.0	2.03	2.249	10.4	2.18	1.45
	35	2.630	12.1	2.07	2.608	11.2	2.27	1.66
	36	2.673	12.2	2.08	2.671	11.4	2.28	1.69
	37	2.636	11.9	2.11	2.640	11.3	2.28	1.67
	38	2.380	11.3	2.06	2.398	10.7	2.22	1.50
	39	2.152	10.5	2.05	2.167	10.2	2.15	1.36
	40	1.923	10.0	1.97	1.939	9.6	2.09	1.22
	41	1.830	9.7	1.96	1.837	9.3	2.05	1.16
	42	1.880	9.8	1.97	1.878	9.5	2.07	1.19
	43	1.987	10.0	2.02	1.980	9.7	2.10	1.26
	44	1.984	10.1	2.00	1.984	9.7	2.10	1.25
	45	1.985	10.0	2.01	1.985	9.7	2.10	1.25
	46	1.848	9.6	1.98	1.858	9.4	2.06	1.17
	47	1.587	8.8	1.94	1.604	8.7	1.98	1.00
Average								
Weekday		1.578	8.6	1.89	1.579	8.5	1.93	1.00
Weekend		1.590	8.7	1.84	1.592	8.4	1.91	1.01
ADWF[1]		1.582	8.6	1.88	1.582	8.5	1.92	1.00
% Error								
Weekday					0.0%	-1.6%	1.9%	
Weekend					0.1%	-2.9%	3.9%	

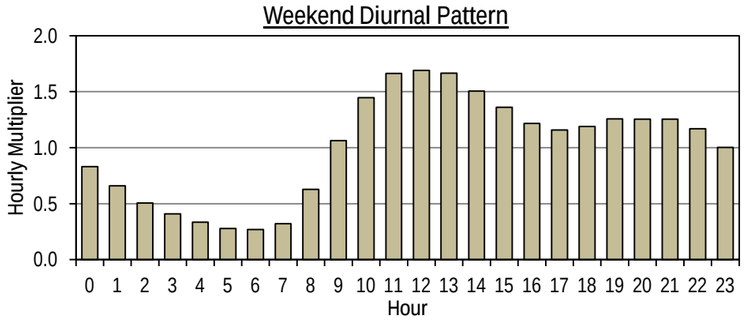
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







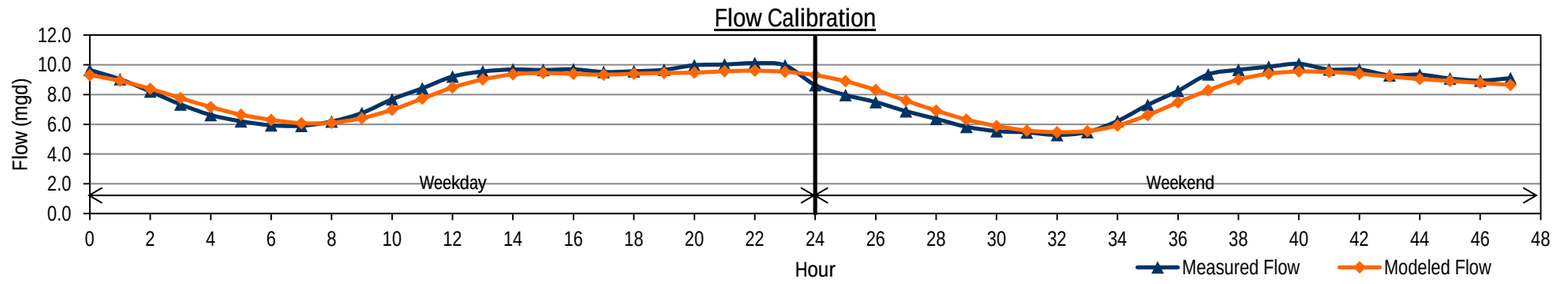


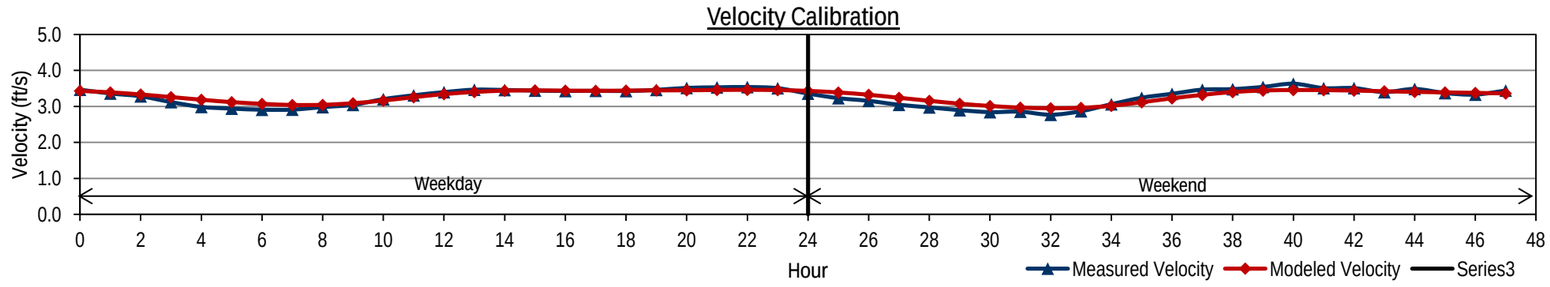


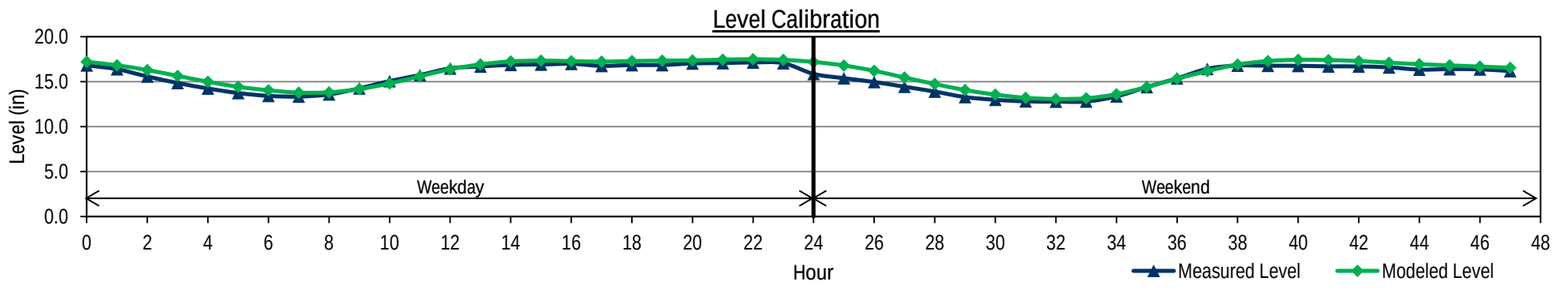
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR13 BASE WASTEWATER FLOW CALIBRATION

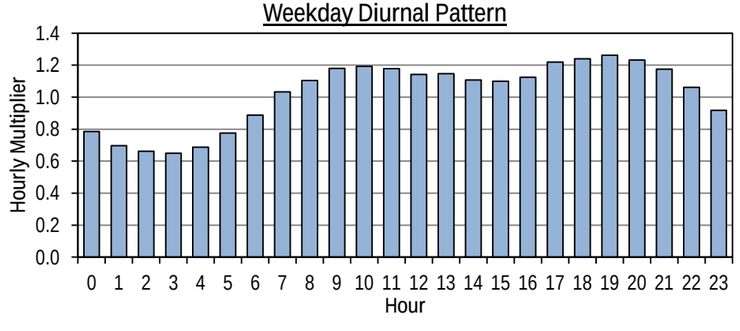
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	9.655	16.8	3.46	9.313	17.2	3.43	0.79
	1	9.037	16.4	3.36	8.931	16.8	3.39	0.70
	2	8.211	15.6	3.28	8.392	16.3	3.33	0.66
	3	7.339	14.8	3.12	7.765	15.6	3.26	0.65
	4	6.626	14.2	2.98	7.159	15.0	3.18	0.69
	5	6.203	13.7	2.94	6.644	14.4	3.12	0.78
	6	5.934	13.4	2.91	6.297	14.0	3.07	0.89
	7	5.898	13.3	2.91	6.071	13.8	3.04	1.03
	8	6.191	13.6	2.98	6.101	13.8	3.04	1.10
	9	6.758	14.2	3.04	6.411	14.2	3.09	1.18
	10	7.684	15.1	3.20	6.976	14.8	3.16	1.19
	11	8.423	15.7	3.31	7.727	15.6	3.25	1.18
	12	9.214	16.5	3.40	8.480	16.4	3.34	1.14
	13	9.555	16.7	3.46	9.020	16.9	3.40	1.15
	14	9.691	16.9	3.46	9.367	17.2	3.43	1.11
	15	9.656	16.9	3.44	9.454	17.3	3.44	1.10
	16	9.704	17.0	3.43	9.392	17.3	3.44	1.13
	17	9.524	16.7	3.43	9.339	17.2	3.43	1.22
	18	9.572	16.8	3.43	9.405	17.3	3.44	1.24
	19	9.671	16.8	3.46	9.456	17.3	3.44	1.26
	20	9.977	17.0	3.51	9.479	17.4	3.45	1.23
	21	10.028	17.1	3.53	9.572	17.4	3.45	1.18
	22	10.118	17.1	3.54	9.611	17.5	3.46	1.06
	23	9.964	17.0	3.51	9.537	17.4	3.45	0.92
Weekend	24	8.636	15.8	3.35	9.309	17.2	3.43	0.69
	25	7.971	15.4	3.23	8.901	16.8	3.39	0.64
	26	7.494	15.0	3.15	8.313	16.2	3.32	0.60
	27	6.880	14.4	3.04	7.596	15.5	3.24	0.60
	28	6.369	13.9	2.97	6.921	14.7	3.15	0.64
	29	5.830	13.3	2.89	6.319	14.1	3.07	0.64
	30	5.540	13.0	2.84	5.882	13.6	3.01	0.70
	31	5.452	12.8	2.85	5.576	13.2	2.96	0.84
	32	5.281	12.8	2.77	5.468	13.1	2.95	1.01
	33	5.478	12.8	2.87	5.538	13.2	2.96	1.12
	34	6.219	13.4	3.06	5.915	13.6	3.01	1.27
	35	7.302	14.4	3.24	6.617	14.4	3.11	1.24
	36	8.251	15.4	3.35	7.475	15.3	3.22	1.22
	37	9.359	16.4	3.46	8.291	16.2	3.32	1.22
	38	9.667	16.8	3.48	9.004	16.9	3.40	1.13
	39	9.874	16.8	3.54	9.409	17.3	3.44	1.13
	40	10.072	16.7	3.63	9.556	17.4	3.45	1.07
	41	9.687	16.7	3.51	9.521	17.4	3.45	1.10
	42	9.691	16.7	3.51	9.404	17.3	3.44	1.06
	43	9.295	16.6	3.40	9.216	17.1	3.42	1.04
	44	9.345	16.3	3.48	9.052	16.9	3.40	1.09
	45	9.083	16.4	3.37	8.919	16.8	3.39	0.96
	46	8.943	16.4	3.33	8.787	16.7	3.37	0.83
	47	9.107	16.2	3.44	8.652	16.5	3.36	0.77
Average								
	Weekday	8.526	15.8	3.29	8.329	16.2	3.31	1.02
	Weekend	7.951	15.2	3.24	7.902	15.7	3.26	0.94
	ADWF[1]	8.362	15.6	3.28	8.207	16.0	3.30	1.00
% Error								
	Weekday				-2.3%	2.3%	0.6%	
	Weekend				-0.6%	3.6%	0.6%	

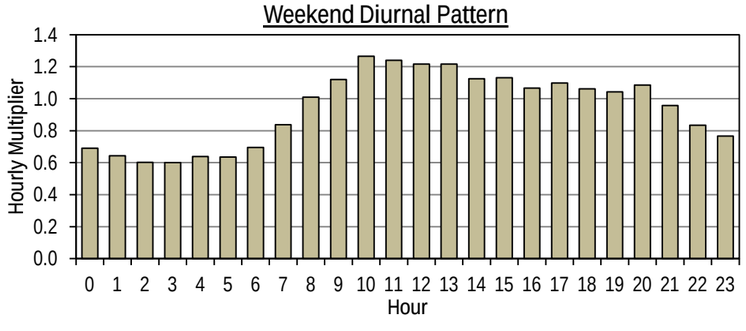
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







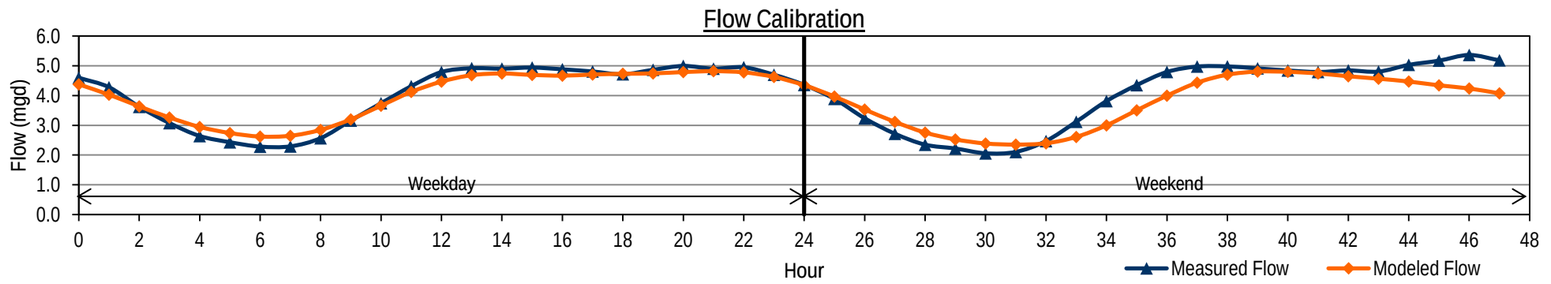


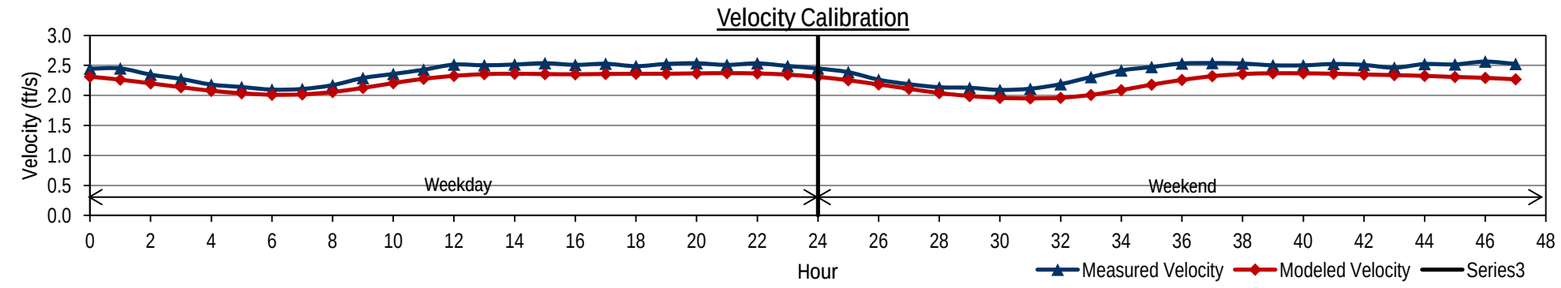


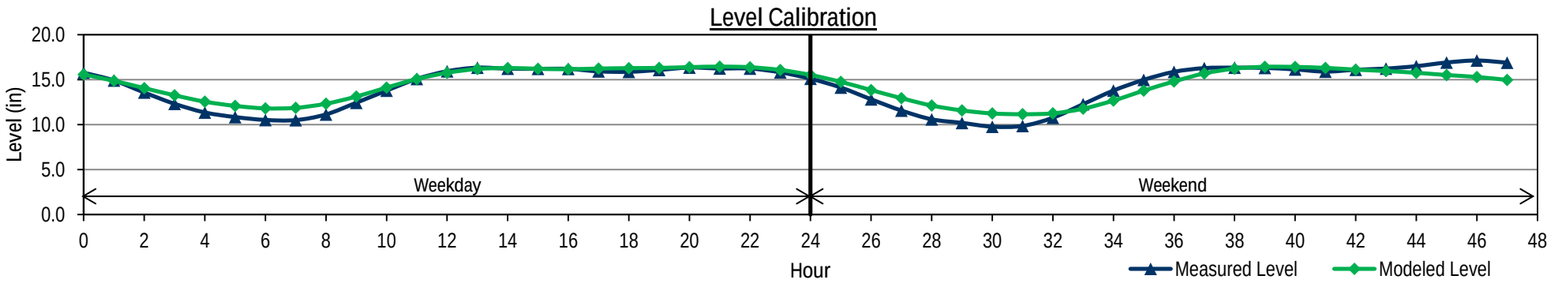
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR14 BASE WASTEWATER FLOW CALIBRATION

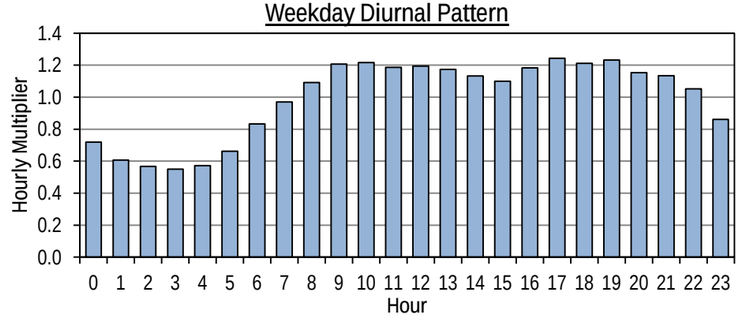
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	4.599	15.8	2.45	4.376	15.6	2.31	0.72
	1	4.281	14.9	2.45	4.029	14.9	2.26	0.61
	2	3.620	13.6	2.35	3.635	14.1	2.20	0.57
	3	3.074	12.3	2.28	3.261	13.3	2.14	0.55
	4	2.639	11.3	2.18	2.943	12.6	2.08	0.57
	5	2.429	10.8	2.14	2.738	12.1	2.04	0.66
	6	2.282	10.5	2.10	2.620	11.8	2.01	0.83
	7	2.290	10.5	2.11	2.646	11.9	2.02	0.97
	8	2.566	11.1	2.17	2.844	12.3	2.06	1.09
	9	3.159	12.4	2.29	3.197	13.1	2.12	1.21
	10	3.743	13.8	2.36	3.658	14.1	2.20	1.22
	11	4.316	15.1	2.43	4.122	15.1	2.28	1.19
	12	4.793	15.9	2.51	4.468	15.8	2.33	1.20
	13	4.921	16.3	2.50	4.686	16.2	2.35	1.17
	14	4.906	16.2	2.52	4.741	16.3	2.36	1.13
	15	4.943	16.2	2.54	4.694	16.2	2.36	1.10
	16	4.884	16.2	2.51	4.669	16.2	2.35	1.18
	17	4.812	15.9	2.53	4.707	16.2	2.36	1.24
	18	4.717	15.9	2.49	4.732	16.3	2.36	1.21
	19	4.868	16.1	2.53	4.744	16.3	2.36	1.23
	20	4.998	16.3	2.54	4.790	16.4	2.37	1.15
	21	4.905	16.2	2.51	4.819	16.4	2.37	1.14
	22	4.953	16.2	2.54	4.780	16.4	2.37	1.05
	23	4.701	15.8	2.49	4.626	16.1	2.35	0.86
Weekend	24	4.359	15.1	2.45	4.348	15.5	2.31	0.59
	25	3.889	14.1	2.39	3.967	14.7	2.25	0.52
	26	3.235	12.8	2.26	3.529	13.8	2.18	0.52
	27	2.716	11.6	2.19	3.114	12.9	2.11	0.50
	28	2.347	10.6	2.14	2.754	12.1	2.04	0.55
	29	2.218	10.2	2.13	2.524	11.6	1.99	0.69
	30	2.056	9.8	2.09	2.386	11.2	1.96	0.91
	31	2.103	9.8	2.11	2.350	11.2	1.95	1.12
	32	2.470	10.8	2.19	2.393	11.3	1.96	1.23
	33	3.119	12.3	2.31	2.607	11.8	2.01	1.31
	34	3.815	13.8	2.42	2.997	12.7	2.09	1.30
	35	4.351	15.0	2.47	3.503	13.8	2.18	1.24
	36	4.795	15.9	2.53	3.995	14.8	2.26	1.18
	37	4.977	16.3	2.54	4.433	15.7	2.32	1.14
	38	4.983	16.3	2.53	4.701	16.2	2.36	1.13
	39	4.915	16.3	2.50	4.806	16.4	2.37	1.17
	40	4.845	16.1	2.50	4.798	16.4	2.37	1.17
	41	4.794	15.9	2.52	4.743	16.3	2.36	1.28
	42	4.847	16.1	2.51	4.648	16.1	2.35	1.34
	43	4.808	16.2	2.46	4.566	15.9	2.34	1.42
	44	5.034	16.5	2.52	4.471	15.8	2.33	1.36
	45	5.175	16.9	2.52	4.343	15.5	2.31	1.05
	46	5.367	17.1	2.57	4.237	15.3	2.29	0.91
	47	5.186	16.9	2.53	4.073	15.0	2.27	0.72
Average								
	Weekday	4.058	14.4	2.40	4.022	14.8	2.25	0.99
	Weekend	4.017	14.3	2.39	3.762	14.2	2.21	1.01
	ADWF[1]	4.046	14.4	2.39	3.948	14.6	2.24	1.00
% Error								
	Weekday				-0.9%	2.9%	-6.1%	
	Weekend				-6.3%	-0.1%	-7.8%	

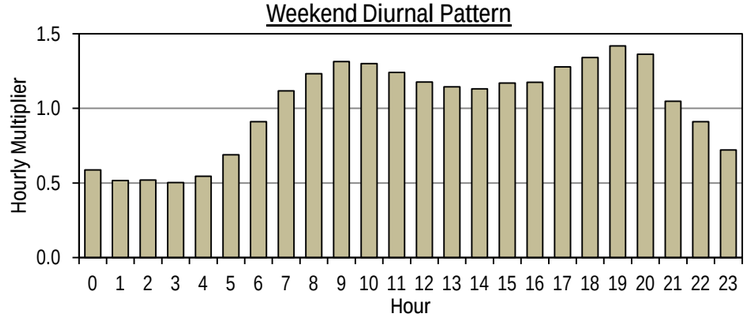
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









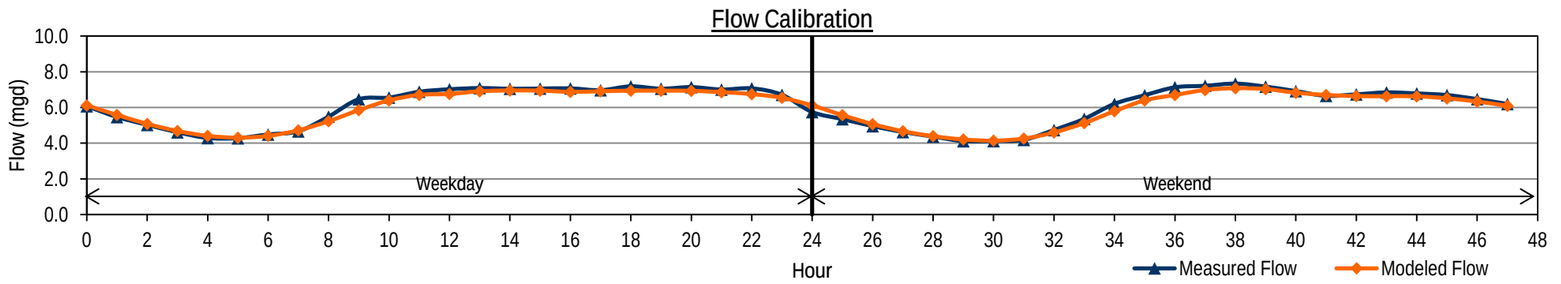


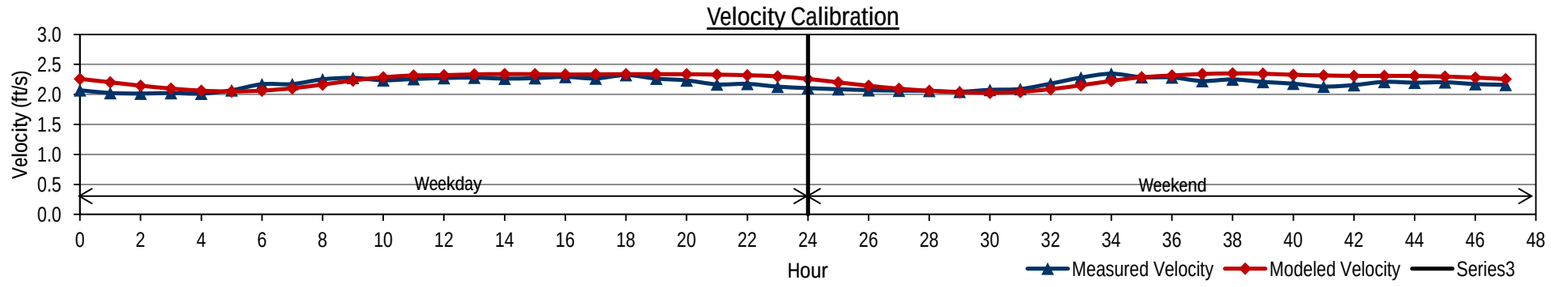
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR15 BASE WASTEWATER FLOW CALIBRATION

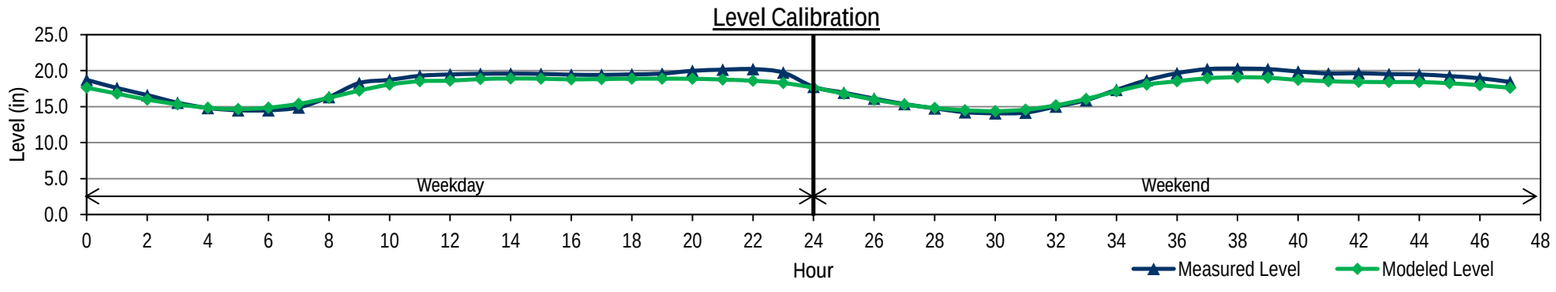
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	6.069	18.7	2.07	6.112	17.6	2.26	0.84
	1	5.461	17.6	2.02	5.580	16.8	2.20	0.75
	2	5.022	16.6	2.01	5.077	16.0	2.14	0.68
	3	4.608	15.5	2.02	4.679	15.3	2.10	0.67
	4	4.286	14.8	2.01	4.407	14.8	2.06	0.69
	5	4.275	14.5	2.07	4.304	14.7	2.05	0.71
	6	4.484	14.5	2.17	4.409	14.9	2.06	0.86
	7	4.660	14.9	2.17	4.716	15.4	2.10	1.05
	8	5.485	16.3	2.25	5.228	16.2	2.16	1.04
	9	6.460	18.3	2.28	5.847	17.2	2.23	1.09
	10	6.555	18.7	2.24	6.392	18.1	2.29	1.13
	11	6.882	19.3	2.26	6.701	18.5	2.32	1.13
	12	7.020	19.5	2.27	6.752	18.6	2.32	1.12
	13	7.087	19.6	2.28	6.902	18.8	2.33	1.12
	14	7.048	19.6	2.26	6.949	18.9	2.34	1.15
	15	7.059	19.6	2.27	6.937	18.9	2.34	1.13
	16	7.070	19.4	2.29	6.871	18.8	2.33	1.18
	17	6.968	19.4	2.27	6.904	18.8	2.33	1.17
	18	7.184	19.5	2.32	6.937	18.9	2.34	1.20
	19	7.051	19.6	2.26	6.935	18.9	2.34	1.20
	20	7.141	20.0	2.23	6.928	18.9	2.34	1.24
	21	7.004	20.1	2.17	6.853	18.8	2.33	1.17
	22	7.070	20.2	2.18	6.744	18.6	2.32	1.04
	23	6.707	19.7	2.13	6.538	18.3	2.30	0.92
Weekend	24	5.742	17.8	2.10	6.108	17.6	2.26	0.82
	25	5.344	16.9	2.09	5.568	16.8	2.20	0.75
	26	4.951	16.1	2.07	5.063	16.0	2.14	0.69
	27	4.621	15.4	2.06	4.668	15.3	2.09	0.62
	28	4.365	14.8	2.06	4.390	14.8	2.06	0.61
	29	4.111	14.2	2.04	4.205	14.5	2.03	0.61
	30	4.117	14.1	2.08	4.139	14.4	2.03	0.70
	31	4.184	14.2	2.09	4.255	14.6	2.04	0.82
	32	4.735	15.0	2.18	4.599	15.2	2.09	0.98
	33	5.358	15.9	2.28	5.122	16.1	2.15	1.07
	34	6.201	17.3	2.34	5.788	17.1	2.22	1.19
	35	6.685	18.7	2.29	6.393	18.1	2.29	1.20
	36	7.129	19.6	2.28	6.695	18.5	2.31	1.23
	37	7.214	20.2	2.22	6.973	18.9	2.34	1.19
	38	7.337	20.3	2.25	7.075	19.1	2.35	1.15
	39	7.168	20.2	2.21	7.027	19.0	2.35	1.09
	40	6.916	19.9	2.18	6.822	18.7	2.33	1.11
	41	6.651	19.6	2.13	6.698	18.5	2.32	1.14
	42	6.734	19.6	2.16	6.634	18.4	2.31	1.14
	43	6.844	19.5	2.21	6.625	18.4	2.31	1.14
	44	6.785	19.5	2.20	6.622	18.4	2.31	1.11
	45	6.694	19.2	2.20	6.507	18.3	2.30	1.06
	46	6.468	18.9	2.17	6.327	18.0	2.28	0.97
	47	6.194	18.4	2.16	6.091	17.6	2.26	0.90
Average								
Weekday		6.194	18.2	2.19	6.071	17.5	2.25	1.01
Weekend		5.939	17.7	2.17	5.850	17.2	2.22	0.97
ADWF[1]		6.121	18.0	2.18	6.008	17.4	2.24	1.00
% Error								
Weekday					-2.0%	-3.5%	2.7%	
Weekend					-1.5%	-3.1%	2.5%	

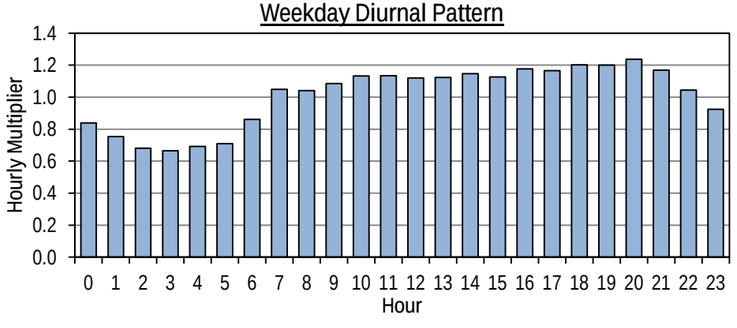
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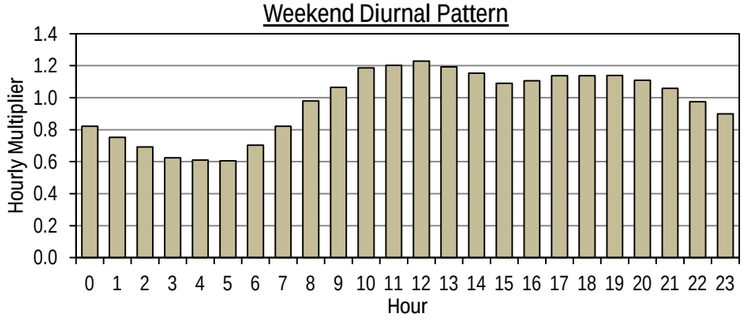
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









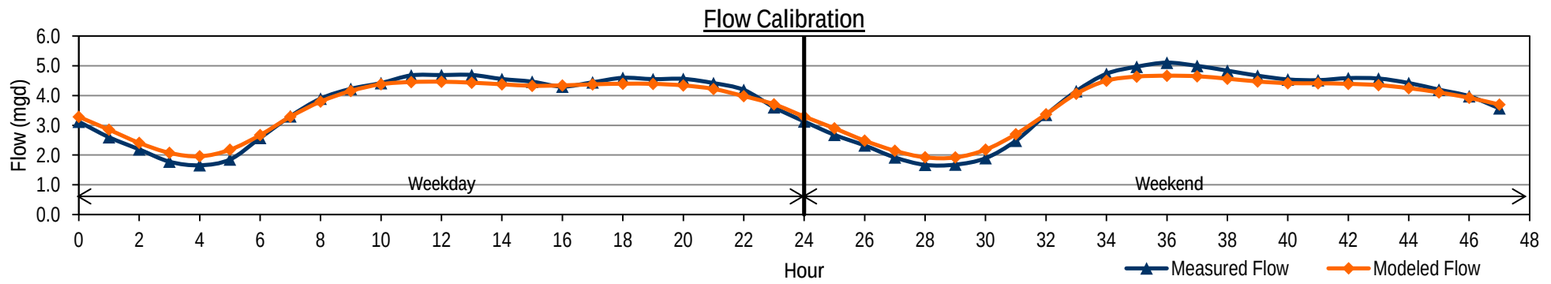


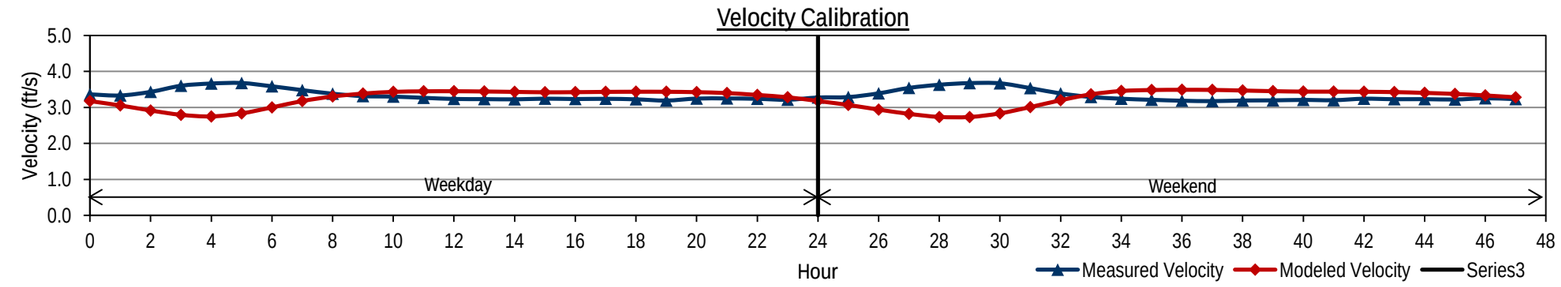
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR16 BASE WASTEWATER FLOW CALIBRATION

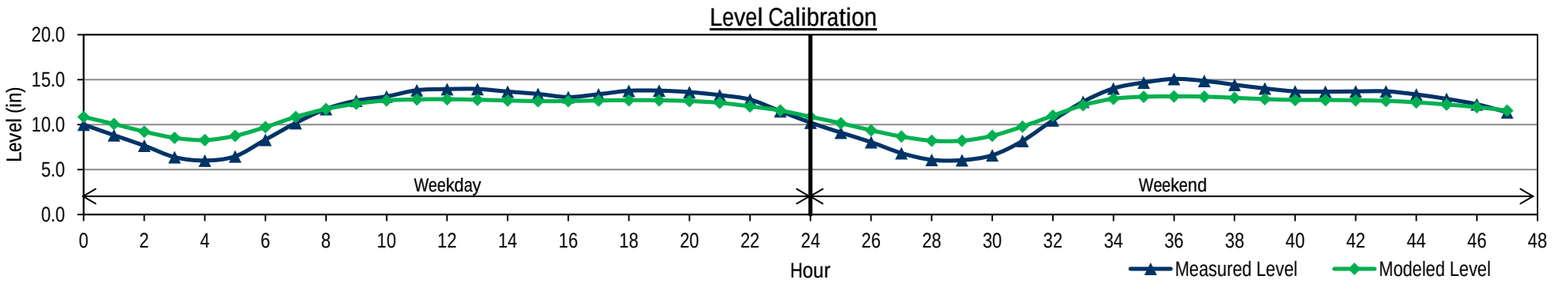
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	3.122	10.0	3.37	3.284	10.8	3.18	0.82
	1	2.601	8.8	3.33	2.853	10.1	3.06	0.68
	2	2.193	7.7	3.43	2.410	9.2	2.91	0.57
	3	1.781	6.4	3.60	2.076	8.5	2.79	0.46
	4	1.660	6.0	3.67	1.960	8.3	2.75	0.44
	5	1.853	6.5	3.68	2.181	8.7	2.83	0.50
	6	2.577	8.3	3.59	2.673	9.7	3.00	0.71
	7	3.304	10.2	3.48	3.288	10.8	3.18	0.91
	8	3.897	11.7	3.38	3.797	11.7	3.31	1.08
	9	4.225	12.6	3.32	4.153	12.3	3.39	1.17
	10	4.420	13.1	3.30	4.379	12.7	3.43	1.20
	11	4.677	13.8	3.27	4.452	12.8	3.45	1.26
	12	4.688	13.9	3.24	4.463	12.8	3.45	1.27
	13	4.692	14.0	3.23	4.430	12.8	3.45	1.26
	14	4.555	13.7	3.23	4.376	12.7	3.43	1.22
	15	4.466	13.4	3.25	4.326	12.6	3.42	1.19
	16	4.301	13.0	3.24	4.339	12.6	3.43	1.15
	17	4.445	13.4	3.24	4.374	12.7	3.43	1.19
	18	4.595	13.7	3.23	4.396	12.7	3.44	1.24
	19	4.551	13.8	3.19	4.391	12.7	3.44	1.23
	20	4.560	13.6	3.25	4.339	12.6	3.43	1.23
	21	4.419	13.3	3.25	4.220	12.4	3.40	1.18
	22	4.191	12.8	3.24	3.980	12.0	3.35	1.12
	23	3.607	11.5	3.22	3.707	11.6	3.28	0.95
Weekend	24	3.131	10.2	3.28	3.294	10.9	3.18	0.82
	25	2.682	9.1	3.29	2.900	10.2	3.07	0.70
	26	2.325	8.0	3.39	2.486	9.4	2.94	0.60
	27	1.923	6.8	3.54	2.146	8.7	2.82	0.50
	28	1.674	6.1	3.63	1.926	8.2	2.73	0.44
	29	1.682	6.0	3.68	1.922	8.2	2.73	0.45
	30	1.898	6.6	3.67	2.183	8.8	2.83	0.51
	31	2.482	8.2	3.54	2.702	9.8	3.01	0.68
	32	3.354	10.5	3.39	3.372	11.0	3.20	0.93
	33	4.148	12.5	3.29	4.059	12.2	3.37	1.15
	34	4.731	14.0	3.24	4.497	12.9	3.46	1.31
	35	4.968	14.7	3.21	4.634	13.1	3.49	1.37
	36	5.104	15.1	3.19	4.664	13.1	3.49	1.40
	37	4.997	14.9	3.18	4.646	13.1	3.49	1.36
	38	4.836	14.4	3.20	4.564	13.0	3.47	1.30
	39	4.668	14.0	3.20	4.471	12.8	3.45	1.25
	40	4.542	13.7	3.21	4.414	12.7	3.44	1.22
	41	4.517	13.7	3.20	4.411	12.7	3.44	1.21
	42	4.586	13.7	3.24	4.391	12.7	3.44	1.23
	43	4.572	13.7	3.23	4.349	12.6	3.43	1.23
	44	4.422	13.3	3.23	4.247	12.5	3.41	1.18
	45	4.198	12.9	3.22	4.104	12.2	3.38	1.12
	46	3.978	12.3	3.26	3.924	11.9	3.34	1.05
	47	3.572	11.4	3.23	3.697	11.6	3.28	0.94
Average								
Weekday		3.724	11.5	3.34	3.702	11.5	3.26	1.00
Weekend		3.708	11.5	3.32	3.667	11.4	3.24	1.00
ADWF[1]		3.720	11.5	3.34	3.692	11.5	3.26	1.00
% Error								
Weekday					-0.6%	0.3%	-2.5%	
Weekend					-1.1%	-0.5%	-2.3%	

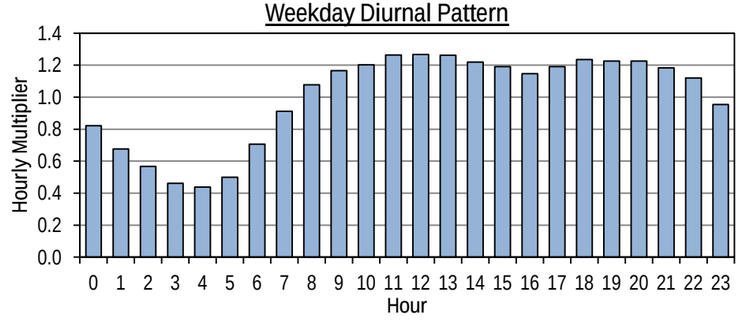
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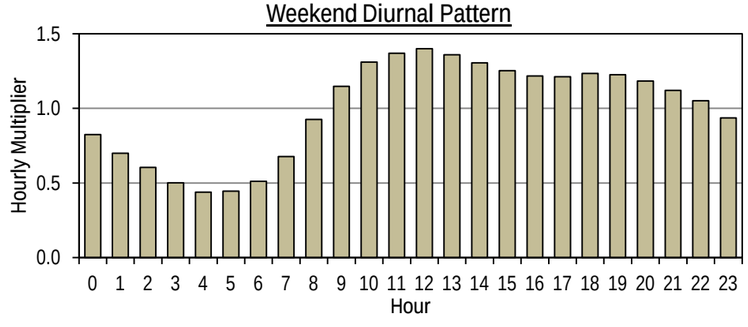
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









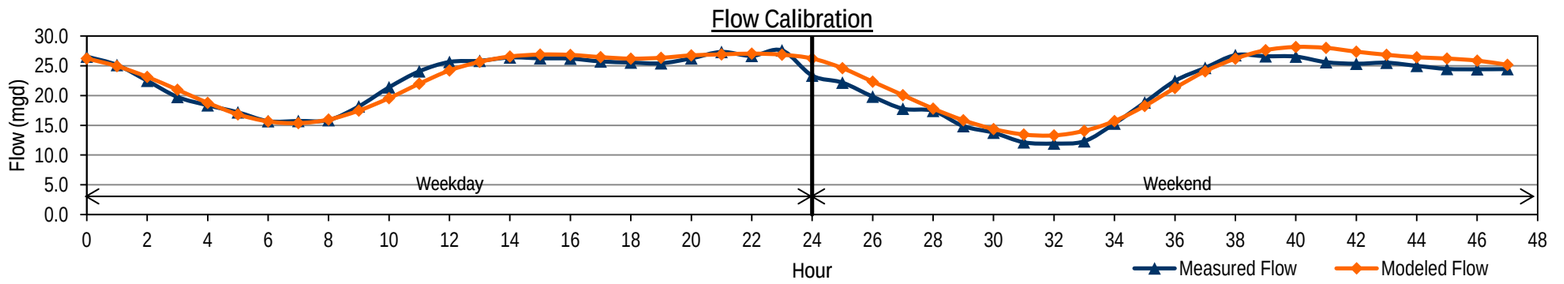


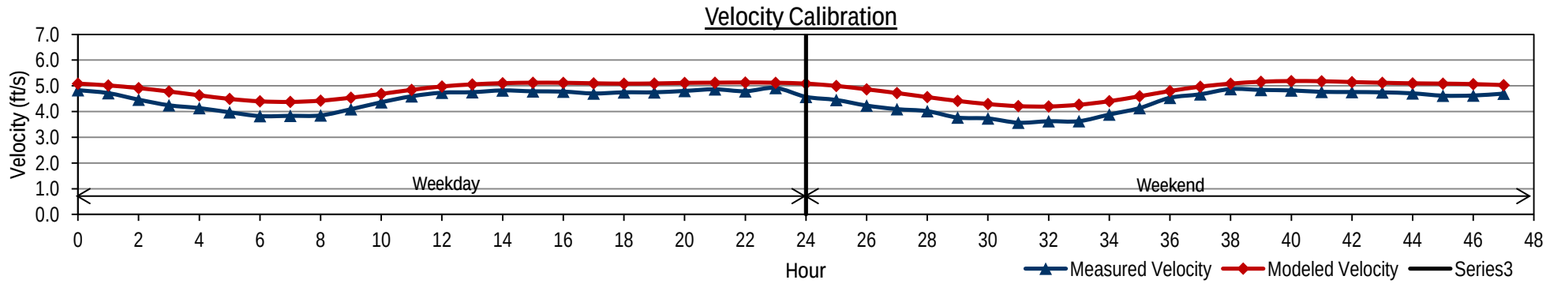
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR19 BASE WASTEWATER FLOW CALIBRATION

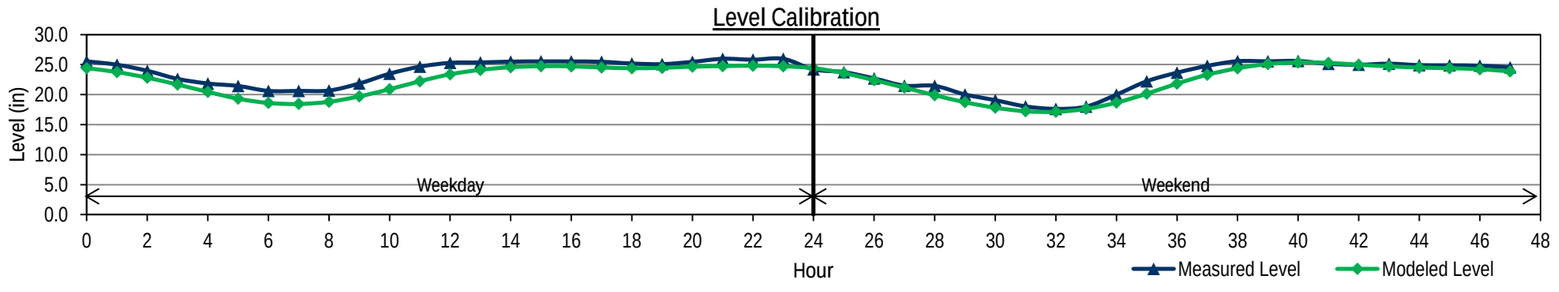
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	26.554	25.6	4.83	26.229	24.4	5.08	1.18
	1	25.140	25.0	4.72	24.946	23.8	5.01	1.12
	2	22.494	24.0	4.46	23.137	22.8	4.91	1.00
	3	19.773	22.6	4.25	20.978	21.7	4.78	0.88
	4	18.374	21.9	4.14	18.777	20.5	4.63	0.82
	5	17.191	21.4	3.97	16.837	19.3	4.49	0.76
	6	15.704	20.6	3.83	15.652	18.6	4.40	0.70
	7	15.738	20.6	3.84	15.371	18.5	4.38	0.70
	8	15.882	20.7	3.85	15.968	18.8	4.42	0.71
	9	18.189	21.9	4.09	17.474	19.7	4.54	0.81
	10	21.393	23.5	4.36	19.565	20.9	4.69	0.95
	11	24.081	24.7	4.59	21.992	22.2	4.84	1.07
	12	25.653	25.3	4.73	24.218	23.4	4.97	1.14
	13	25.849	25.4	4.75	25.671	24.1	5.05	1.15
	14	26.413	25.5	4.82	26.561	24.6	5.10	1.17
	15	26.271	25.5	4.79	26.894	24.7	5.12	1.17
	16	26.219	25.5	4.78	26.834	24.7	5.12	1.16
	17	25.742	25.5	4.70	26.462	24.5	5.10	1.14
	18	25.563	25.2	4.75	26.205	24.4	5.08	1.14
	19	25.434	25.1	4.75	26.348	24.5	5.09	1.13
	20	26.261	25.5	4.80	26.757	24.7	5.11	1.17
	21	27.339	26.0	4.87	26.915	24.7	5.12	1.21
	22	26.677	25.8	4.79	27.048	24.8	5.13	1.19
	23	27.598	26.0	4.92	26.869	24.7	5.12	1.23
Weekend	24	23.356	24.2	4.57	26.229	24.4	5.08	1.04
	25	22.179	23.8	4.45	24.606	23.6	4.99	0.99
	26	19.829	22.7	4.23	22.338	22.4	4.86	0.88
	27	17.797	21.5	4.09	20.068	21.2	4.72	0.79
	28	17.435	21.5	4.02	17.807	19.9	4.56	0.77
	29	14.872	20.0	3.77	15.855	18.7	4.41	0.66
	30	13.771	19.1	3.73	14.370	17.8	4.29	0.61
	31	12.152	18.0	3.57	13.455	17.2	4.21	0.54
	32	11.944	17.6	3.63	13.305	17.1	4.20	0.53
	33	12.324	18.0	3.63	14.069	17.6	4.27	0.55
	34	15.301	20.0	3.89	15.716	18.7	4.40	0.68
	35	18.845	22.2	4.14	18.247	20.2	4.59	0.84
	36	22.468	23.7	4.53	21.273	21.8	4.80	1.00
	37	24.664	24.8	4.67	24.077	23.3	4.97	1.10
	38	26.800	25.6	4.88	26.202	24.4	5.08	1.19
	39	26.613	25.6	4.84	27.629	25.1	5.16	1.18
	40	26.558	25.6	4.82	28.163	25.4	5.18	1.18
	41	25.614	25.1	4.77	28.015	25.3	5.18	1.14
	42	25.359	25.0	4.76	27.377	25.0	5.14	1.13
	43	25.528	25.2	4.75	26.854	24.7	5.12	1.13
	44	24.999	24.9	4.71	26.438	24.5	5.09	1.11
	45	24.482	24.9	4.62	26.224	24.4	5.08	1.09
	46	24.425	24.8	4.62	25.873	24.2	5.06	1.09
	47	24.459	24.6	4.70	25.173	23.9	5.03	1.09
Average								
	Weekday	23.147	24.1	4.52	23.071	22.7	4.89	1.03
	Weekend	20.907	22.8	4.35	22.057	22.1	4.81	0.93
	ADWF[1]	22.507	23.8	4.47	22.781	22.5	4.86	1.00
% Error								
	Weekday				-0.3%	-5.8%	8.2%	
	Weekend				5.5%	-3.2%	10.6%	

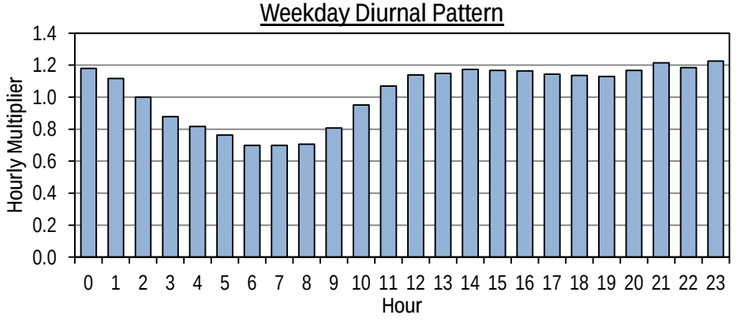
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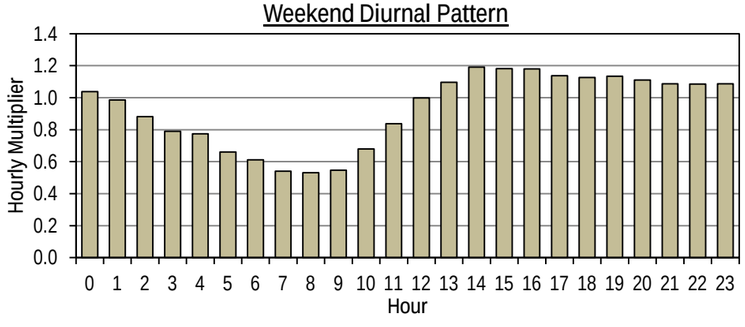
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









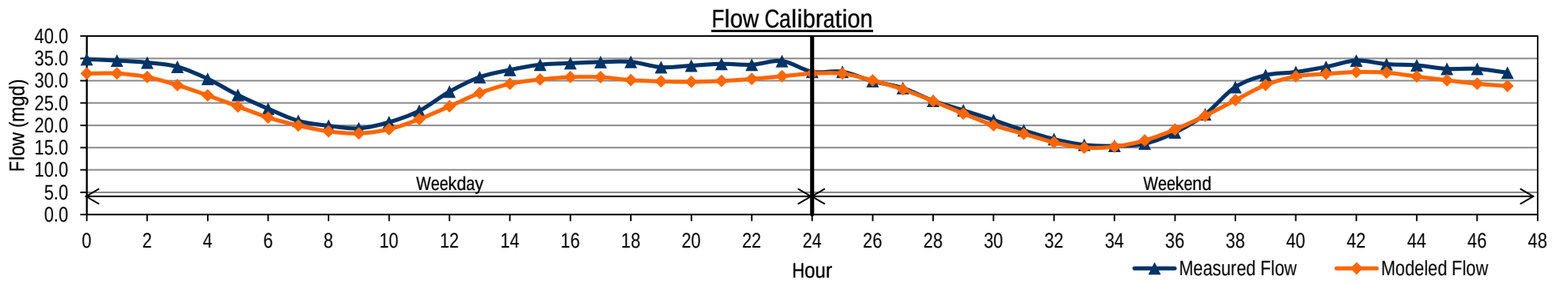


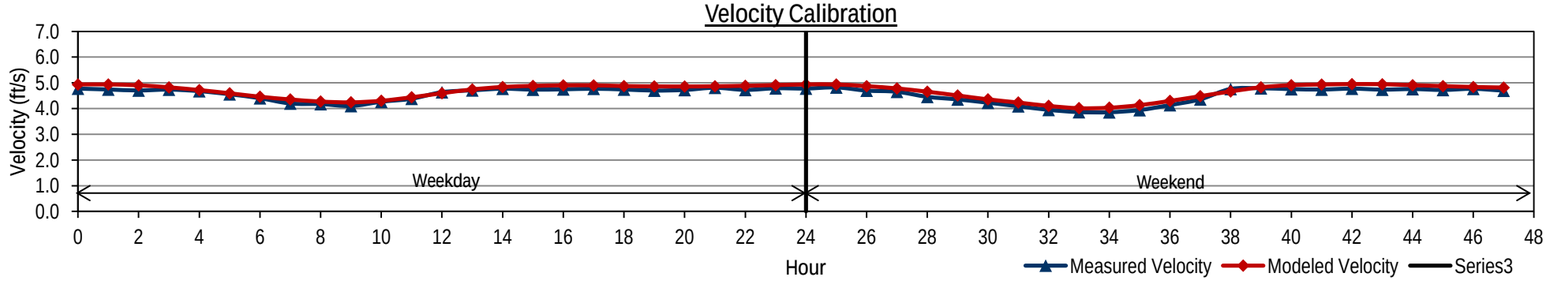
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR20 BASE WASTEWATER FLOW CALIBRATION

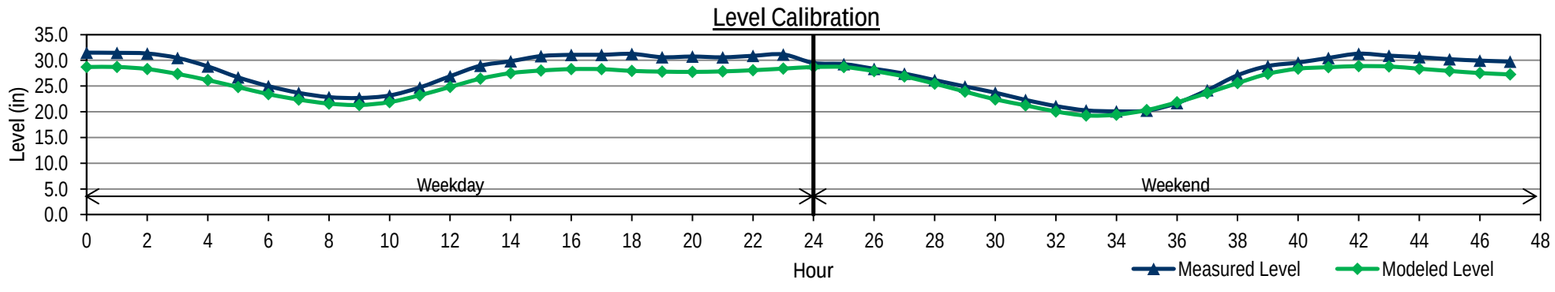
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	34.806	31.5	4.77	31.625	28.7	4.93	1.19
	1	34.508	31.5	4.74	31.643	28.7	4.94	1.18
	2	34.059	31.3	4.70	30.832	28.3	4.90	1.14
	3	33.114	30.5	4.73	29.012	27.4	4.82	1.05
	4	30.411	28.8	4.67	26.722	26.2	4.72	0.93
	5	26.794	26.7	4.55	24.224	24.8	4.59	0.82
	6	23.721	25.0	4.40	21.763	23.4	4.46	0.73
	7	21.021	23.7	4.19	19.963	22.4	4.35	0.69
	8	19.923	22.8	4.17	18.658	21.6	4.27	0.67
	9	19.350	22.7	4.10	18.205	21.3	4.24	0.72
	10	20.724	23.2	4.26	19.138	21.9	4.30	0.80
	11	23.265	24.7	4.38	21.390	23.2	4.44	0.95
	12	27.552	26.9	4.63	24.274	24.8	4.60	1.06
	13	30.797	29.0	4.71	27.249	26.4	4.74	1.12
	14	32.418	29.8	4.77	29.310	27.5	4.84	1.16
	15	33.584	30.8	4.73	30.287	28.0	4.88	1.17
	16	33.924	31.1	4.74	30.816	28.3	4.90	1.18
	17	34.184	31.1	4.77	30.803	28.3	4.90	1.18
	18	34.222	31.2	4.74	30.151	27.9	4.87	1.14
	19	33.023	30.6	4.70	29.859	27.8	4.86	1.15
	20	33.372	30.7	4.72	29.765	27.8	4.86	1.17
	21	33.764	30.6	4.81	29.963	27.9	4.86	1.16
	22	33.580	30.9	4.72	30.402	28.1	4.88	1.19
	23	34.393	31.1	4.78	31.015	28.4	4.91	1.20
Weekend	24	31.997	29.5	4.78	31.625	28.7	4.93	1.11
	25	31.994	29.3	4.82	31.603	28.7	4.93	1.03
	26	29.908	28.3	4.70	30.071	27.9	4.87	0.98
	27	28.352	27.4	4.65	28.073	26.9	4.78	0.88
	28	25.504	26.2	4.45	25.440	25.5	4.65	0.81
	29	23.368	24.9	4.35	22.630	23.9	4.51	0.73
	30	21.197	23.7	4.22	20.016	22.4	4.36	0.65
	31	18.890	22.3	4.09	18.098	21.3	4.24	0.58
	32	16.918	21.1	3.95	16.189	20.1	4.11	0.54
	33	15.644	20.3	3.86	14.991	19.3	4.02	0.53
	34	15.409	20.1	3.85	15.231	19.4	4.04	0.55
	35	15.909	20.2	3.94	16.616	20.3	4.14	0.64
	36	18.412	21.7	4.13	19.062	21.8	4.30	0.78
	37	22.476	24.2	4.36	22.141	23.6	4.48	0.99
	38	28.577	27.1	4.76	25.657	25.6	4.67	1.08
	39	31.231	28.9	4.79	29.048	27.4	4.82	1.10
	40	31.945	29.6	4.75	30.978	28.4	4.91	1.14
	41	33.095	30.5	4.74	31.547	28.7	4.93	1.19
	42	34.503	31.3	4.77	31.954	28.9	4.95	1.16
	43	33.711	30.9	4.73	31.826	28.8	4.94	1.16
	44	33.451	30.6	4.75	30.956	28.4	4.91	1.13
	45	32.656	30.2	4.72	30.112	27.9	4.87	1.13
	46	32.661	29.9	4.76	29.330	27.5	4.84	1.10
	47	31.803	29.7	4.69	28.816	27.3	4.81	1.11
Average								
Weekday		29.854	28.6	4.60	26.961	26.2	4.71	1.03
Weekend		26.650	26.6	4.48	25.500	25.4	4.62	0.92
ADWF[1]		28.939	28.0	4.57	26.544	26.0	4.69	1.00
% Error								
Weekday					-9.7%	-8.3%	2.3%	
Weekend					-4.3%	-4.6%	3.1%	

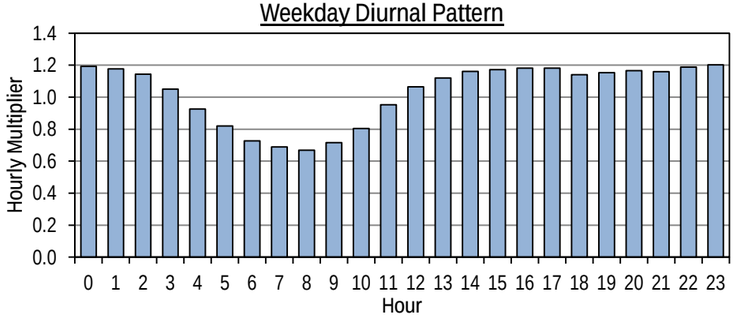
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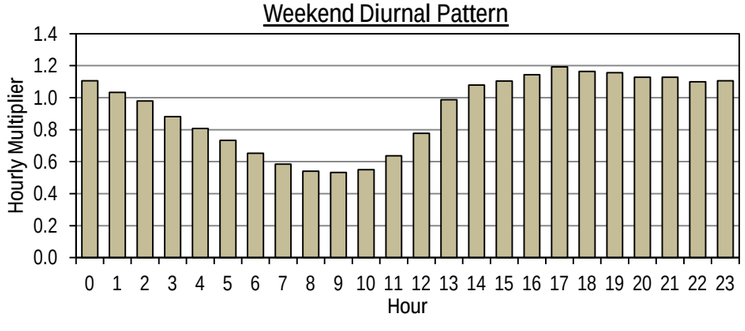
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









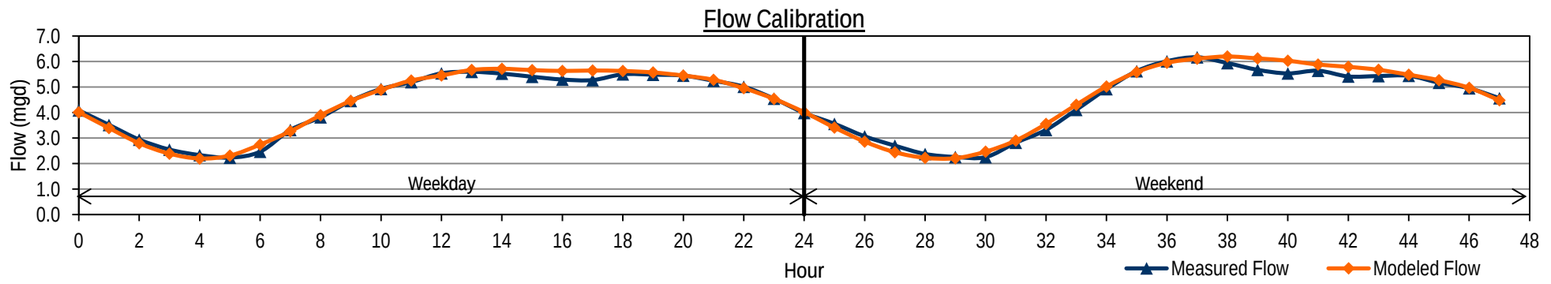


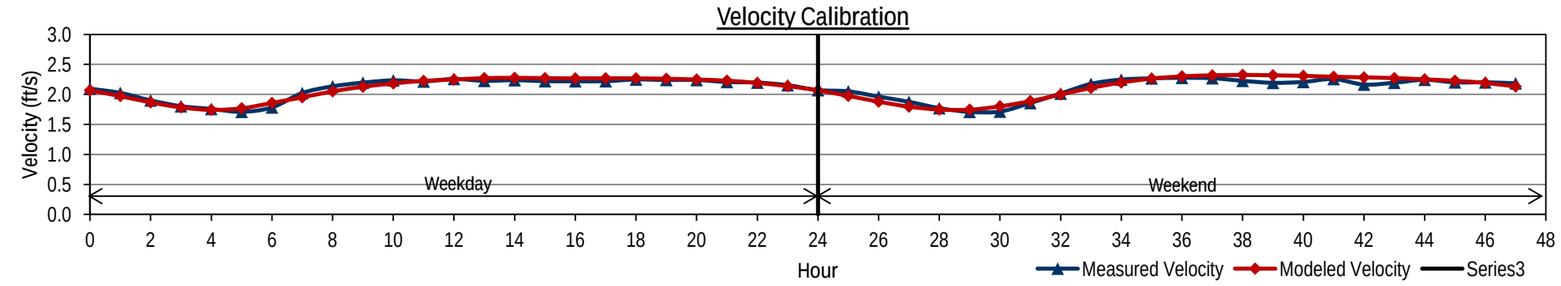
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR21 BASE WASTEWATER FLOW CALIBRATION

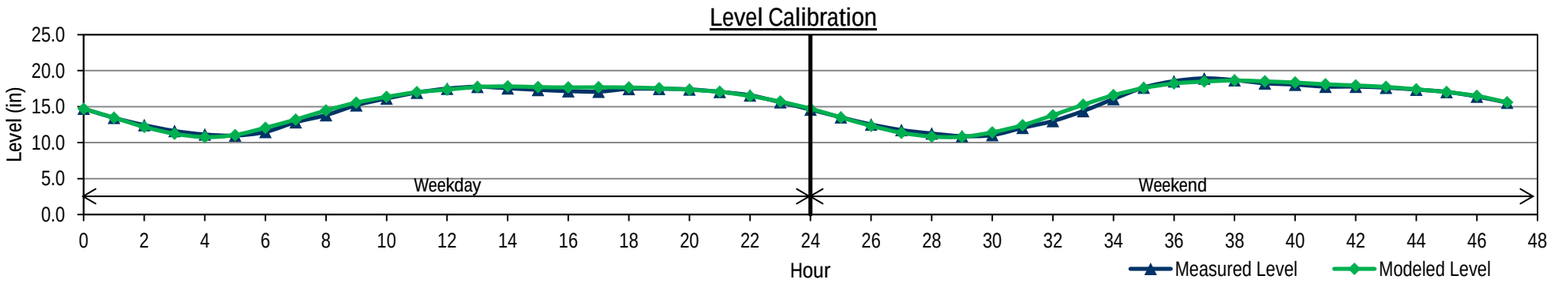
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	4.083	14.7	2.10	4.012	14.7	2.07	0.53
	1	3.514	13.5	2.02	3.392	13.5	1.97	0.48
	2	2.936	12.4	1.90	2.794	12.2	1.87	0.46
	3	2.545	11.6	1.80	2.387	11.2	1.79	0.53
	4	2.330	11.1	1.76	2.196	10.8	1.74	0.76
	5	2.229	11.0	1.71	2.312	11.1	1.77	0.88
	6	2.463	11.5	1.78	2.743	12.1	1.86	1.04
	7	3.317	12.8	2.02	3.266	13.2	1.95	1.15
	8	3.815	13.8	2.13	3.895	14.5	2.05	1.22
	9	4.455	15.2	2.20	4.458	15.6	2.13	1.30
	10	4.926	16.1	2.23	4.893	16.4	2.18	1.29
	11	5.194	16.9	2.22	5.257	17.0	2.23	1.27
	12	5.539	17.5	2.26	5.456	17.4	2.25	1.24
	13	5.596	17.8	2.23	5.672	17.7	2.27	1.20
	14	5.526	17.5	2.24	5.716	17.8	2.28	1.19
	15	5.402	17.3	2.22	5.665	17.7	2.27	1.25
	16	5.294	17.1	2.22	5.632	17.7	2.27	1.25
	17	5.272	17.1	2.22	5.649	17.7	2.27	1.24
	18	5.500	17.5	2.25	5.631	17.7	2.27	1.18
	19	5.484	17.5	2.24	5.573	17.6	2.26	1.12
	20	5.448	17.4	2.24	5.452	17.4	2.25	1.00
	21	5.246	17.0	2.21	5.284	17.1	2.23	0.89
	22	5.012	16.6	2.20	4.957	16.5	2.19	0.76
	23	4.544	15.6	2.15	4.537	15.7	2.14	0.62
Weekend	24	3.984	14.6	2.07	4.014	14.7	2.07	0.57
	25	3.557	13.5	2.05	3.411	13.5	1.98	0.49
	26	3.066	12.5	1.96	2.860	12.3	1.88	0.47
	27	2.700	11.8	1.88	2.443	11.4	1.80	0.48
	28	2.374	11.3	1.77	2.224	10.8	1.75	0.64
	29	2.256	10.9	1.71	2.208	10.8	1.75	0.77
	30	2.250	11.1	1.71	2.466	11.4	1.80	0.96
	31	2.816	12.1	1.86	2.902	12.4	1.89	1.16
	32	3.319	13.0	2.01	3.554	13.8	2.00	1.34
	33	4.105	14.4	2.18	4.303	15.3	2.11	1.42
	34	4.919	16.1	2.25	5.022	16.6	2.20	1.46
	35	5.624	17.6	2.27	5.589	17.6	2.26	1.39
	36	6.011	18.5	2.28	5.953	18.2	2.30	1.31
	37	6.167	18.9	2.27	6.112	18.5	2.32	1.27
	38	5.940	18.7	2.23	6.199	18.6	2.33	1.30
	39	5.675	18.2	2.19	6.123	18.5	2.32	1.24
	40	5.534	18.0	2.21	6.033	18.4	2.31	1.24
	41	5.641	17.8	2.26	5.883	18.1	2.29	1.24
	42	5.414	17.8	2.16	5.794	18.0	2.28	1.17
	43	5.431	17.6	2.19	5.677	17.7	2.27	1.11
	44	5.442	17.4	2.24	5.484	17.4	2.25	1.02
	45	5.169	17.0	2.20	5.269	17.0	2.23	0.87
	46	4.952	16.4	2.20	4.971	16.5	2.19	0.77
	47	4.563	15.6	2.19	4.483	15.6	2.13	0.65
Average								
	Weekday	4.403	15.3	2.11	4.451	15.4	2.11	0.99
	Weekend	4.454	15.4	2.10	4.541	15.6	2.11	1.01
	ADWF[1]	4.418	15.3	2.10	4.477	15.5	2.11	1.00
% Error								
	Weekday				1.1%	0.9%	0.0%	
	Weekend				1.9%	0.7%	0.7%	

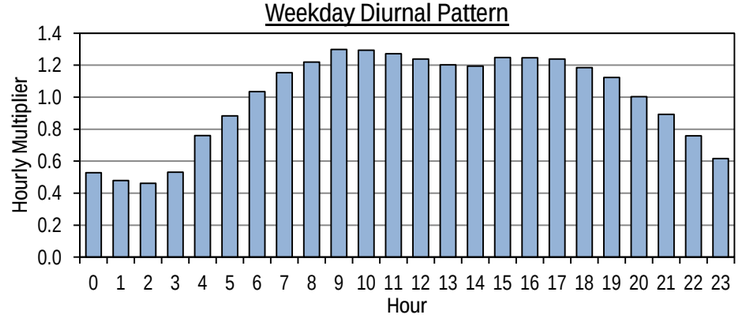
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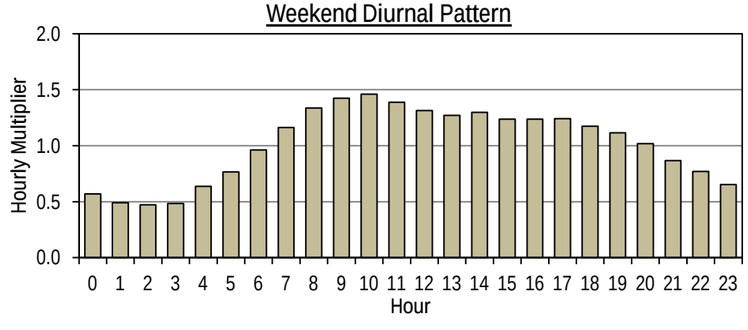
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









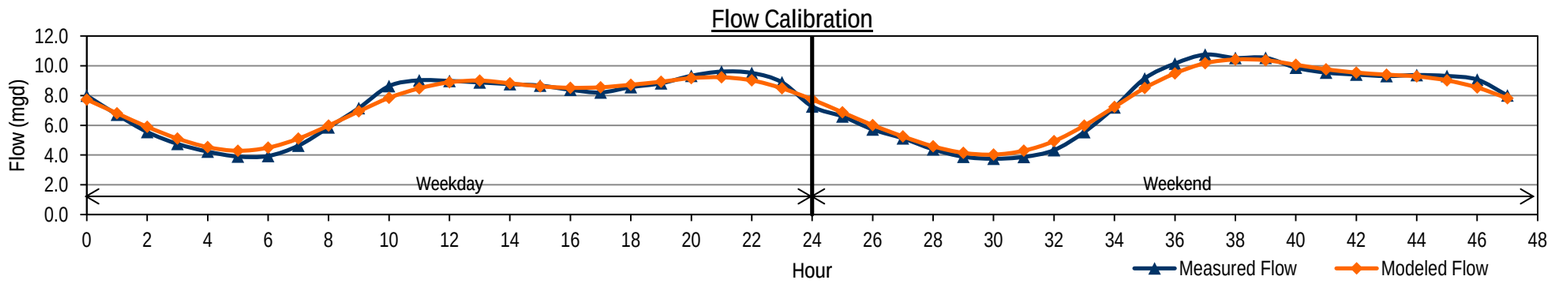


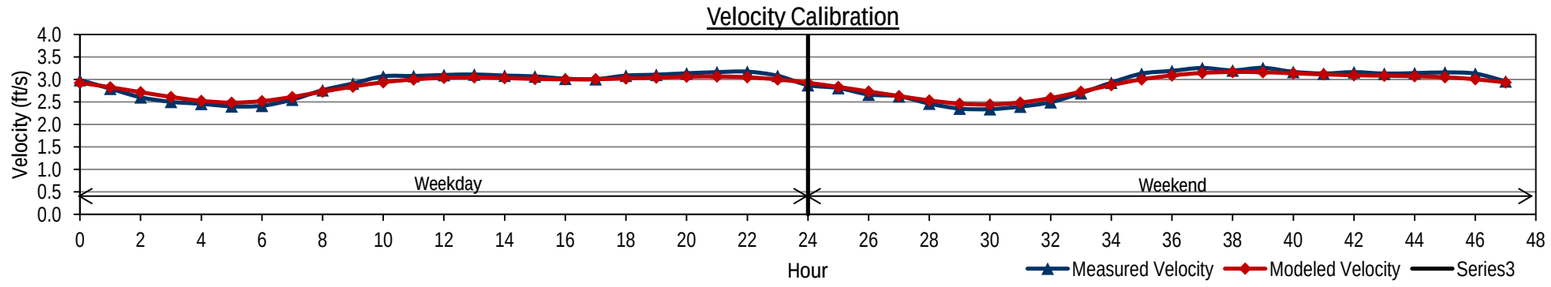
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR22 BASE WASTEWATER FLOW CALIBRATION

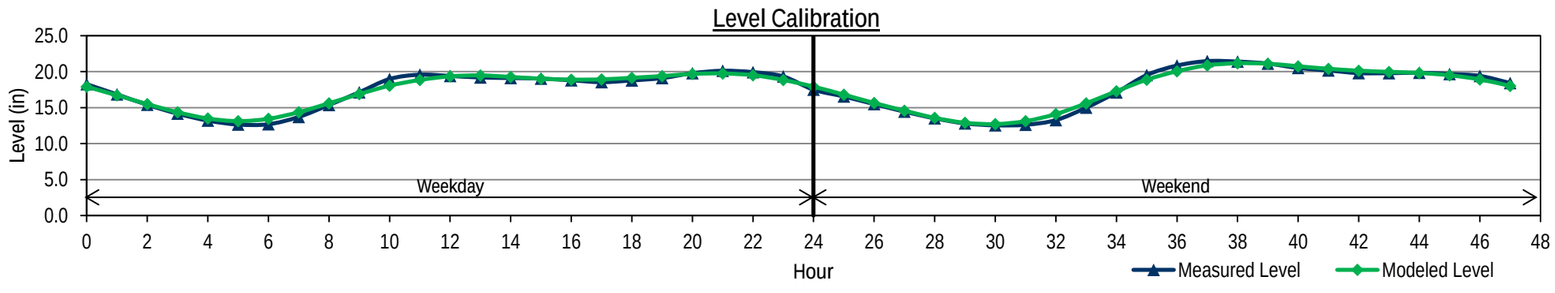
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	7.998	18.3	2.98	7.734	17.9	2.92	0.24
	1	6.717	16.8	2.79	6.812	16.7	2.83	0.26
	2	5.552	15.4	2.60	5.903	15.5	2.72	0.31
	3	4.752	14.2	2.50	5.115	14.4	2.61	0.42
	4	4.235	13.2	2.46	4.540	13.5	2.52	0.69
	5	3.902	12.7	2.40	4.293	13.1	2.48	1.07
	6	3.939	12.7	2.41	4.503	13.4	2.52	1.37
	7	4.632	13.7	2.55	5.112	14.4	2.61	1.60
	8	5.863	15.4	2.76	5.987	15.6	2.73	1.47
	9	7.159	17.1	2.91	6.941	16.9	2.84	1.26
	10	8.638	19.0	3.07	7.851	18.0	2.94	1.15
	11	9.026	19.6	3.07	8.489	18.8	3.00	1.13
	12	8.983	19.4	3.10	8.895	19.3	3.04	1.12
	13	8.886	19.2	3.11	9.010	19.5	3.05	1.06
	14	8.770	19.1	3.08	8.826	19.2	3.03	1.03
	15	8.671	19.0	3.07	8.621	19.0	3.01	1.17
	16	8.391	18.8	3.01	8.525	18.9	3.00	1.28
	17	8.209	18.5	3.00	8.558	18.9	3.00	1.41
	18	8.568	18.8	3.08	8.728	19.1	3.02	1.46
	19	8.825	19.1	3.10	8.932	19.4	3.04	1.39
	20	9.330	19.8	3.13	9.175	19.7	3.06	1.16
	21	9.611	20.1	3.16	9.230	19.7	3.07	0.86
	22	9.521	19.9	3.17	9.024	19.5	3.05	0.53
	23	8.892	19.3	3.08	8.491	18.8	3.00	0.30
Weekend	24	7.268	17.5	2.87	7.740	17.9	2.92	0.35
	25	6.599	16.6	2.81	6.877	16.8	2.83	0.31
	26	5.723	15.5	2.66	6.017	15.6	2.73	0.30
	27	5.125	14.5	2.62	5.258	14.6	2.63	0.36
	28	4.388	13.5	2.46	4.593	13.6	2.53	0.46
	29	3.886	12.8	2.35	4.154	12.9	2.46	0.64
	30	3.755	12.6	2.34	4.038	12.7	2.44	1.00
	31	3.876	12.6	2.40	4.299	13.1	2.48	1.42
	32	4.333	13.3	2.49	4.939	14.1	2.58	1.83
	33	5.546	15.0	2.69	5.984	15.6	2.73	1.88
	34	7.207	17.1	2.93	7.240	17.3	2.87	1.80
	35	9.146	19.5	3.13	8.509	18.9	3.00	1.54
	36	10.149	20.8	3.19	9.490	20.0	3.09	1.46
	37	10.754	21.5	3.25	10.178	20.9	3.14	1.27
	38	10.529	21.4	3.20	10.427	21.1	3.16	1.22
	39	10.540	21.1	3.25	10.379	21.1	3.16	1.24
	40	9.876	20.5	3.17	10.070	20.7	3.14	1.27
	41	9.545	20.2	3.13	9.767	20.4	3.11	1.32
	42	9.413	19.8	3.16	9.545	20.1	3.09	1.32
	43	9.313	19.8	3.13	9.406	19.9	3.08	1.24
	44	9.381	19.8	3.14	9.291	19.8	3.07	0.93
	45	9.319	19.7	3.15	9.022	19.5	3.05	0.64
	46	9.074	19.4	3.13	8.544	18.9	3.00	0.49
	47	8.010	18.4	2.96	7.821	18.0	2.93	0.35
Average								
Weekday		7.461	17.5	2.90	7.471	17.5	2.88	0.99
Weekend		7.615	17.6	2.90	7.650	17.6	2.88	1.03
ADWF[1]		7.505	17.5	2.90	7.522	17.5	2.88	1.00
% Error								
Weekday					0.1%	0.0%	-0.8%	
Weekend					0.5%	0.1%	-0.5%	

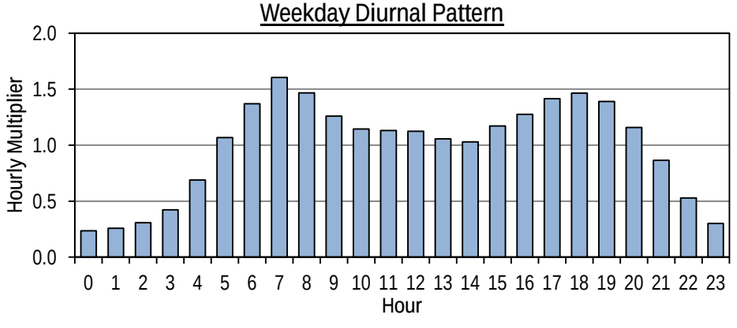
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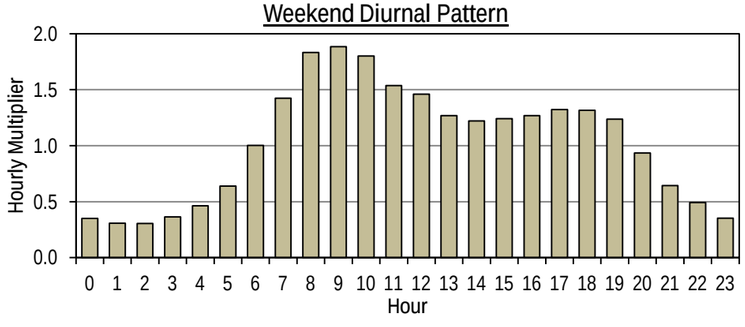
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









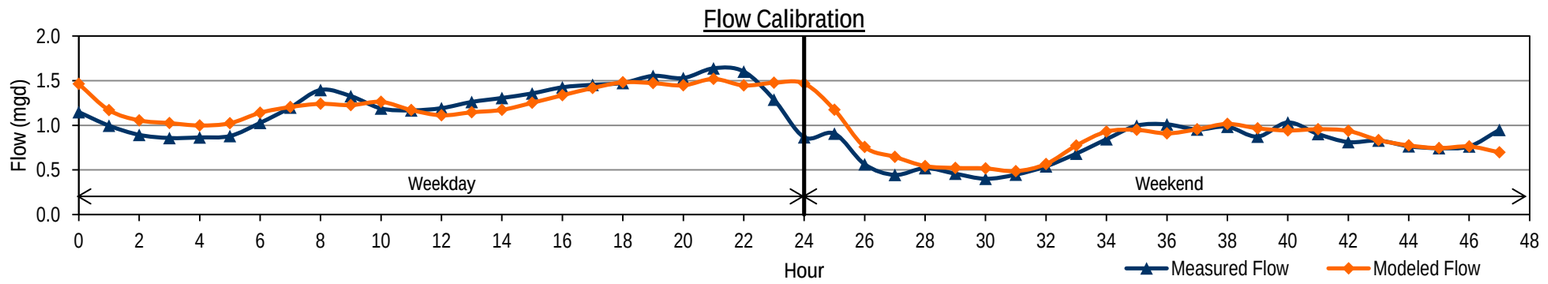


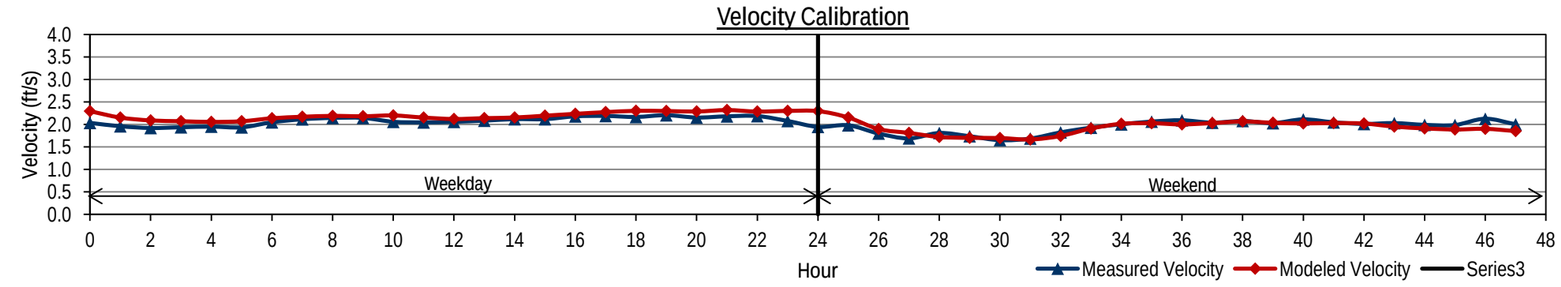
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR23 BASE WASTEWATER FLOW CALIBRATION

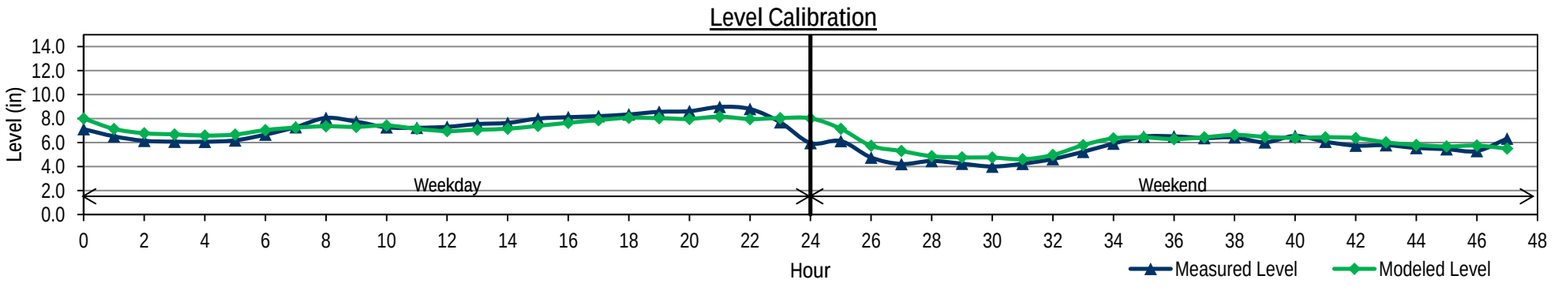
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	1.148	7.1	2.03	1.465	8.0	2.30	0.49
	1	0.996	6.5	1.96	1.171	7.1	2.15	0.58
	2	0.893	6.2	1.92	1.056	6.8	2.09	0.65
	3	0.858	6.1	1.94	1.026	6.7	2.07	0.72
	4	0.864	6.1	1.95	0.999	6.6	2.06	0.97
	5	0.880	6.2	1.93	1.024	6.7	2.07	1.27
	6	1.028	6.7	2.05	1.142	7.0	2.14	1.48
	7	1.199	7.3	2.11	1.206	7.2	2.17	1.47
	8	1.396	8.1	2.14	1.242	7.4	2.19	1.34
	9	1.327	7.8	2.14	1.227	7.3	2.18	1.14
	10	1.189	7.3	2.06	1.264	7.4	2.20	1.09
	11	1.167	7.2	2.04	1.172	7.1	2.15	1.08
	12	1.192	7.3	2.06	1.113	7.0	2.12	1.04
	13	1.262	7.6	2.08	1.147	7.1	2.14	1.01
	14	1.306	7.6	2.12	1.174	7.2	2.16	1.03
	15	1.357	8.0	2.12	1.253	7.4	2.20	1.08
	16	1.426	8.1	2.18	1.338	7.6	2.24	1.10
	17	1.454	8.2	2.19	1.419	7.9	2.28	1.20
	18	1.474	8.4	2.16	1.483	8.1	2.30	1.02
	19	1.553	8.6	2.20	1.474	8.0	2.30	1.13
	20	1.529	8.6	2.15	1.449	8.0	2.29	1.03
	21	1.638	9.0	2.18	1.521	8.2	2.32	0.79
	22	1.602	8.8	2.18	1.448	8.0	2.29	0.79
	23	1.288	7.7	2.08	1.478	8.0	2.30	0.65
Weekend	24	0.866	6.0	1.95	1.469	8.0	2.30	0.57
	25	0.907	6.1	1.98	1.175	7.2	2.16	0.72
	26	0.564	4.8	1.80	0.758	5.7	1.90	0.56
	27	0.445	4.2	1.69	0.647	5.3	1.81	0.55
	28	0.520	4.5	1.81	0.544	4.9	1.72	0.61
	29	0.458	4.2	1.74	0.523	4.8	1.70	0.59
	30	0.401	4.0	1.65	0.518	4.8	1.70	0.57
	31	0.448	4.2	1.69	0.487	4.6	1.67	0.91
	32	0.541	4.6	1.82	0.567	5.0	1.74	1.33
	33	0.683	5.2	1.93	0.774	5.8	1.91	1.50
	34	0.844	5.9	2.00	0.930	6.4	2.02	1.36
	35	0.996	6.5	2.06	0.950	6.4	2.03	1.26
	36	1.011	6.5	2.09	0.910	6.3	2.00	1.46
	37	0.953	6.4	2.04	0.956	6.4	2.03	1.40
	38	0.984	6.4	2.08	1.017	6.6	2.07	1.30
	39	0.873	6.0	2.03	0.967	6.5	2.04	1.24
	40	1.032	6.6	2.11	0.943	6.4	2.02	1.36
	41	0.903	6.1	2.05	0.957	6.4	2.03	1.08
	42	0.812	5.8	2.01	0.939	6.4	2.02	1.08
	43	0.829	5.8	2.03	0.835	6.0	1.95	0.87
	44	0.765	5.6	1.99	0.776	5.8	1.91	1.04
	45	0.744	5.5	1.99	0.745	5.7	1.89	1.02
	46	0.764	5.3	2.12	0.764	5.8	1.90	0.88
	47	0.949	6.3	2.00	0.698	5.5	1.85	0.40
Average								
Weekday		1.251	7.5	2.08	1.262	7.4	2.20	1.01
Weekend		0.762	5.5	1.94	0.827	5.9	1.93	0.99
ADWF[1]		1.111	6.9	2.04	1.138	7.0	2.12	1.00
% Error								
Weekday					0.9%	-1.5%	5.5%	
Weekend					8.5%	7.6%	-0.6%	

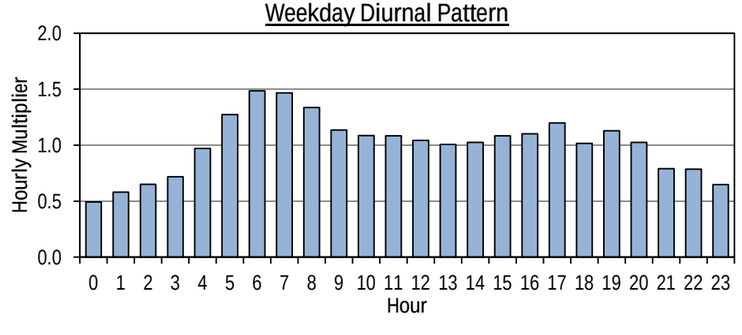
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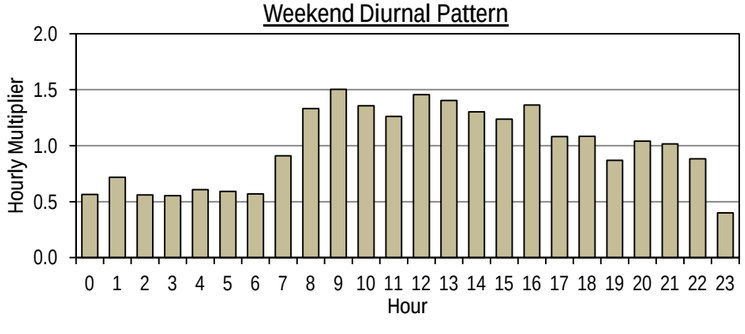
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







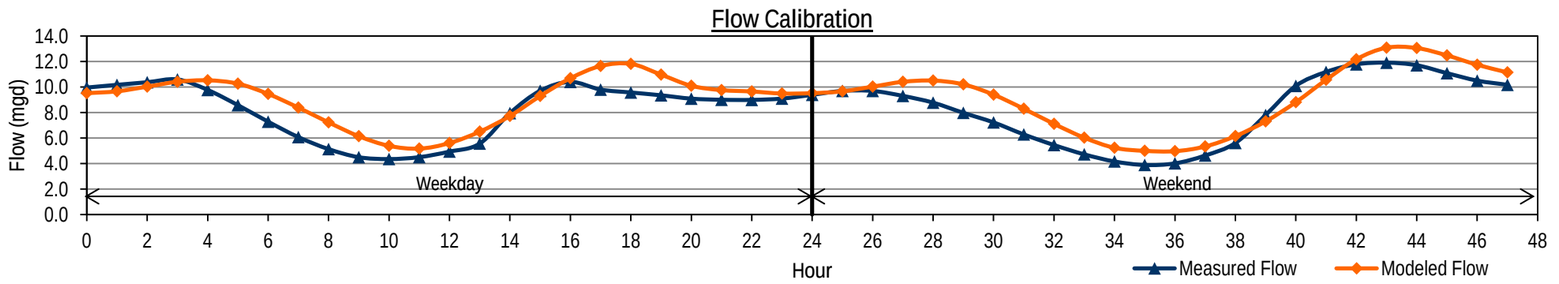


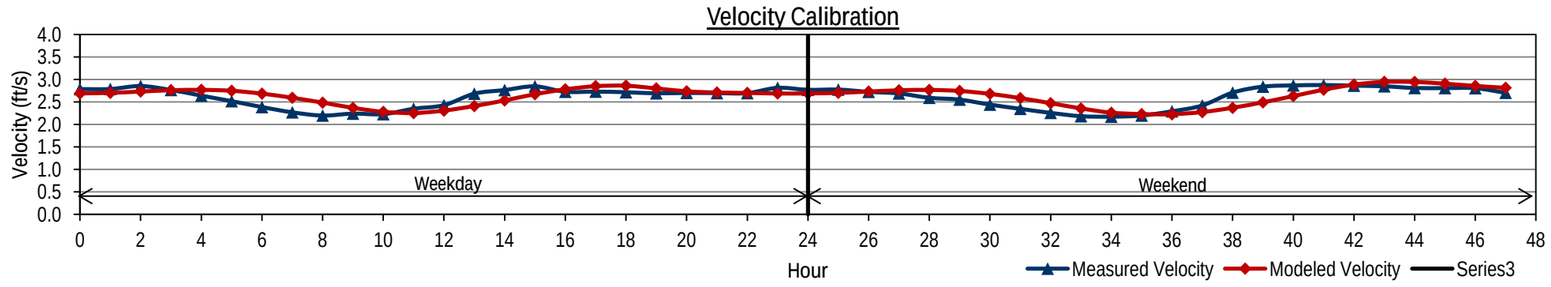


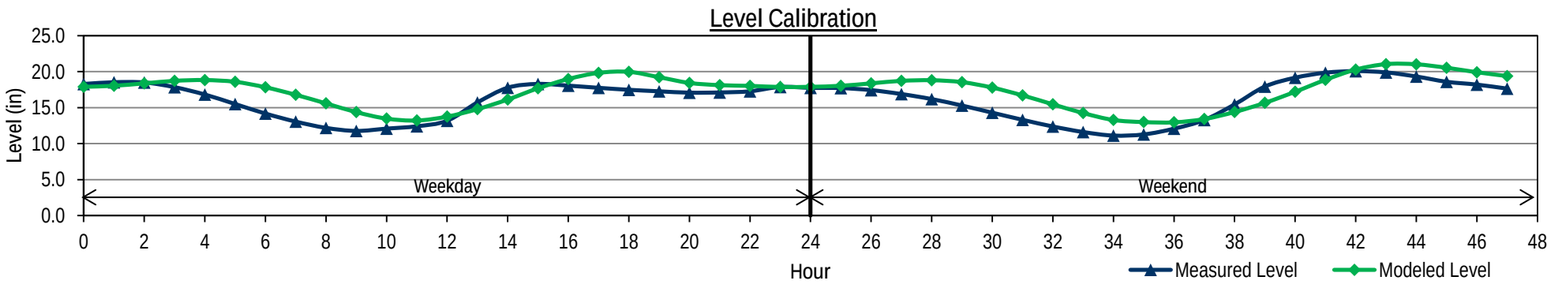
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR24 BASE WASTEWATER FLOW CALIBRATION

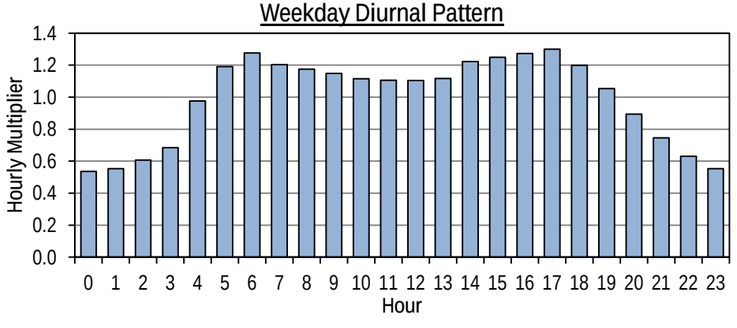
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	9.962	18.3	2.79	9.529	17.9	2.69	0.54
	1	10.176	18.5	2.79	9.673	18.0	2.70	0.55
	2	10.381	18.5	2.85	10.041	18.4	2.73	0.61
	3	10.599	17.8	2.77	10.424	18.7	2.76	0.68
	4	9.775	16.8	2.64	10.537	18.8	2.77	0.98
	5	8.583	15.5	2.52	10.273	18.6	2.75	1.19
	6	7.285	14.2	2.39	9.469	17.8	2.68	1.28
	7	6.080	13.1	2.27	8.397	16.8	2.59	1.20
	8	5.139	12.2	2.20	7.237	15.6	2.48	1.18
	9	4.504	11.8	2.24	6.154	14.4	2.37	1.15
	10	4.360	12.1	2.23	5.399	13.5	2.28	1.12
	11	4.511	12.4	2.35	5.181	13.2	2.25	1.11
	12	4.945	13.2	2.43	5.619	13.8	2.31	1.10
	13	5.571	15.7	2.68	6.512	14.8	2.41	1.12
	14	7.958	17.8	2.76	7.740	16.1	2.53	1.22
	15	9.709	18.3	2.85	9.306	17.7	2.67	1.25
	16	10.407	18.0	2.73	10.700	19.0	2.78	1.27
	17	9.803	17.7	2.73	11.660	19.8	2.85	1.30
	18	9.576	17.5	2.72	11.826	20.0	2.86	1.20
	19	9.356	17.3	2.69	10.982	19.2	2.80	1.05
	20	9.093	17.1	2.70	10.107	18.4	2.74	0.89
	21	9.006	17.1	2.70	9.769	18.1	2.71	0.75
	22	8.995	17.3	2.70	9.661	18.0	2.70	0.63
	23	9.098	17.9	2.81	9.501	17.9	2.69	0.55
Weekend	24	9.394	17.7	2.77	9.529	17.9	2.69	0.51
	25	9.700	17.7	2.78	9.673	18.0	2.70	0.48
	26	9.699	17.4	2.72	10.041	18.4	2.73	0.49
	27	9.309	16.9	2.69	10.419	18.7	2.76	0.57
	28	8.780	16.2	2.59	10.516	18.8	2.77	0.69
	29	7.983	15.3	2.55	10.220	18.5	2.74	0.96
	30	7.232	14.3	2.44	9.412	17.8	2.68	1.24
	31	6.290	13.3	2.35	8.308	16.7	2.58	1.37
	32	5.458	12.4	2.26	7.121	15.5	2.47	1.45
	33	4.729	11.6	2.18	6.038	14.3	2.35	1.46
	34	4.171	11.1	2.17	5.245	13.3	2.26	1.44
	35	3.896	11.3	2.20	5.007	13.0	2.23	1.36
	36	4.021	12.1	2.29	4.980	13.0	2.22	1.29
	37	4.637	13.3	2.42	5.348	13.4	2.27	1.25
	38	5.618	15.4	2.71	6.163	14.4	2.37	1.15
	39	7.805	17.9	2.84	7.314	15.7	2.49	1.19
	40	10.093	19.1	2.87	8.820	17.2	2.63	1.19
	41	11.185	19.8	2.88	10.574	18.9	2.77	1.14
	42	11.784	20.1	2.86	12.187	20.3	2.89	1.08
	43	11.913	19.9	2.85	13.093	21.0	2.95	0.98
	44	11.711	19.3	2.81	13.069	21.0	2.94	0.89
	45	11.090	18.6	2.81	12.490	20.5	2.91	0.77
	46	10.506	18.2	2.81	11.755	19.9	2.86	0.67
	47	10.177	17.6	2.70	11.158	19.4	2.81	0.58
Average								
Weekday		8.120	16.1	2.60	8.987	17.3	2.63	1.00
Weekend		8.216	16.1	2.61	9.103	17.3	2.63	1.01
ADWF[1]		8.147	16.1	2.61	9.021	17.3	2.63	1.00
% Error								
Weekday					10.7%	7.5%	0.9%	
Weekend					10.8%	7.5%	0.8%	

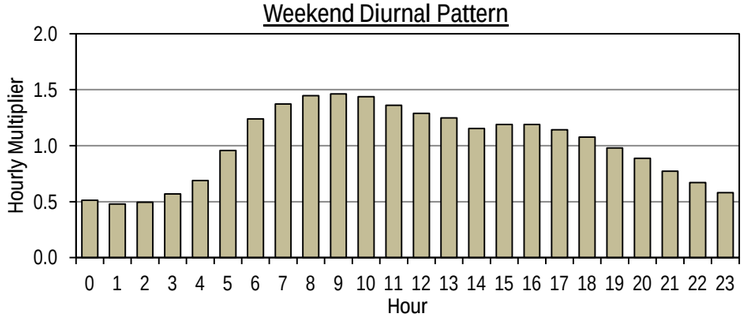
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









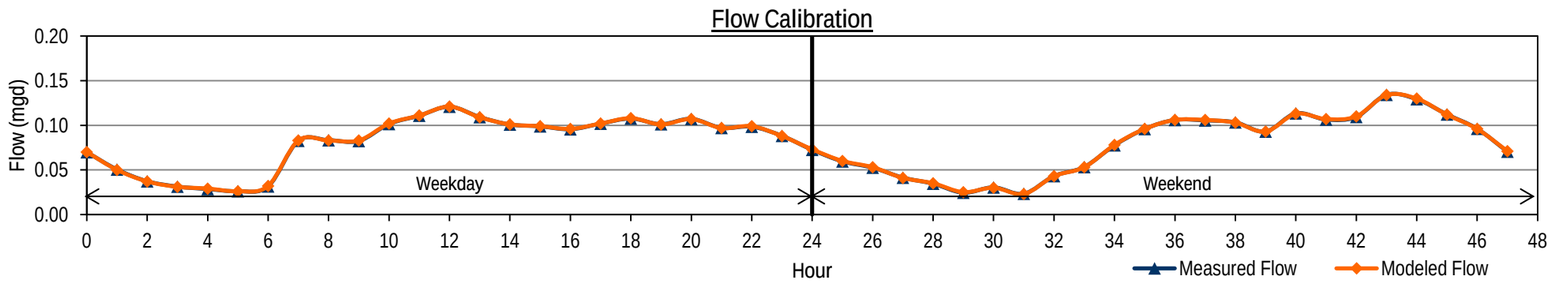


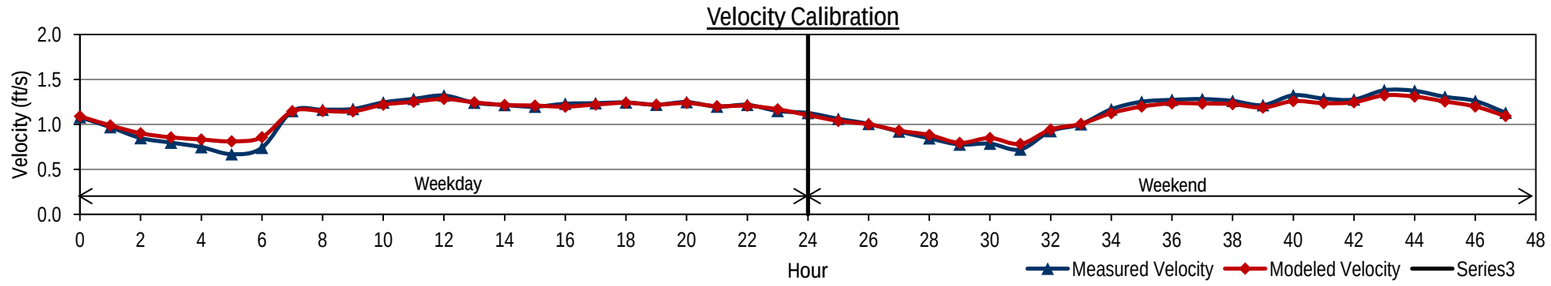
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR25 BASE WASTEWATER FLOW CALIBRATION

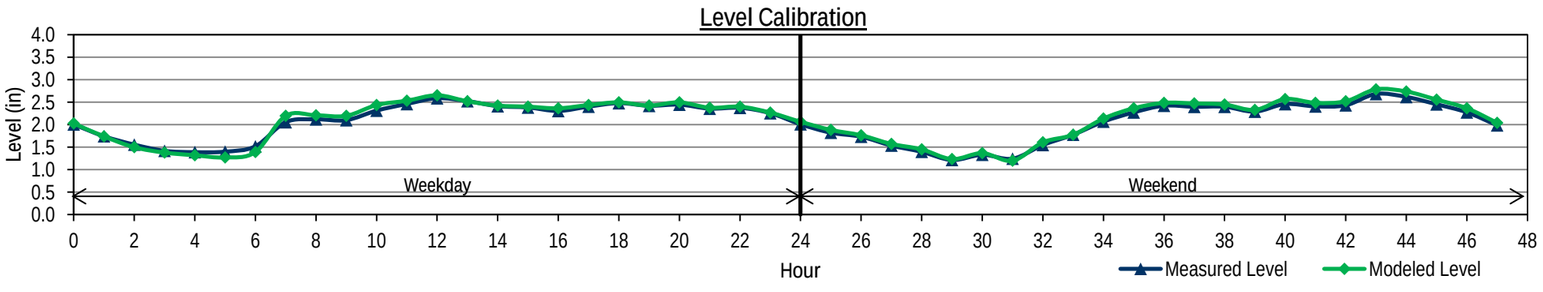
		Measured Data			Modeled Data			Diurnal
	Hour	Flow (mgd)	Level (in)	Velocity (ft/s)	Flow (mgd)	Level (in)	Velocity (ft/s)	Calibrated Diurnal
Weekday	0	0.070	2.0	1.08	0.070	2.0	1.09	0.86
	1	0.050	1.7	0.97	0.050	1.7	0.99	0.62
	2	0.037	1.6	0.85	0.037	1.5	0.90	0.46
	3	0.031	1.4	0.80	0.031	1.4	0.86	0.39
	4	0.029	1.4	0.75	0.029	1.3	0.83	0.35
	5	0.026	1.4	0.67	0.026	1.3	0.81	0.32
	6	0.032	1.5	0.74	0.032	1.4	0.86	0.39
	7	0.083	2.1	1.15	0.083	2.2	1.15	1.02
	8	0.083	2.1	1.16	0.083	2.2	1.15	1.03
	9	0.082	2.1	1.17	0.083	2.2	1.15	1.02
	10	0.102	2.3	1.25	0.102	2.4	1.22	1.25
	11	0.111	2.5	1.28	0.111	2.5	1.25	1.37
	12	0.121	2.6	1.32	0.121	2.7	1.28	1.49
	13	0.109	2.5	1.24	0.109	2.5	1.25	1.35
	14	0.101	2.4	1.22	0.101	2.4	1.22	1.25
	15	0.099	2.4	1.20	0.099	2.4	1.21	1.22
	16	0.096	2.3	1.23	0.096	2.4	1.20	1.18
	17	0.102	2.4	1.24	0.102	2.4	1.22	1.26
	18	0.108	2.5	1.25	0.108	2.5	1.24	1.33
	19	0.101	2.4	1.22	0.101	2.4	1.22	1.25
	20	0.107	2.4	1.25	0.107	2.5	1.24	1.33
	21	0.097	2.4	1.20	0.097	2.4	1.20	1.20
	22	0.098	2.4	1.22	0.099	2.4	1.21	1.22
	23	0.088	2.3	1.15	0.088	2.3	1.17	1.09
Weekend	24	0.073	2.0	1.13	0.073	2.1	1.10	0.90
	25	0.060	1.8	1.06	0.060	1.9	1.04	0.74
	26	0.053	1.7	1.01	0.053	1.8	1.00	0.65
	27	0.041	1.5	0.92	0.041	1.6	0.93	0.51
	28	0.035	1.4	0.85	0.035	1.5	0.88	0.43
	29	0.025	1.2	0.78	0.025	1.2	0.80	0.30
	30	0.030	1.3	0.79	0.030	1.4	0.85	0.38
	31	0.023	1.2	0.72	0.023	1.2	0.78	0.29
	32	0.043	1.5	0.93	0.043	1.6	0.94	0.53
	33	0.053	1.8	1.00	0.053	1.8	1.01	0.66
	34	0.078	2.1	1.17	0.078	2.1	1.13	0.96
	35	0.096	2.3	1.25	0.096	2.4	1.20	1.19
	36	0.106	2.4	1.27	0.106	2.5	1.23	1.31
	37	0.106	2.4	1.28	0.106	2.5	1.23	1.30
	38	0.103	2.4	1.26	0.103	2.4	1.23	1.28
	39	0.093	2.3	1.22	0.093	2.3	1.19	1.15
	40	0.113	2.5	1.33	0.113	2.6	1.26	1.40
	41	0.106	2.4	1.29	0.107	2.5	1.24	1.32
	42	0.109	2.4	1.28	0.110	2.5	1.25	1.35
	43	0.134	2.7	1.38	0.134	2.8	1.32	1.66
	44	0.129	2.6	1.37	0.130	2.7	1.31	1.60
	45	0.112	2.5	1.31	0.112	2.6	1.26	1.39
	46	0.096	2.3	1.26	0.096	2.4	1.20	1.19
	47	0.071	2.0	1.13	0.071	2.0	1.09	0.87
Average								
Weekday		0.082	2.1	1.11	0.082	2.1	1.12	1.01
Weekend		0.079	2.0	1.12	0.079	2.1	1.10	0.97
ADWF[1]		0.081	2.1	1.11	0.081	2.1	1.12	1.00
% Error								
Weekday					0.1%	1.0%	1.1%	
Weekend					0.2%	3.0%	-2.0%	

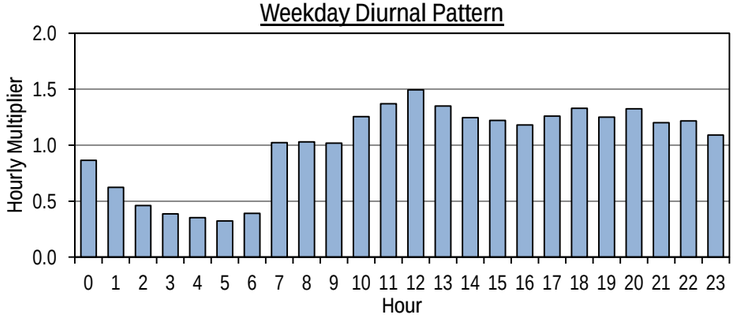
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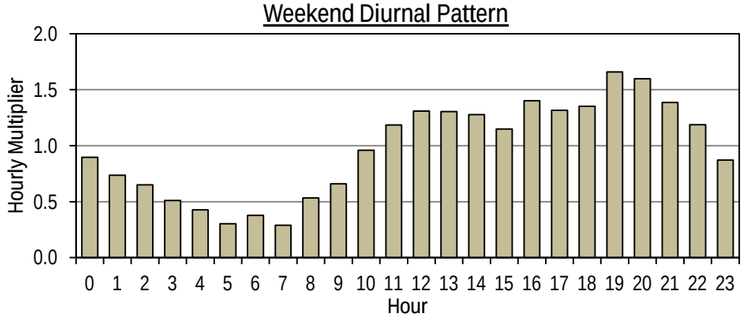
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7







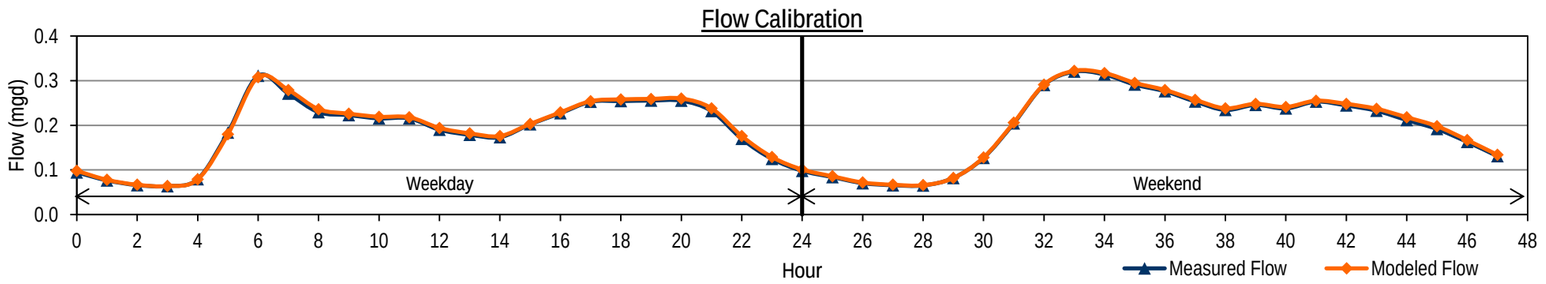


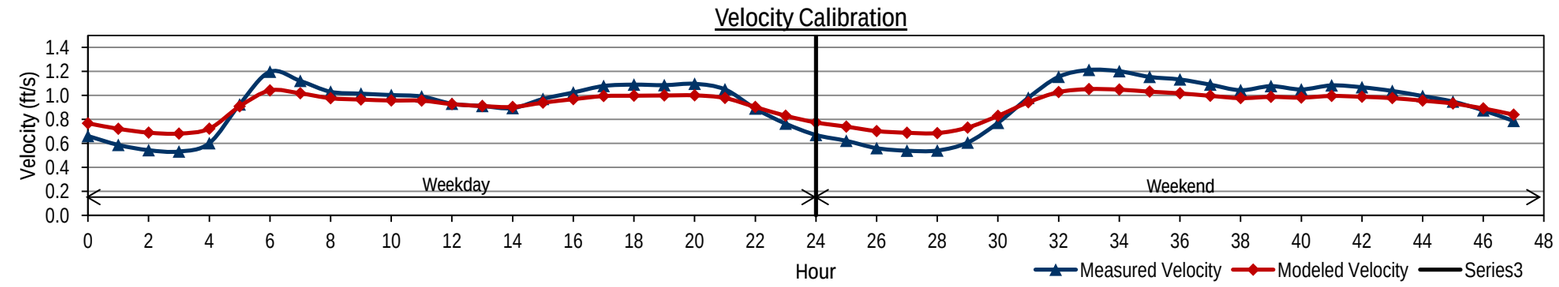


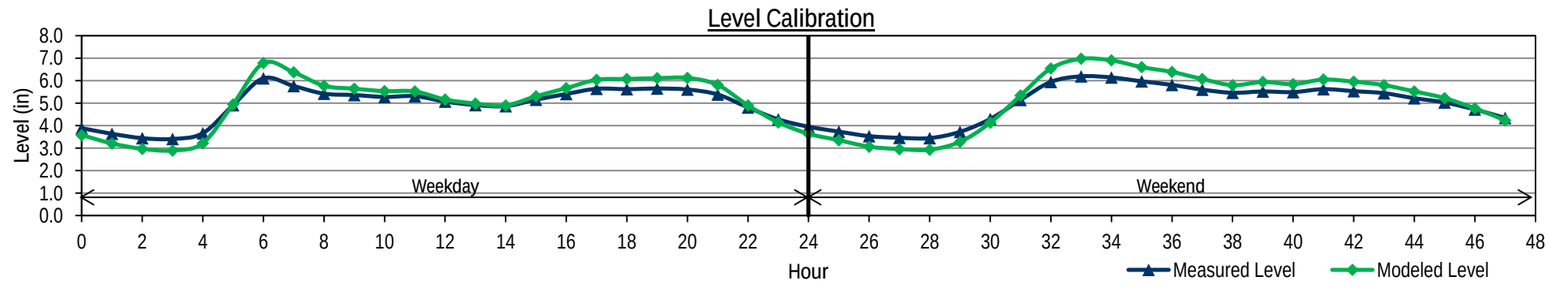
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR26 BASE WASTEWATER FLOW CALIBRATION

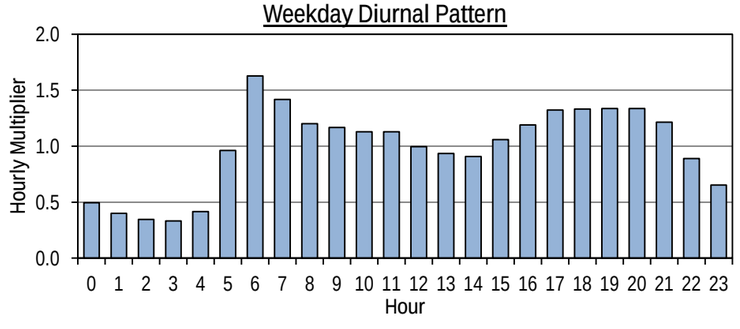
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	0.095	3.9	0.66	0.098	3.6	0.77	0.49
	1	0.077	3.6	0.59	0.078	3.2	0.72	0.40
	2	0.066	3.4	0.54	0.067	3.0	0.69	0.34
	3	0.064	3.4	0.53	0.064	2.9	0.68	0.33
	4	0.079	3.7	0.60	0.079	3.2	0.72	0.42
	5	0.184	4.9	0.93	0.180	4.9	0.91	0.96
	6	0.311	6.1	1.20	0.308	6.8	1.04	1.63
	7	0.271	5.8	1.12	0.279	6.4	1.02	1.42
	8	0.230	5.4	1.03	0.236	5.8	0.98	1.20
	9	0.223	5.4	1.02	0.226	5.6	0.97	1.17
	10	0.216	5.3	1.00	0.219	5.5	0.96	1.13
	11	0.216	5.3	0.99	0.218	5.5	0.96	1.13
	12	0.190	5.1	0.93	0.194	5.2	0.93	0.99
	13	0.179	4.9	0.91	0.182	5.0	0.91	0.94
	14	0.174	4.9	0.90	0.176	4.9	0.90	0.91
	15	0.203	5.2	0.97	0.203	5.3	0.94	1.06
	16	0.227	5.4	1.03	0.229	5.7	0.97	1.19
	17	0.253	5.6	1.08	0.254	6.0	1.00	1.32
	18	0.255	5.6	1.09	0.258	6.1	1.00	1.33
	19	0.256	5.6	1.09	0.259	6.1	1.00	1.34
	20	0.255	5.6	1.10	0.260	6.1	1.00	1.34
	21	0.232	5.4	1.05	0.238	5.8	0.98	1.21
	22	0.170	4.8	0.89	0.176	4.9	0.90	0.89
	23	0.125	4.3	0.77	0.129	4.1	0.83	0.65
Weekend	24	0.098	4.0	0.67	0.101	3.6	0.78	0.51
	25	0.084	3.7	0.62	0.086	3.3	0.74	0.44
	26	0.070	3.5	0.56	0.072	3.1	0.70	0.37
	27	0.066	3.5	0.54	0.067	3.0	0.69	0.34
	28	0.065	3.4	0.54	0.066	2.9	0.69	0.34
	29	0.082	3.7	0.61	0.082	3.3	0.73	0.43
	30	0.127	4.3	0.77	0.128	4.1	0.83	0.66
	31	0.205	5.1	0.98	0.206	5.3	0.94	1.07
	32	0.291	5.9	1.16	0.291	6.5	1.03	1.52
	33	0.321	6.2	1.21	0.322	7.0	1.05	1.68
	34	0.314	6.1	1.20	0.317	6.9	1.05	1.64
	35	0.292	6.0	1.16	0.295	6.6	1.03	1.52
	36	0.277	5.8	1.13	0.279	6.4	1.02	1.45
	37	0.254	5.6	1.09	0.257	6.1	1.00	1.33
	38	0.235	5.5	1.04	0.238	5.8	0.98	1.23
	39	0.246	5.5	1.08	0.248	5.9	0.99	1.29
	40	0.238	5.5	1.05	0.241	5.8	0.98	1.24
	41	0.253	5.6	1.08	0.255	6.0	1.00	1.32
	42	0.245	5.5	1.07	0.248	6.0	0.99	1.28
	43	0.233	5.4	1.04	0.237	5.8	0.98	1.22
	44	0.212	5.2	1.00	0.218	5.5	0.96	1.11
	45	0.192	5.0	0.95	0.198	5.2	0.93	1.00
	46	0.163	4.7	0.88	0.167	4.8	0.89	0.85
	47	0.131	4.3	0.79	0.134	4.2	0.84	0.69
Average								
	Weekday	0.190	4.9	0.92	0.192	5.1	0.91	0.99
	Weekend	0.195	5.0	0.93	0.198	5.1	0.91	1.02
	ADWF[1]	0.191	4.9	0.92	0.194	5.1	0.91	1.00
% Error								
	Weekday				1.4%	2.6%	-1.1%	
	Weekend				1.3%	3.3%	-1.9%	

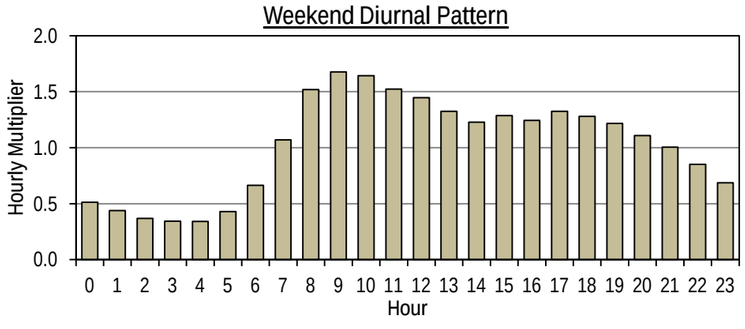
Note:
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7









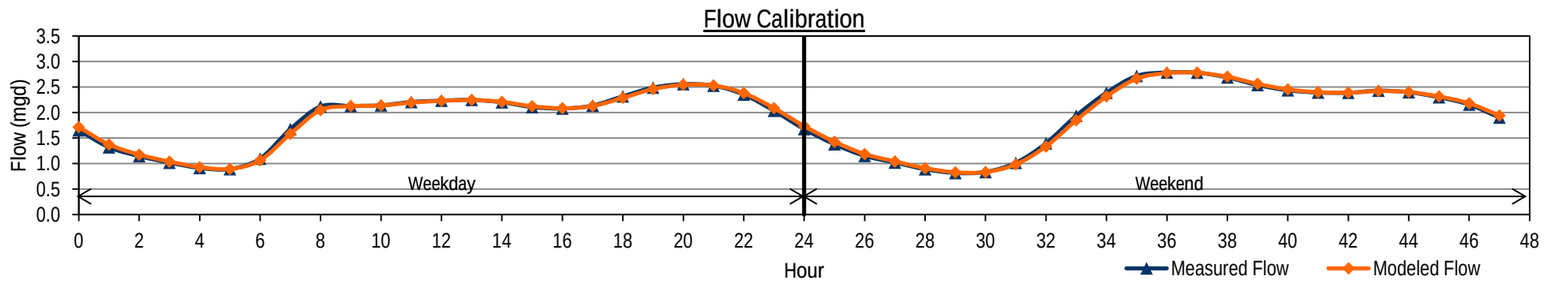


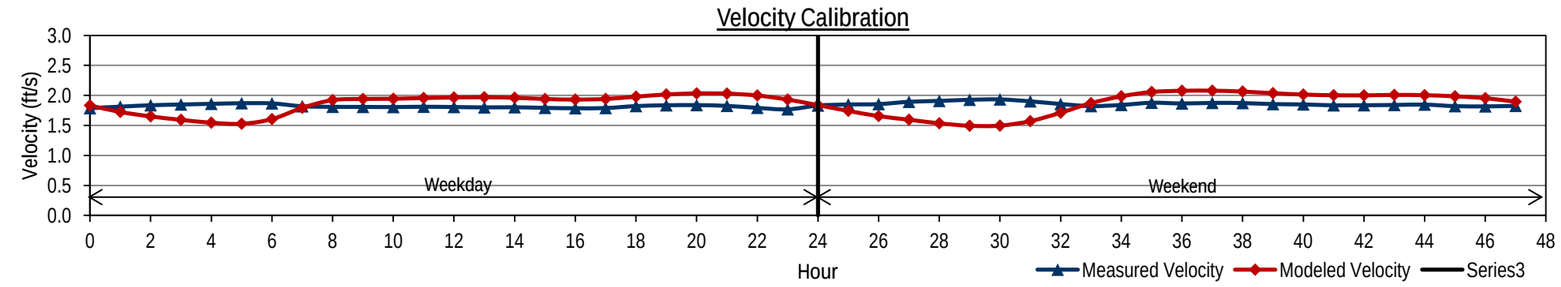
CITY OF FRESNO
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE
FLOW MONITORING SITE FR27 BASE WASTEWATER FLOW CALIBRATION

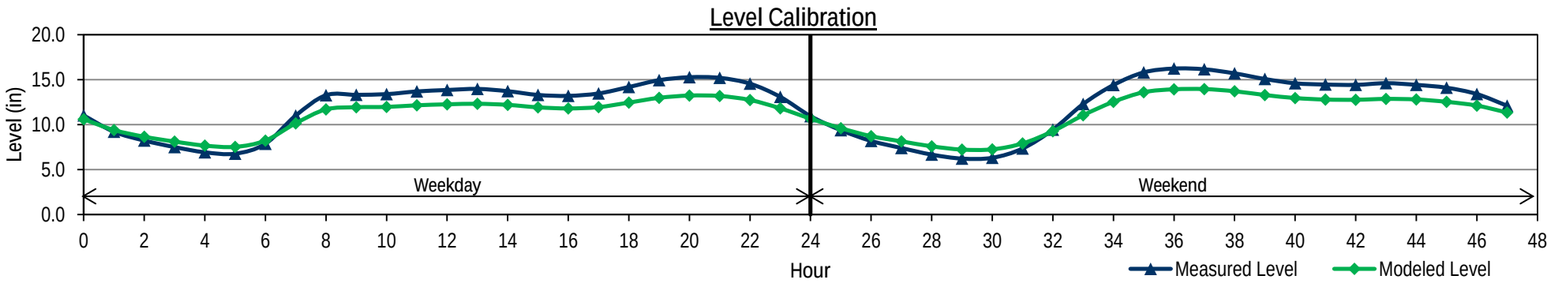
	Hour	Measured Data Flow (mgd)	Measured Data Level (in)	Measured Data Velocity (ft/s)	Modeled Data Flow (mgd)	Modeled Data Level (in)	Modeled Data Velocity (ft/s)	Diurnal Calibrated Diurnal
Weekday	0	1.653	11.0	1.79	1.715	10.6	1.83	0.87
	1	1.319	9.2	1.81	1.373	9.4	1.73	0.69
	2	1.146	8.2	1.84	1.174	8.7	1.65	0.60
	3	1.017	7.5	1.85	1.037	8.1	1.59	0.53
	4	0.914	6.9	1.86	0.929	7.7	1.55	0.48
	5	0.891	6.8	1.87	0.894	7.5	1.53	0.47
	6	1.096	7.9	1.87	1.063	8.2	1.61	0.57
	7	1.675	11.0	1.82	1.582	10.1	1.79	0.88
	8	2.119	13.3	1.81	2.049	11.7	1.92	1.11
	9	2.128	13.3	1.81	2.127	11.9	1.94	1.11
	10	2.142	13.4	1.81	2.139	12.0	1.95	1.12
	11	2.207	13.7	1.81	2.196	12.1	1.96	1.16
	12	2.234	13.9	1.81	2.230	12.3	1.97	1.17
	13	2.249	14.0	1.80	2.248	12.3	1.97	1.18
	14	2.202	13.7	1.80	2.210	12.2	1.96	1.15
	15	2.108	13.3	1.79	2.124	11.9	1.94	1.10
	16	2.079	13.2	1.79	2.085	11.8	1.93	1.09
	17	2.138	13.5	1.79	2.128	11.9	1.94	1.12
	18	2.319	14.2	1.82	2.290	12.4	1.98	1.21
	19	2.490	14.9	1.84	2.462	13.0	2.02	1.30
	20	2.558	15.3	1.84	2.546	13.2	2.03	1.34
	21	2.527	15.2	1.83	2.532	13.2	2.03	1.32
	22	2.354	14.6	1.79	2.383	12.7	2.00	1.23
	23	2.036	13.1	1.77	2.087	11.8	1.93	1.07
Weekend	24	1.676	11.0	1.83	1.734	10.7	1.84	0.88
	25	1.379	9.4	1.85	1.427	9.6	1.74	0.72
	26	1.150	8.2	1.86	1.186	8.7	1.66	0.60
	27	1.020	7.4	1.89	1.041	8.1	1.60	0.53
	28	0.889	6.7	1.91	0.909	7.6	1.54	0.47
	29	0.815	6.2	1.93	0.827	7.2	1.50	0.43
	30	0.834	6.3	1.93	0.832	7.2	1.50	0.44
	31	1.014	7.4	1.90	0.985	7.9	1.57	0.53
	32	1.397	9.5	1.86	1.335	9.3	1.71	0.73
	33	1.938	12.3	1.82	1.850	11.0	1.87	1.01
	34	2.389	14.4	1.84	2.317	12.5	1.99	1.25
	35	2.719	15.8	1.88	2.667	13.6	2.06	1.42
	36	2.786	16.2	1.87	2.776	13.9	2.08	1.46
	37	2.784	16.2	1.88	2.783	13.9	2.08	1.46
	38	2.690	15.7	1.87	2.704	13.7	2.07	1.41
	39	2.541	15.1	1.86	2.564	13.3	2.04	1.33
	40	2.438	14.6	1.85	2.454	12.9	2.02	1.28
	41	2.394	14.5	1.84	2.400	12.8	2.00	1.25
	42	2.389	14.4	1.84	2.390	12.8	2.00	1.25
	43	2.430	14.6	1.84	2.423	12.9	2.01	1.27
	44	2.399	14.4	1.85	2.404	12.8	2.01	1.26
	45	2.301	14.1	1.82	2.317	12.5	1.99	1.20
	46	2.158	13.4	1.82	2.181	12.1	1.96	1.13
	47	1.903	12.1	1.83	1.943	11.3	1.90	1.00
Average								
	Weekday	1.900	12.1	1.82	1.900	11.1	1.86	0.99
	Weekend	1.935	12.1	1.86	1.935	11.2	1.86	1.01
	ADWF[1]	1.910	12.1	1.83	1.910	11.1	1.86	1.00
% Error								
	Weekday				0.0%	-8.4%	2.6%	
	Weekend				0.0%	-7.4%	0.1%	

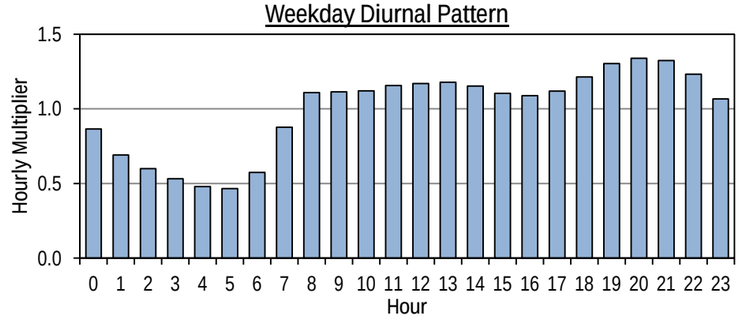
Note:

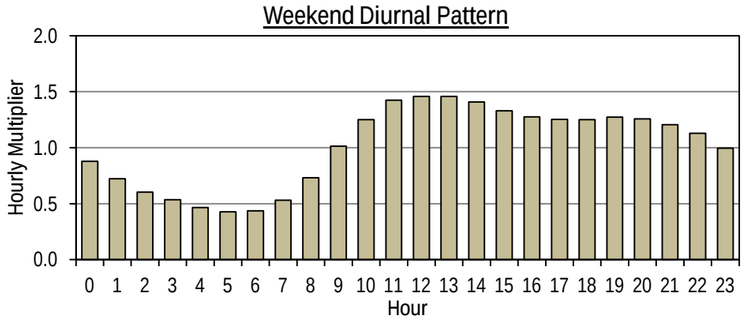
1. ADWF = (5xWeekday Average + 2xWeekend Average)/7











APPENDIX C – WET WEATHER FLOW CALIBRATION

Table 2 Wet Weather Calibration Summary - April 2012 Storm Event
Wastewater Collection System Master Plan Update
City of Fresno

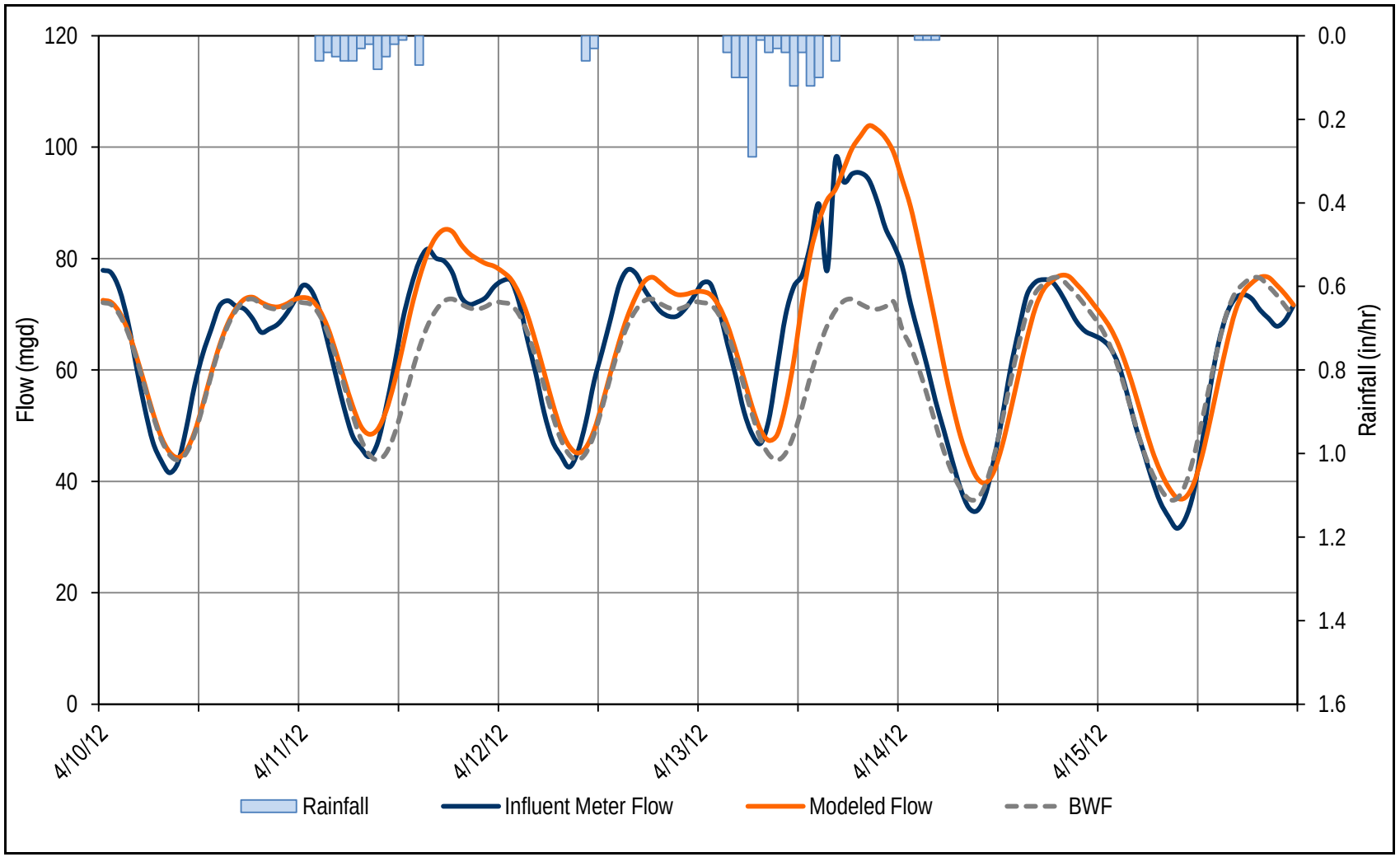
Meter Number	April 13-14, 2012 Storm Event											
	Measured Data[1]				Modeled Data[2]				Percent Error[3]			
	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)
FR01	3.603	5.501	3.40	9.1	4.080	5.806	3.14	10.5	13.2%	5.5%	-7.6%	15.4%
FR02	8.864	12.715	3.58	16.8	8.642	13.321	3.67	16.0	-2.5%	4.8%	2.6%	-4.7%
FR06	4.241	7.986	2.52	14.6	4.572	7.804	2.63	14.3	7.8%	-2.3%	4.5%	-1.7%
FR08	Note 4	Note 4	Note 4	Note 4	9.466	15.576	4.46	14.4	Note 4	Note 4	Note 4	Note 4
FR10	1.332	2.985	1.19	8.2	1.680	3.255	1.23	11.0	*26.1%*	9.1%	2.9%	*33.7%*
FR12	1.790	4.581	1.89	9.3	2.070	4.647	2.06	9.6	15.6%	1.5%	8.7%	3.8%
FR14	4.363	6.793	2.11	16.9	4.641	7.900	2.32	16.0	6.4%	16.3%	9.7%	-5.3%
FR15	6.330	8.273	2.14	18.8	6.565	9.505	2.29	18.2	3.7%	14.9%	6.8%	-2.9%
FR16	4.135	6.434	3.29	12.6	4.168	7.464	3.35	12.2	0.8%	16.0%	1.9%	-2.7%
FR19	22.983	34.118	5.46	20.8	25.384	37.234	4.99	23.8	10.4%	9.1%	-8.6%	14.5%
FR20	Note 4	Note 4	Note 4	Note 4	31.073	47.739	4.86	28.2	Note 4	Note 4	Note 4	Note 4
FR21	5.485	9.333	2.13	17.9	5.241	9.025	2.18	16.8	-4.5%	-3.3%	2.5%	-6.4%
FR22	8.456	12.878	3.02	18.6	8.547	13.454	2.96	18.7	1.1%	4.5%	-1.7%	0.9%
FR23	1.455	5.026	2.01	8.2	1.726	4.522	2.29	8.4	18.6%	-10.0%	14.0%	1.8%
FR24	Note 4	Note 4	Note 4	Note 4	10.316	15.570	2.72	18.4	Note 4	Note 4	Note 4	Note 4
FR25	0.117	0.318	1.26	2.5	0.113	0.329	1.22	2.5	-3.4%	3.5%	-3.1%	-0.1%
FR26	0.216	0.669	0.93	5.3	0.248	0.659	0.95	5.9	14.8%	-1.5%	2.0%	11.9%

Notes:
1. Source: City of Fresno Permanent Flow Monitoring Data
2. Average flows are calculated from flow monitoring data. Maximum flow values are hourly peaks.
3. Percent Difference = (Modeled - Measured)/Measured*100.
4. Meters FR08, FR20, and FR24 have data gaps or questionable data quality, and therefore percent error comparisons are not appropriate for these meters.

CITY OF FRESNO

WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

RWRF WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

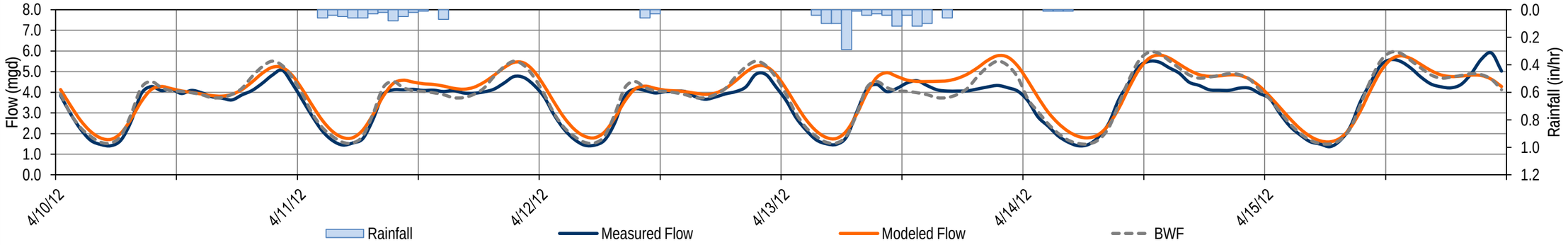


CITY OF FRESNO

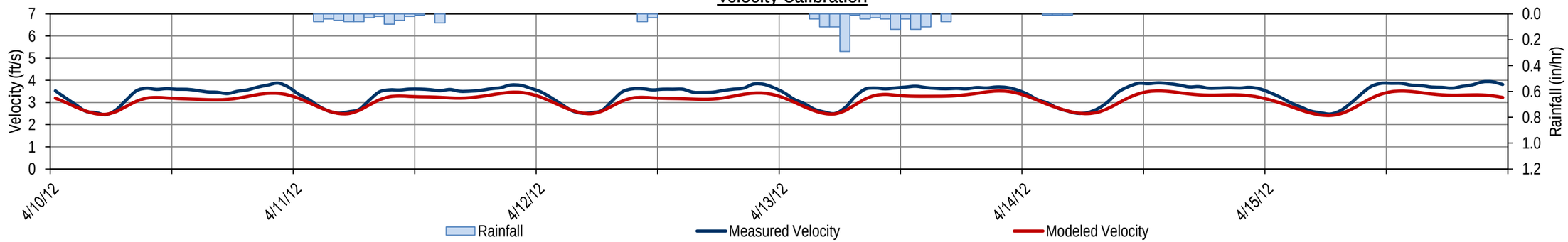
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR01 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

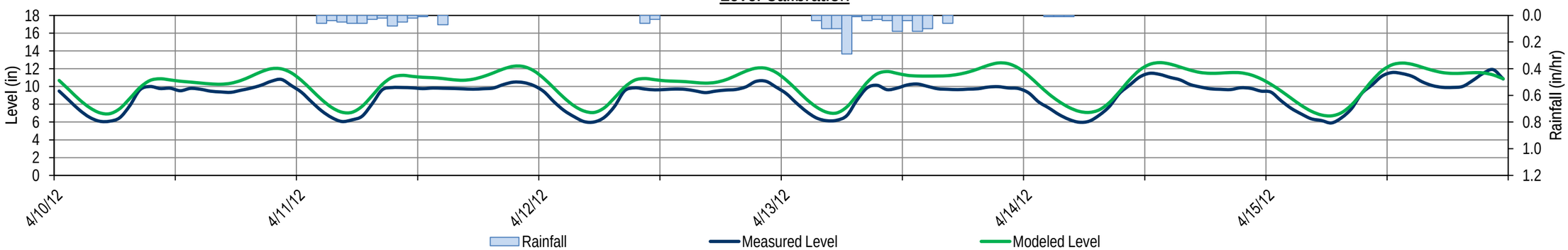
Flow Calibration



Velocity Calibration



Level Calibration

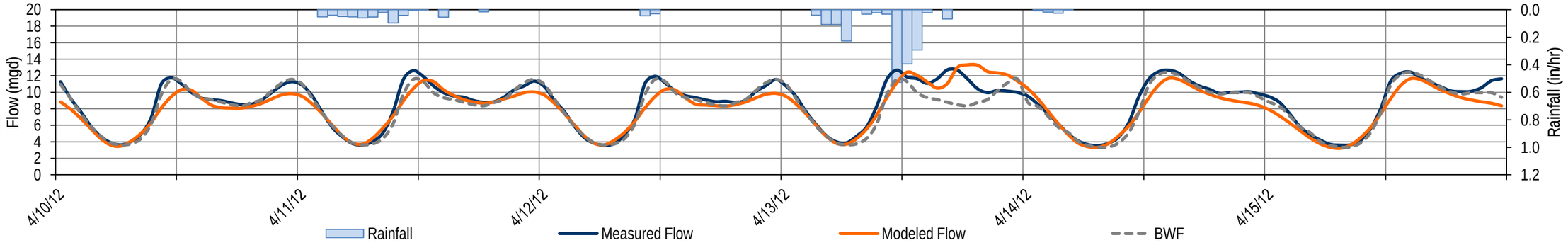


CITY OF FRESNO

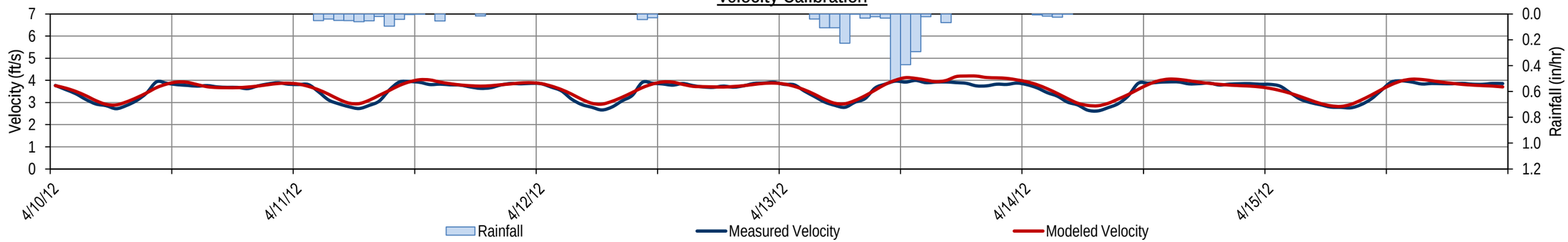
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR02 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

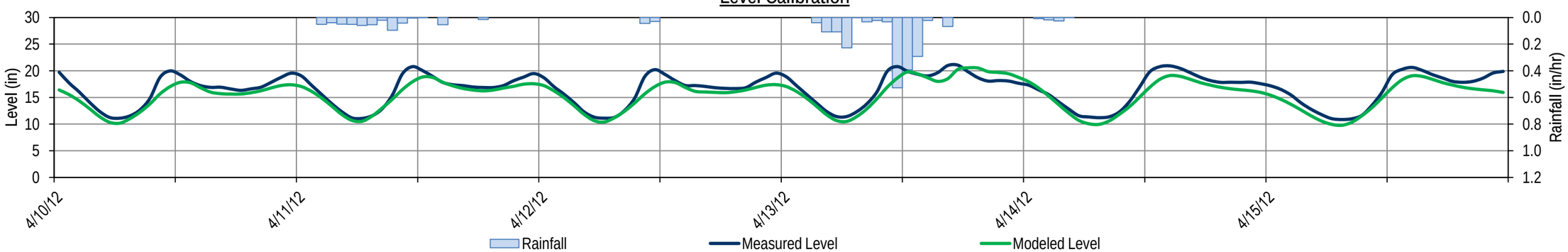
Flow Calibration



Velocity Calibration



Level Calibration

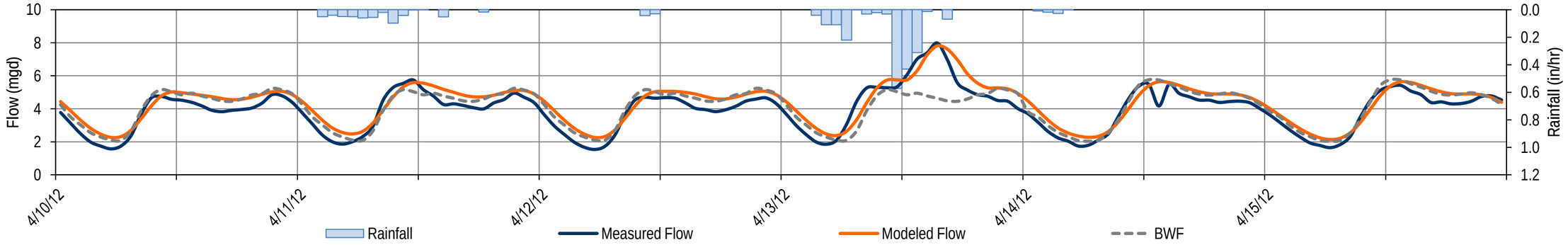


CITY OF FRESNO

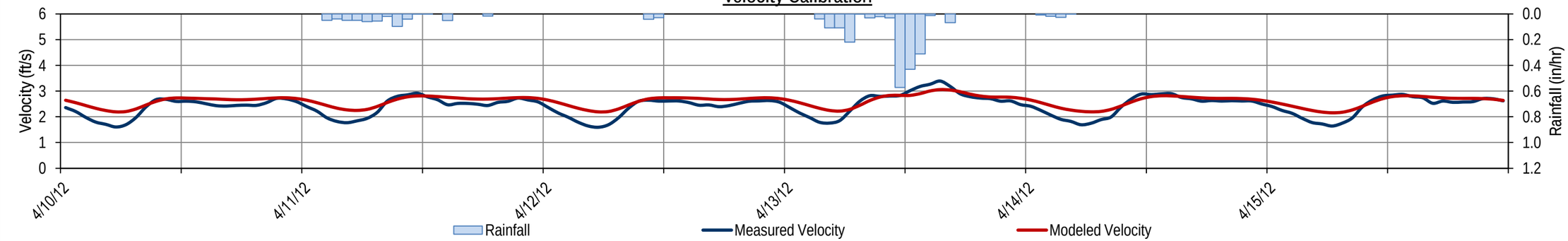
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR06 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

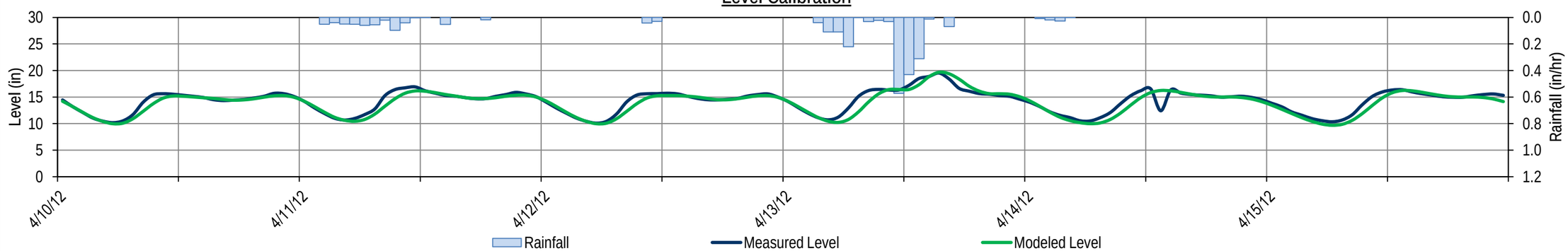
Flow Calibration



Velocity Calibration



Level Calibration

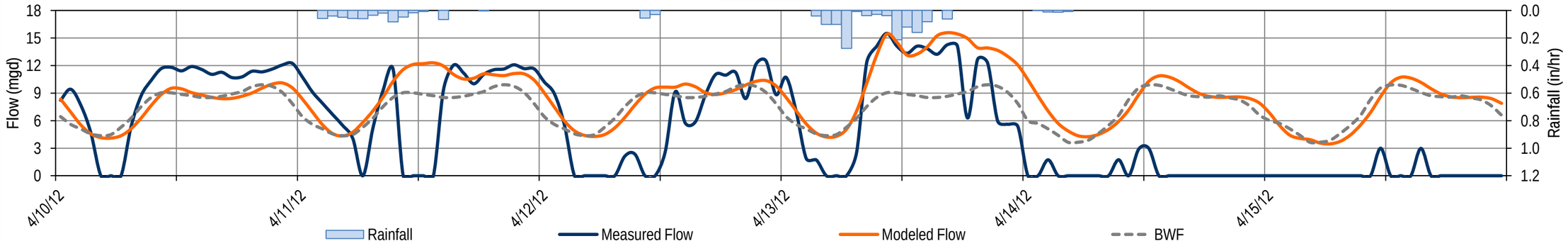


CITY OF FRESNO

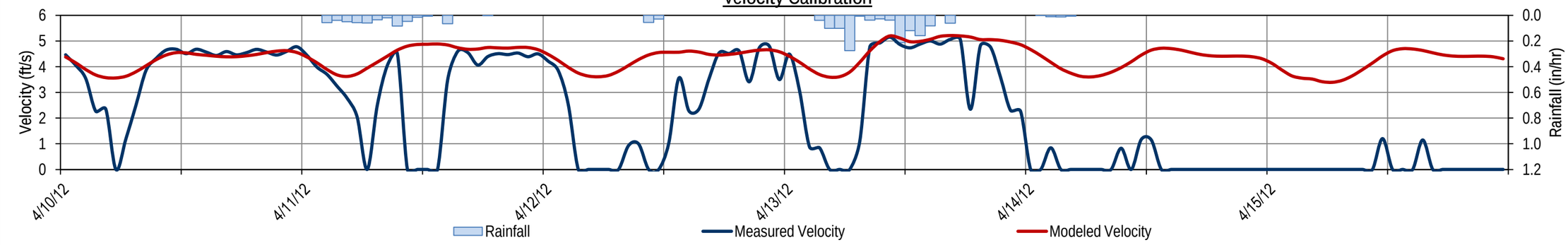
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR08 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

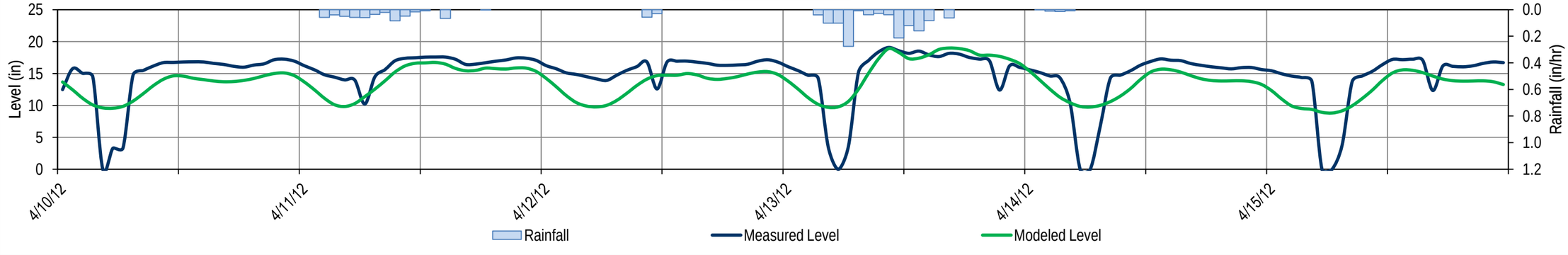
Flow Calibration



Velocity Calibration



Level Calibration

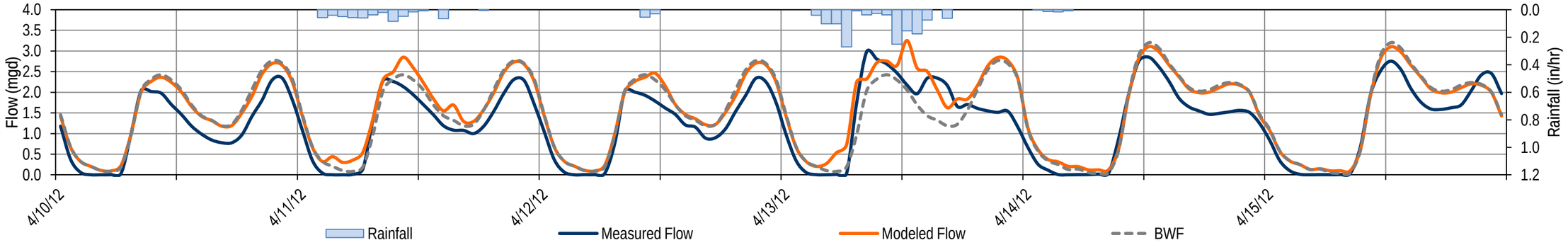


CITY OF FRESNO

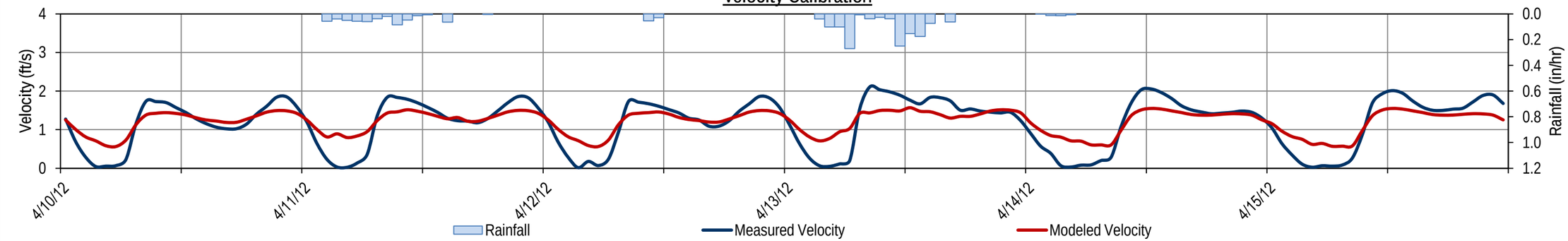
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR10 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

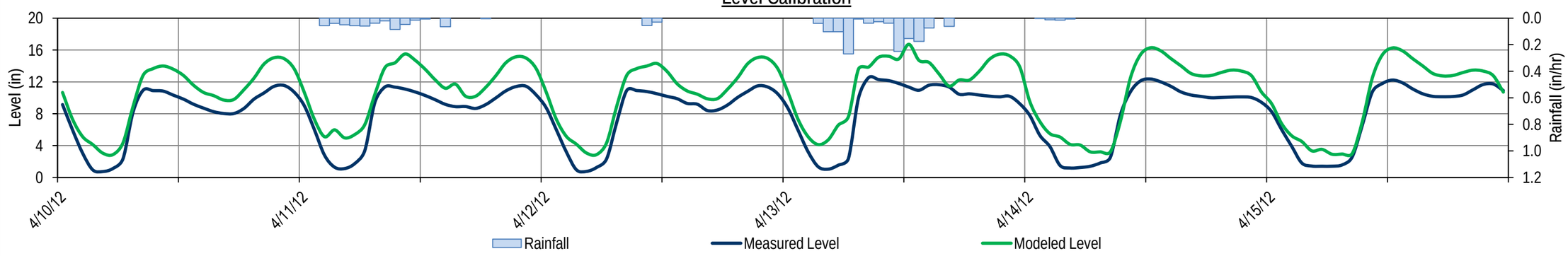
Flow Calibration



Velocity Calibration



Level Calibration

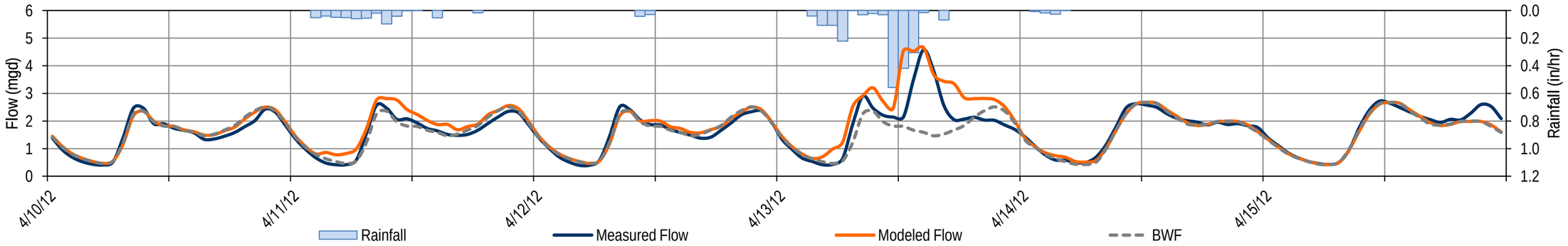


CITY OF FRESNO

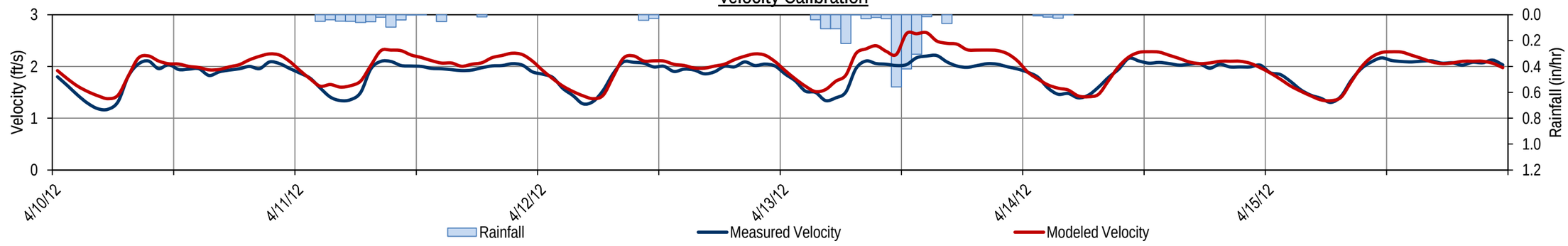
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR12 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

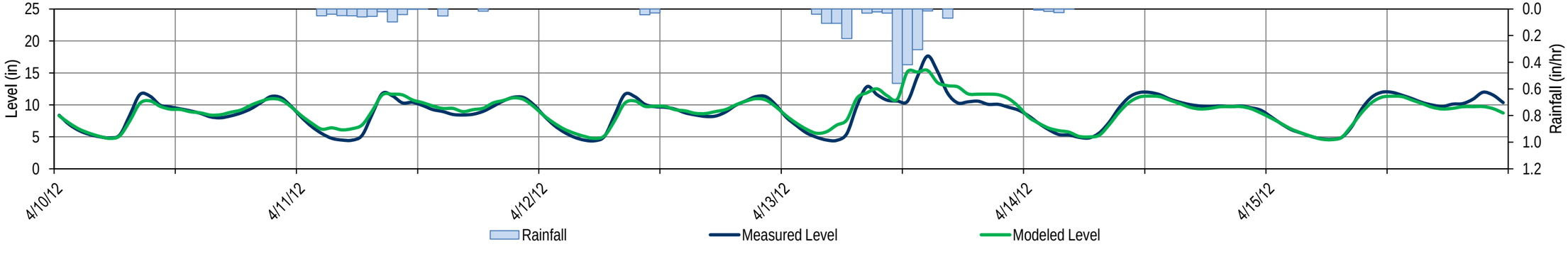
Flow Calibration



Velocity Calibration



Level Calibration

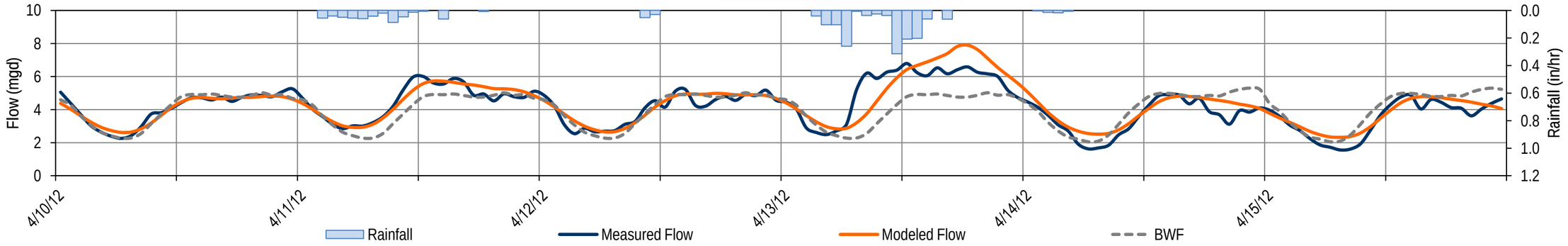


CITY OF FRESNO

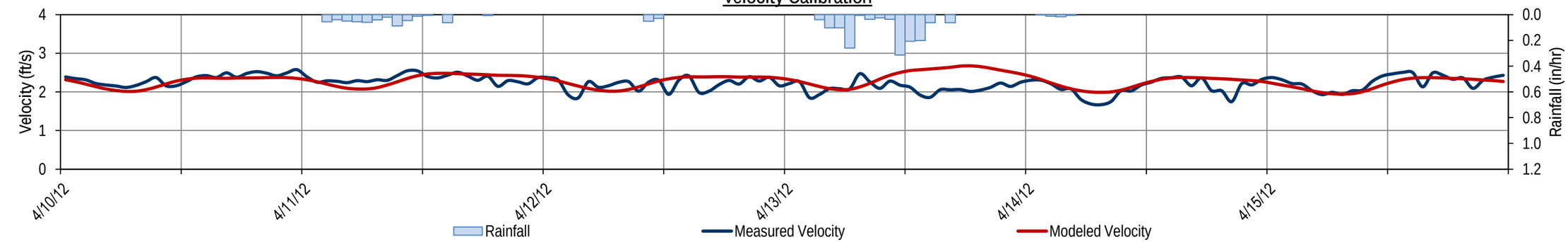
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR14 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

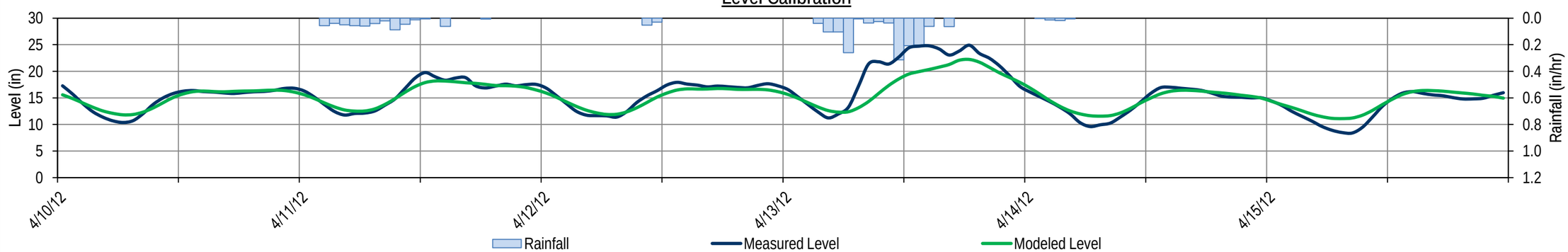
Flow Calibration



Velocity Calibration



Level Calibration

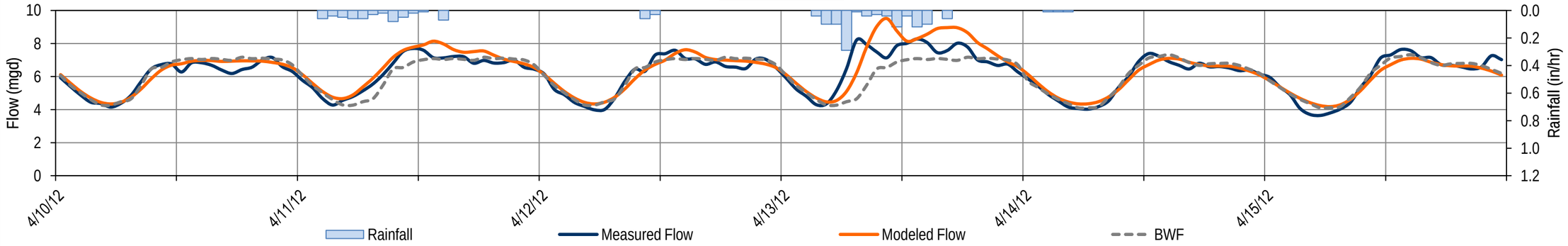


CITY OF FRESNO

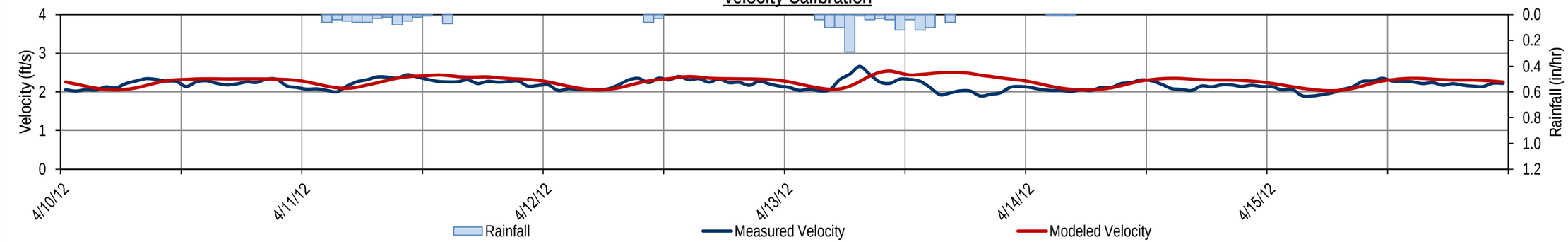
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR15 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

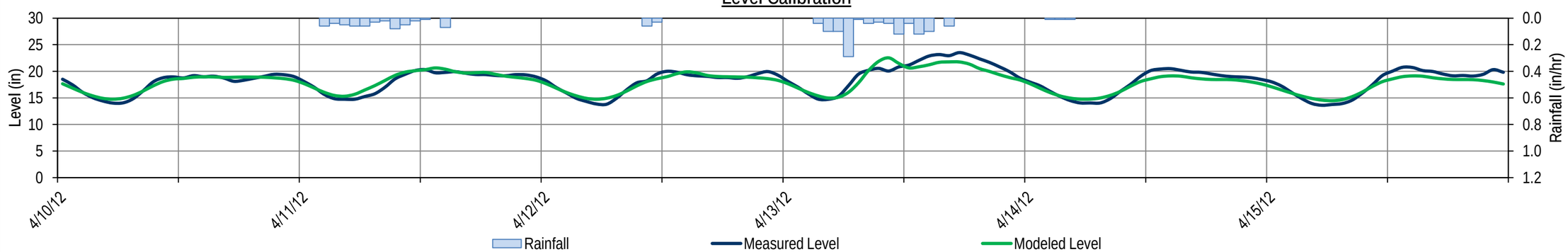
Flow Calibration



Velocity Calibration



Level Calibration

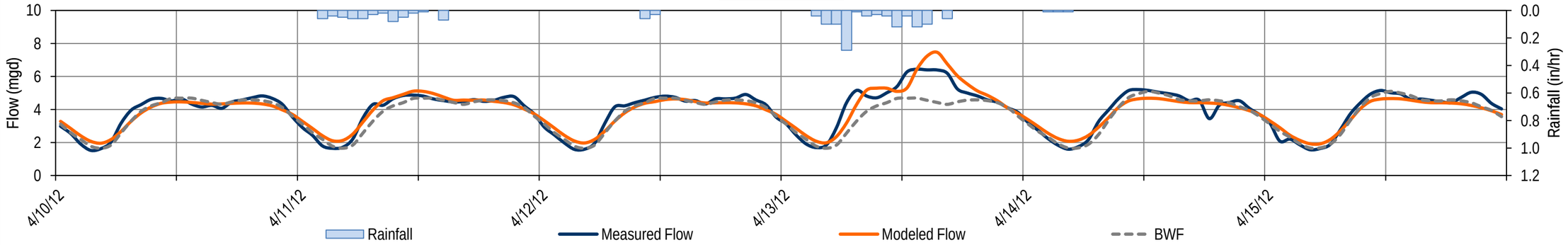


CITY OF FRESNO

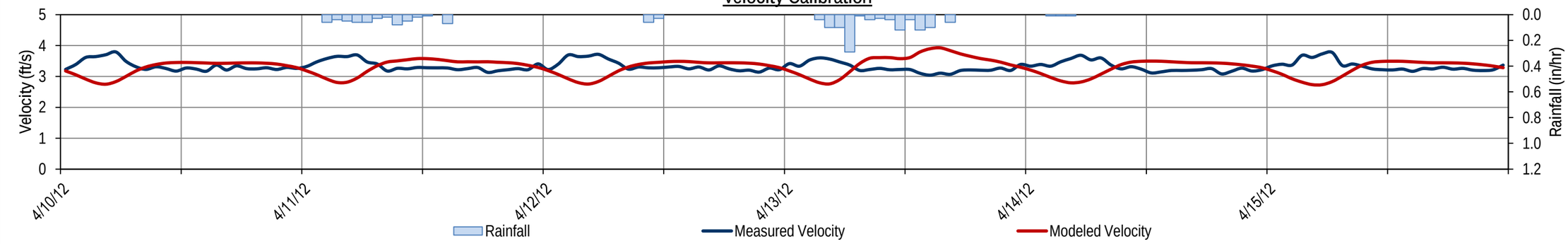
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR16 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

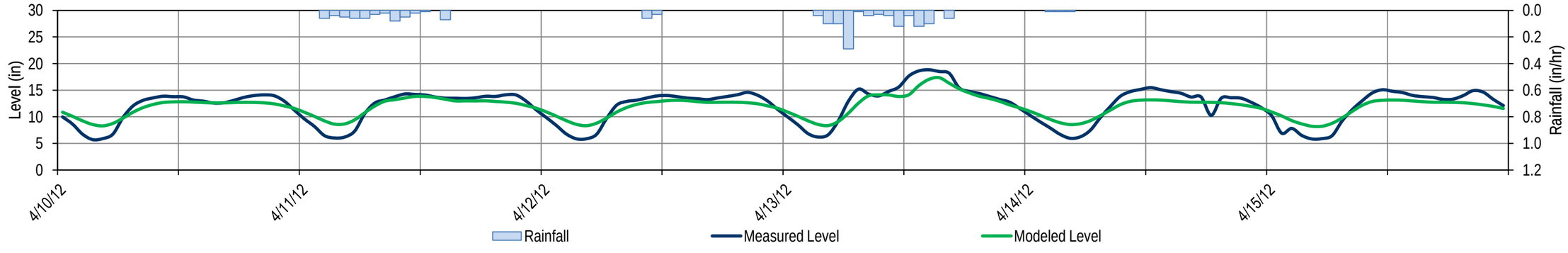
Flow Calibration



Velocity Calibration



Level Calibration

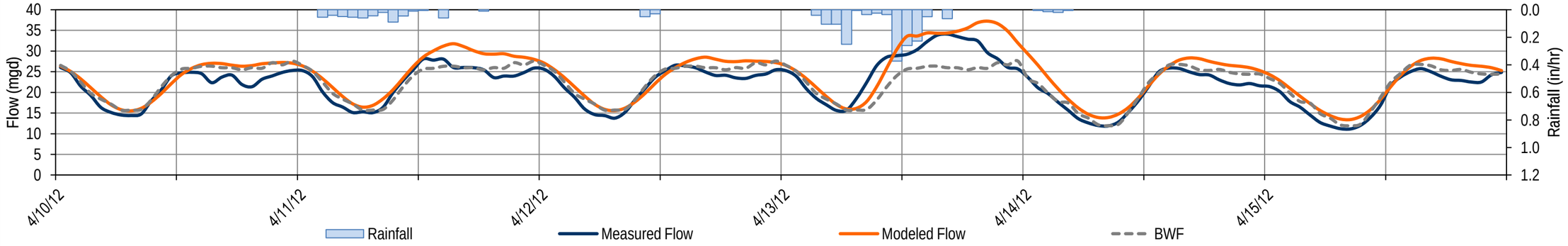


CITY OF FRESNO

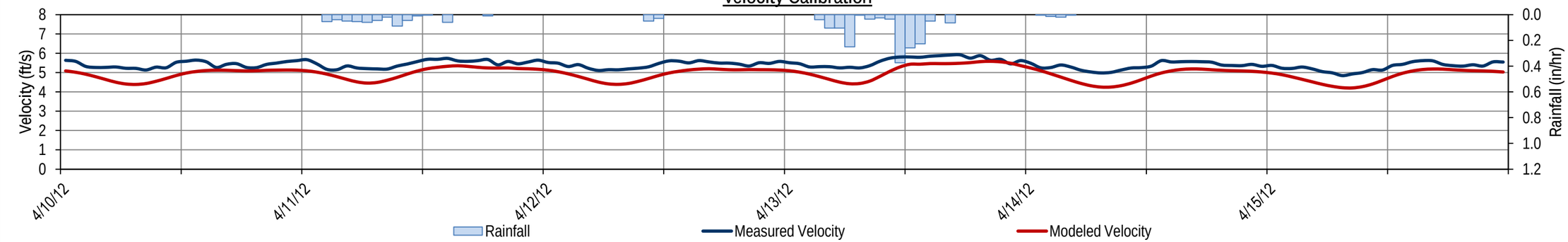
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR19 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

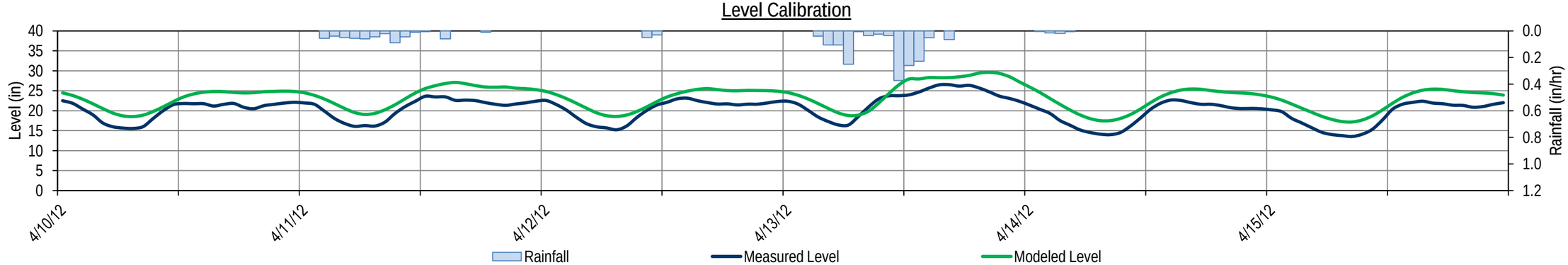
Flow Calibration



Velocity Calibration



Level Calibration

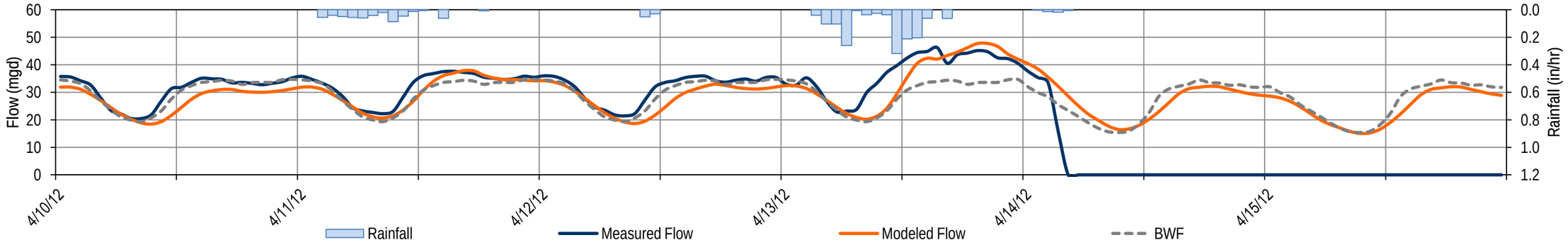


CITY OF FRESNO

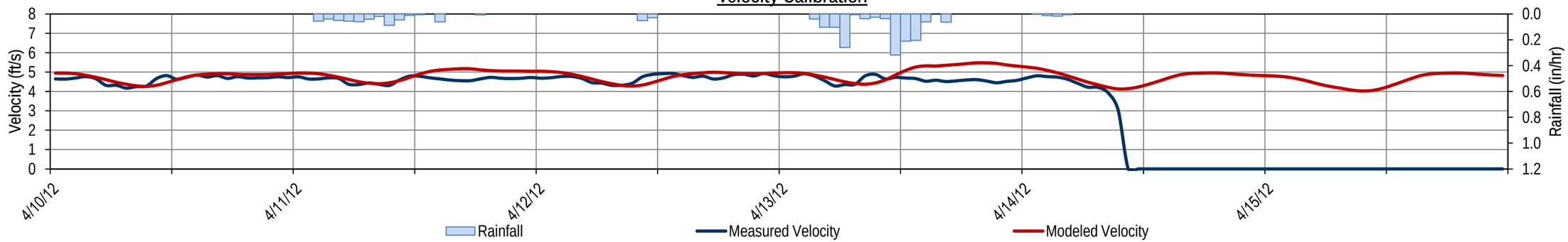
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR20 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

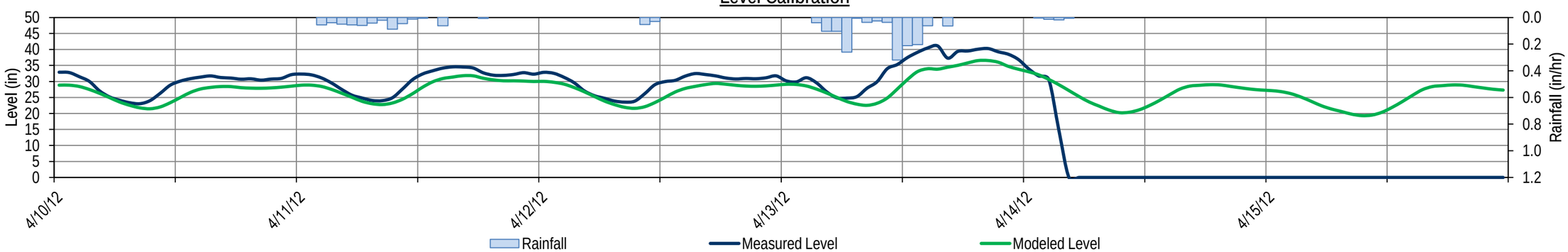
Flow Calibration



Velocity Calibration



Level Calibration

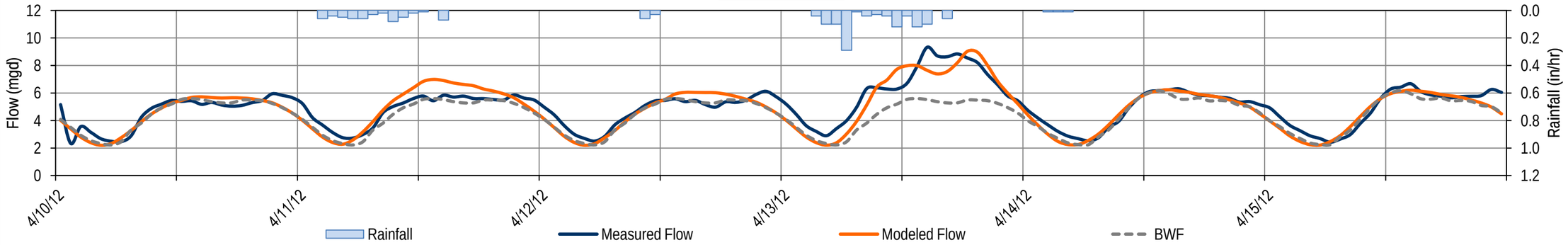


CITY OF FRESNO

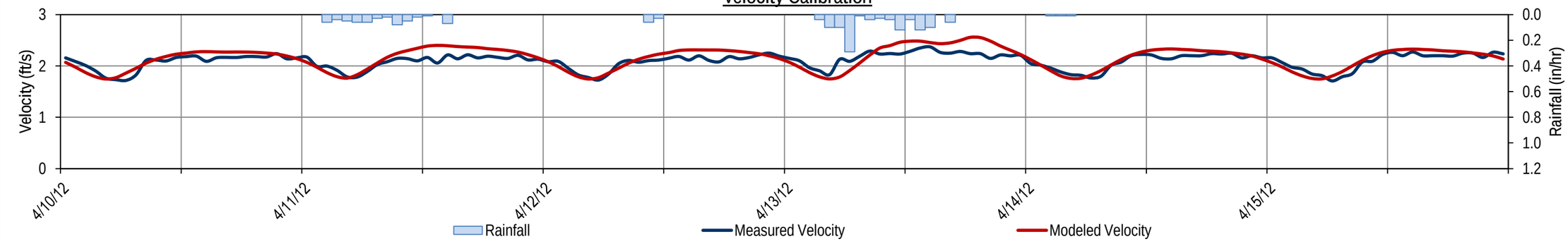
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR21 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

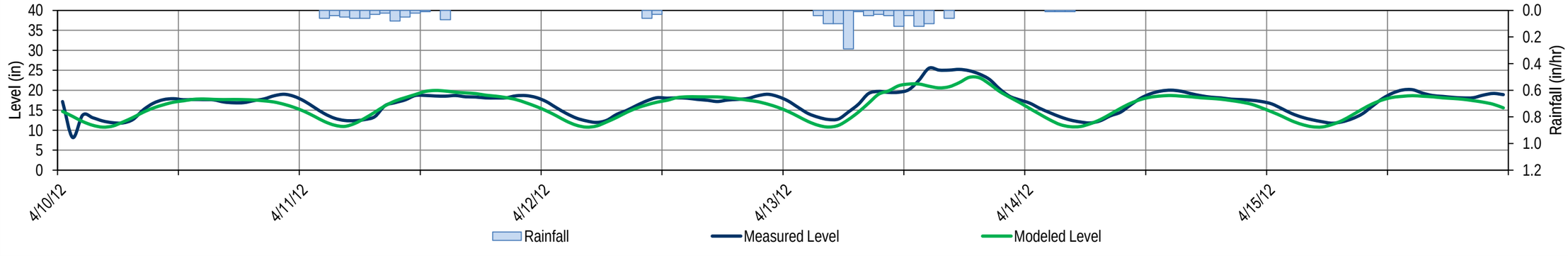
Flow Calibration



Velocity Calibration



Level Calibration

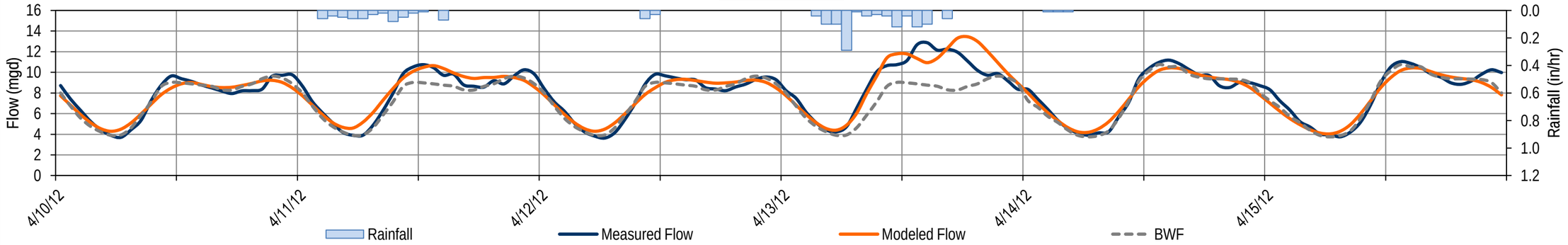


CITY OF FRESNO

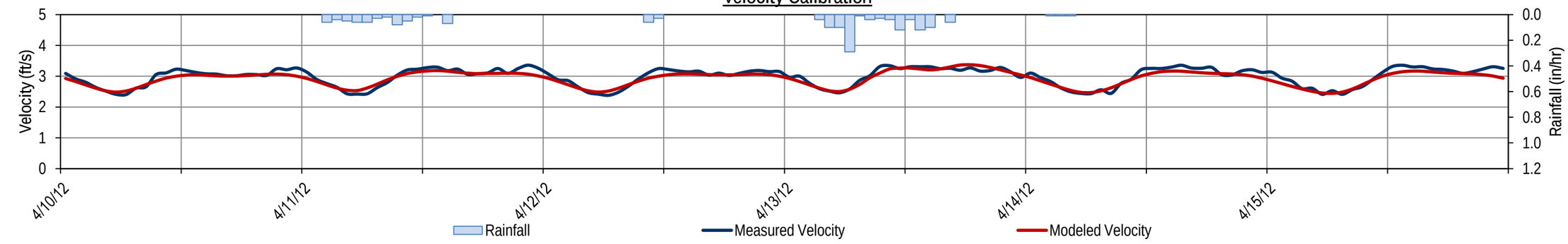
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR22 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

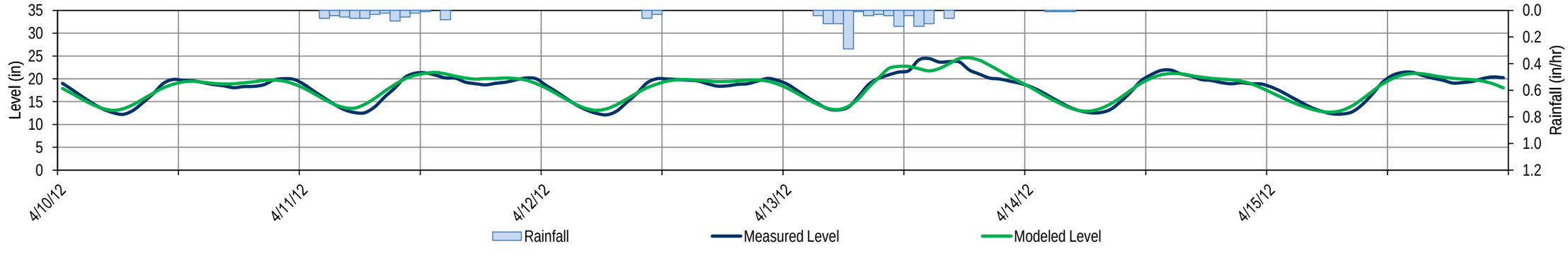
Flow Calibration



Velocity Calibration



Level Calibration

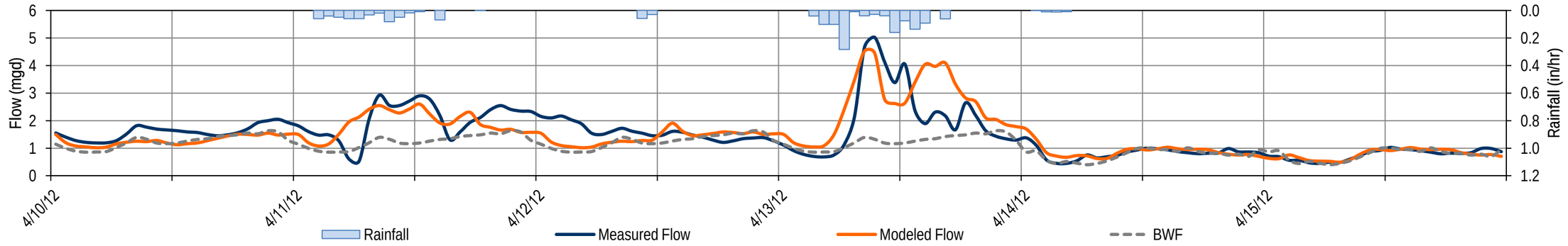


CITY OF FRESNO

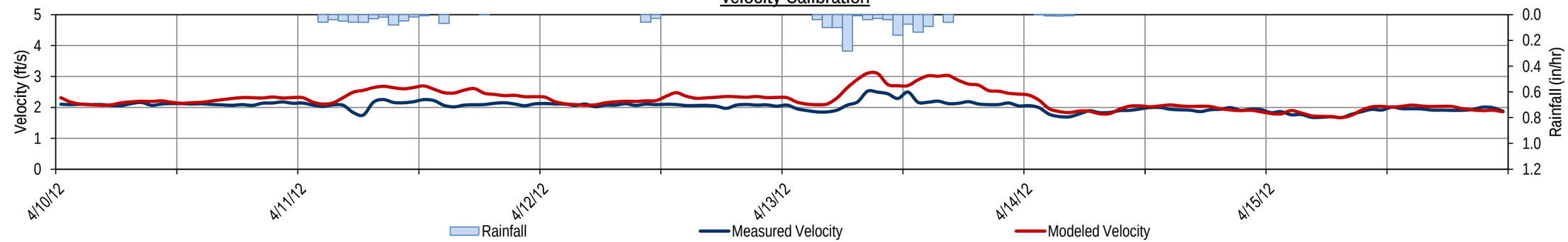
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR23 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

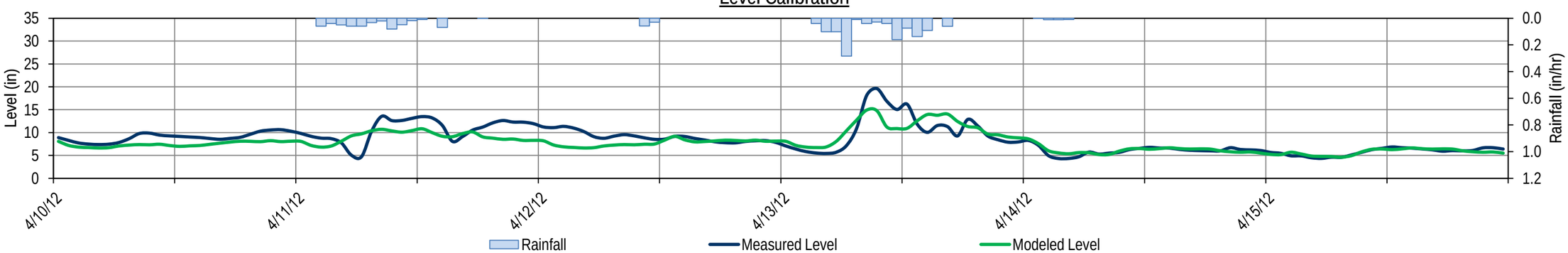
Flow Calibration



Velocity Calibration



Level Calibration

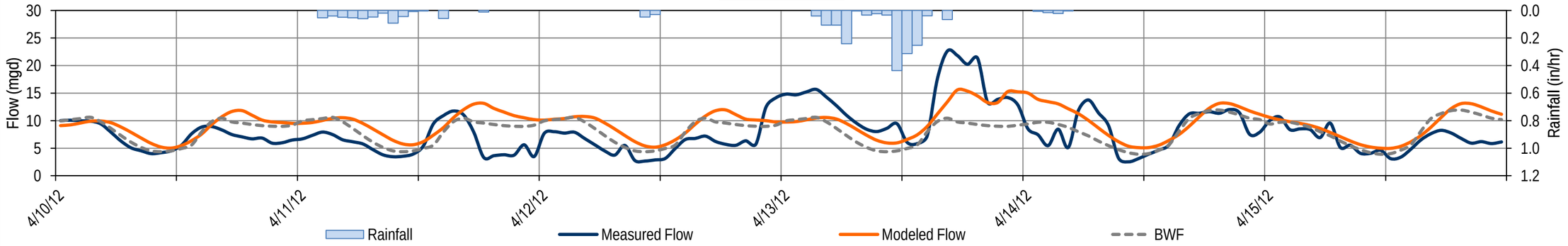


CITY OF FRESNO

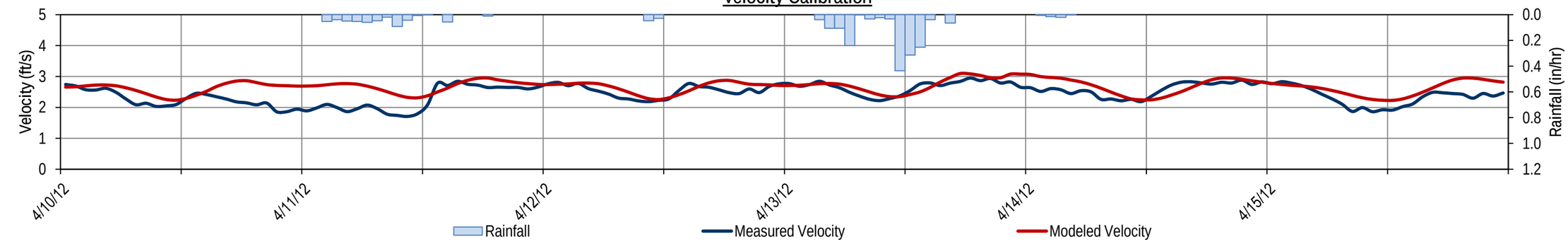
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR24 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

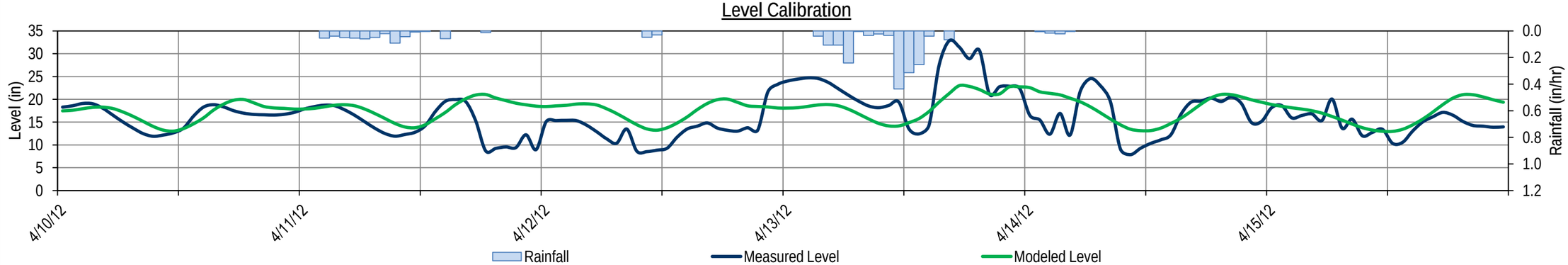
Flow Calibration



Velocity Calibration



Level Calibration

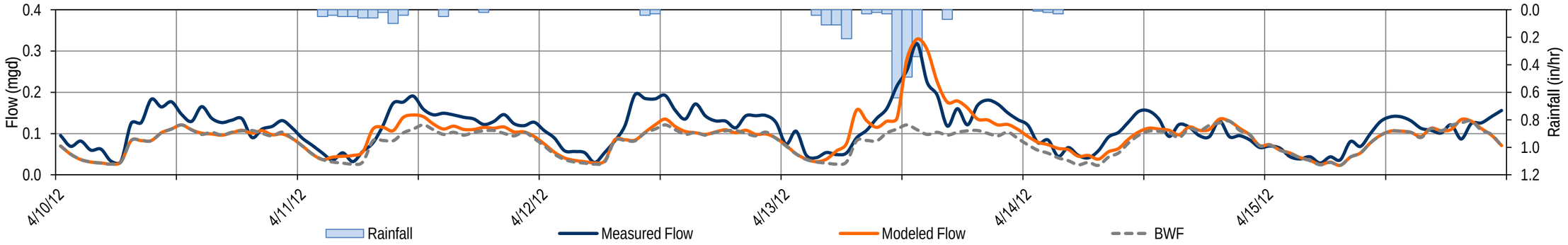


CITY OF FRESNO

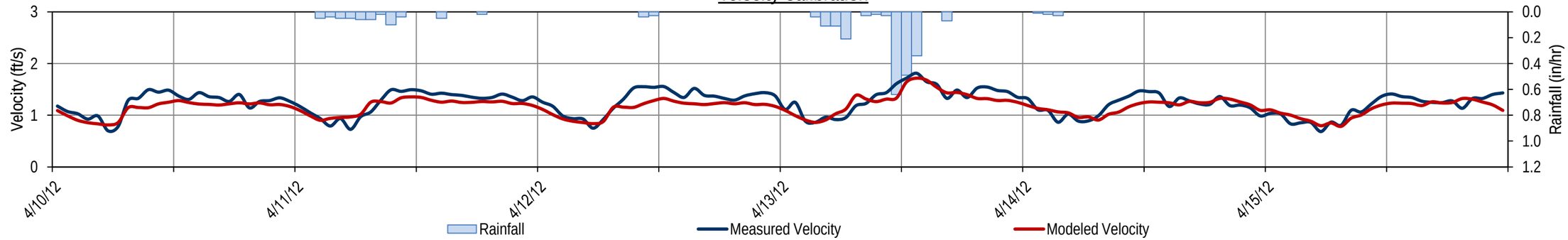
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR25 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

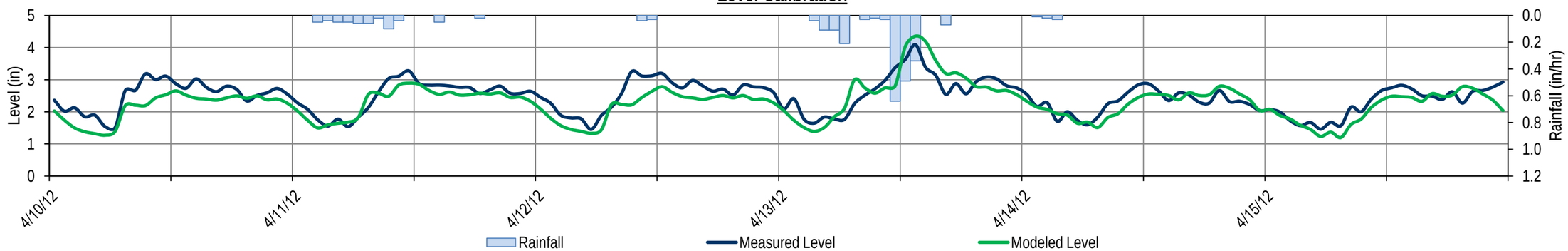
Flow Calibration



Velocity Calibration



Level Calibration

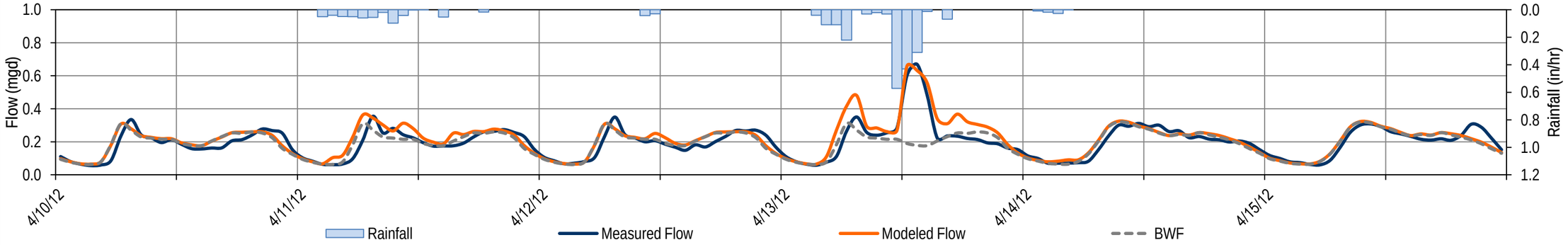


CITY OF FRESNO

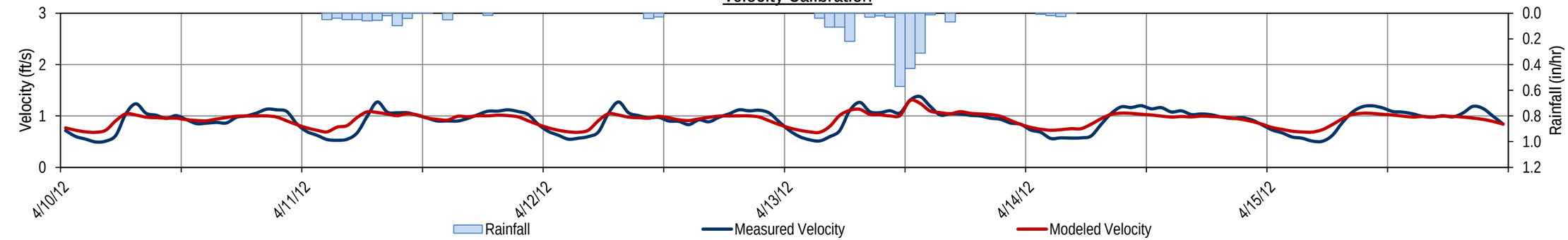
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR26 WET WEATHER FLOW CALIBRATION (4/10/2012-4/15/2012)

Flow Calibration



Velocity Calibration



Level Calibration

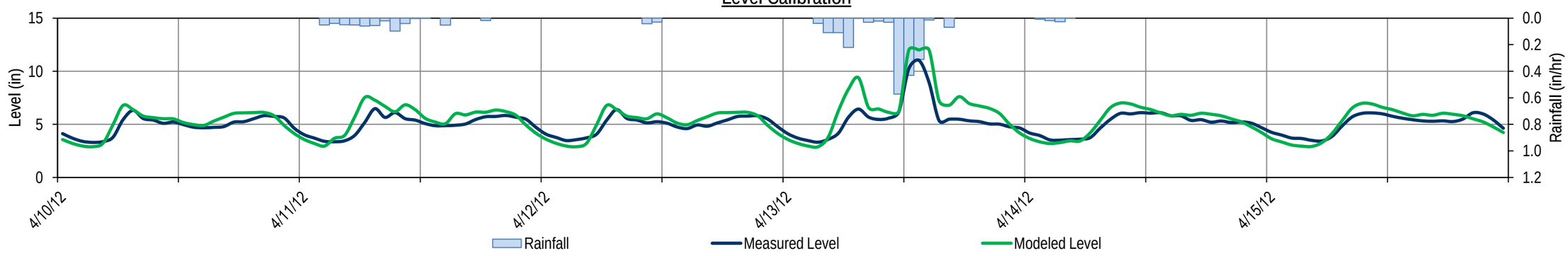


Table 1 Wet Weather Calibration Summary - March 2011 Storm Event
Wastewater Collection System Master Plan Update
City of Fresno

Meter Number	March 20-21, 2011 Storm Event											
	Measured Data[1]				Modeled Data[2]				Percent Error[3]			
	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (mgd)	Peak Flow (mgd)	Avg. Velocity (ft/s)	Avg. Level (in)	Avg. Flow (%)	Peak Flow (%)	Avg. Velocity (%)	Avg. Level (%)
FR01	4.142	6.641	3.52	9.7	4.282	6.444	3.19	10.7	3.4%	-3.0%	-9.6%	10.7%
FR02	8.019	13.113	3.22	16.7	8.512	13.684	3.67	15.9	6.1%	4.4%	13.8%	-4.7%
FR12	2.106	3.823	1.95	10.3	2.088	3.845	2.08	9.7	-0.9%	0.6%	6.6%	-5.5%
FR13	10.263	14.428	3.54	17.1	9.615	12.896	3.44	17.4	-6.3%	-10.6%	-2.7%	1.8%
FR15	7.574	11.218	2.36	19.9	7.030	9.866	2.33	18.9	-7.2%	-12.0%	-1.4%	-4.8%
FR16	3.910	6.178	3.18	12.2	4.236	5.873	3.37	12.4	8.3%	-4.9%	6.0%	1.1%

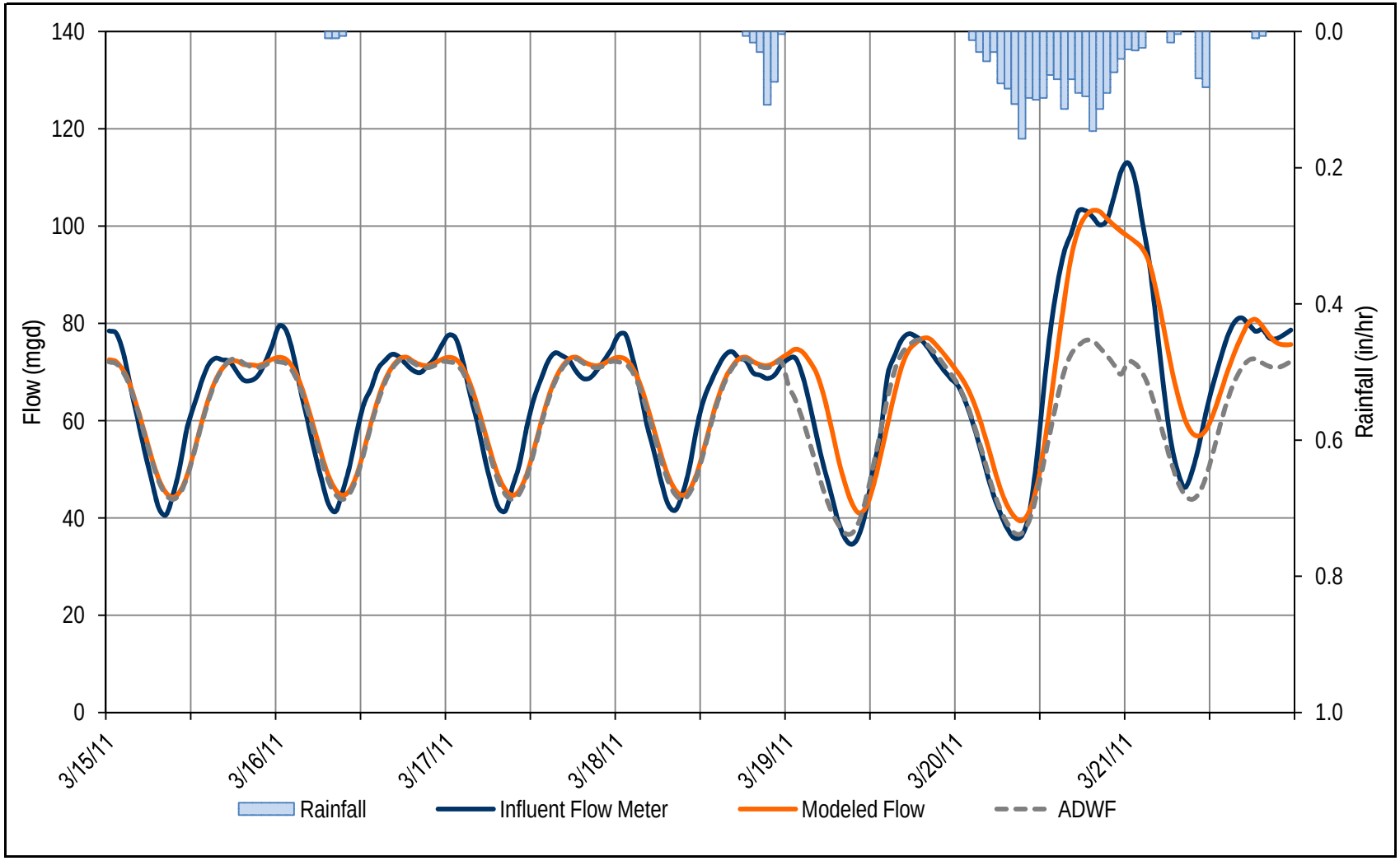
Notes:

1. Source: City of Fresno Permanent Flow Monitoring Data
2. Average flows are calculated from flow monitoring data. Maximum flow values are hourly peaks.
3. Percent Difference = (Modeled - Measured)/Measured*100.

CITY OF FRESNO

WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

RWRF WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

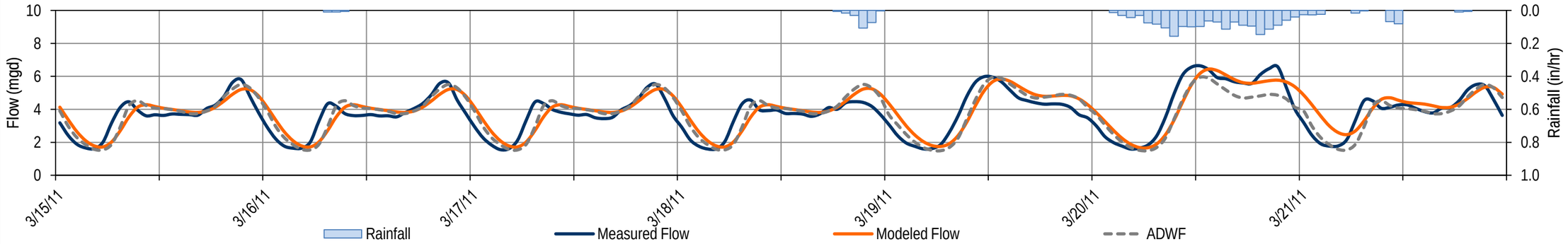


CITY OF FRESNO

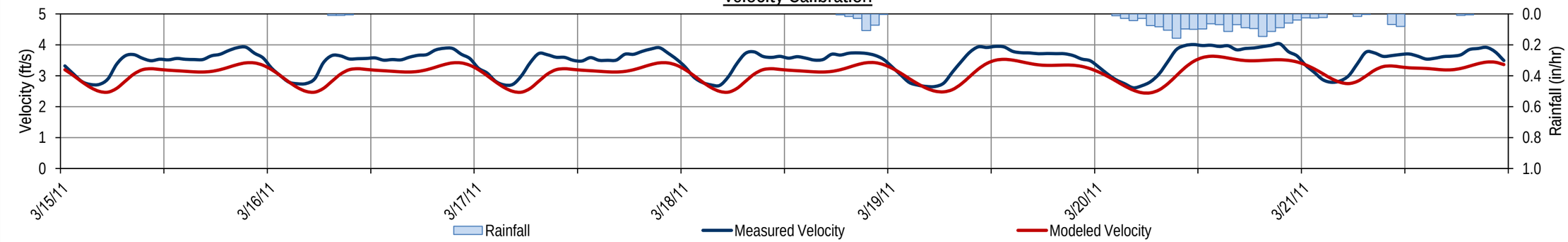
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR01 WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

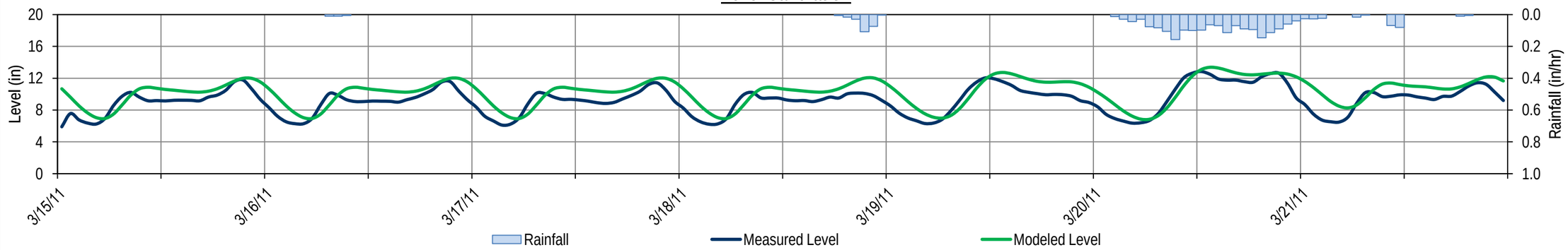
Flow Calibration



Velocity Calibration



Level Calibration

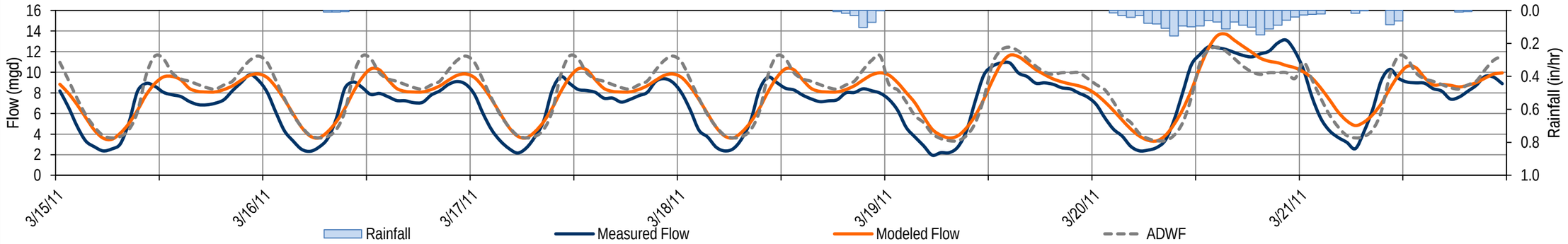


CITY OF FRESNO

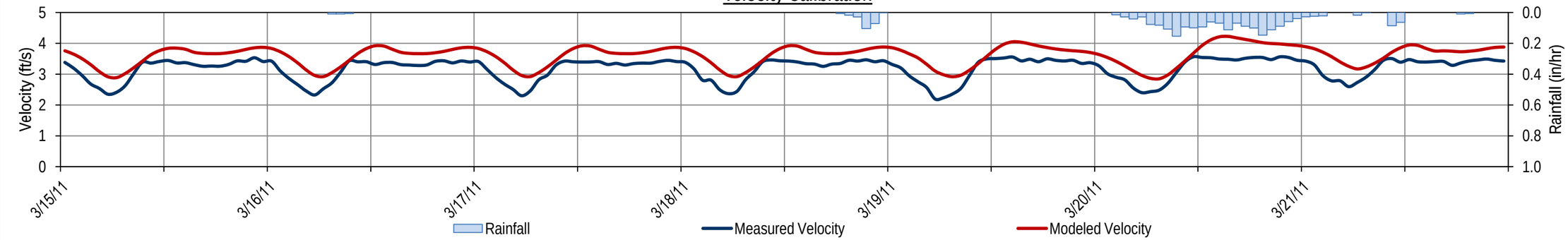
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR02 WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

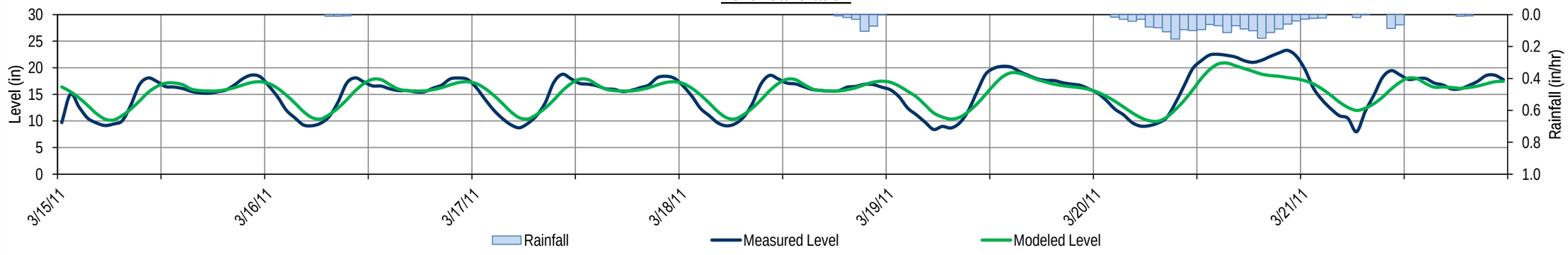
Flow Calibration



Velocity Calibration



Level Calibration

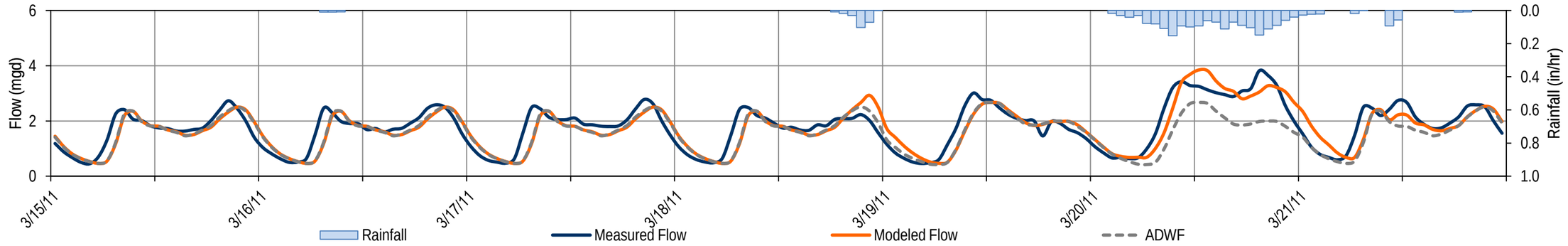


CITY OF FRESNO

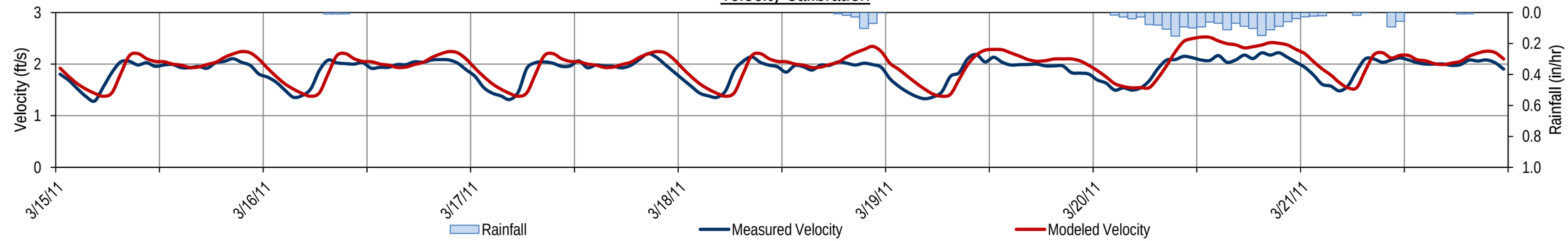
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR12 WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

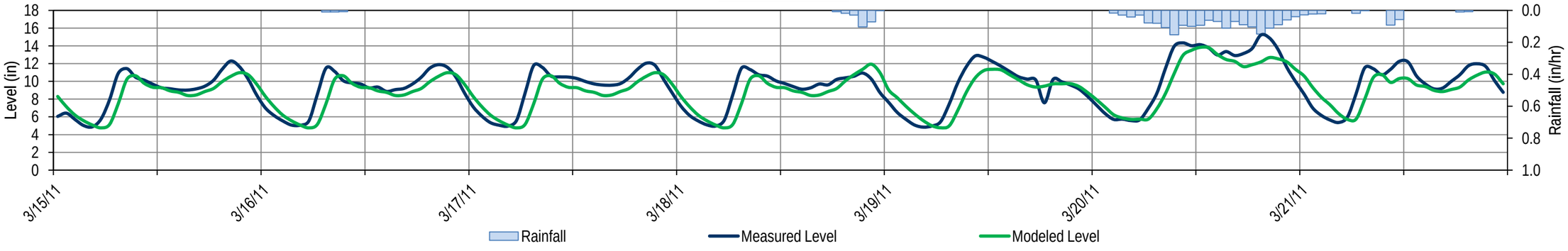
Flow Calibration



Velocity Calibration



Level Calibration

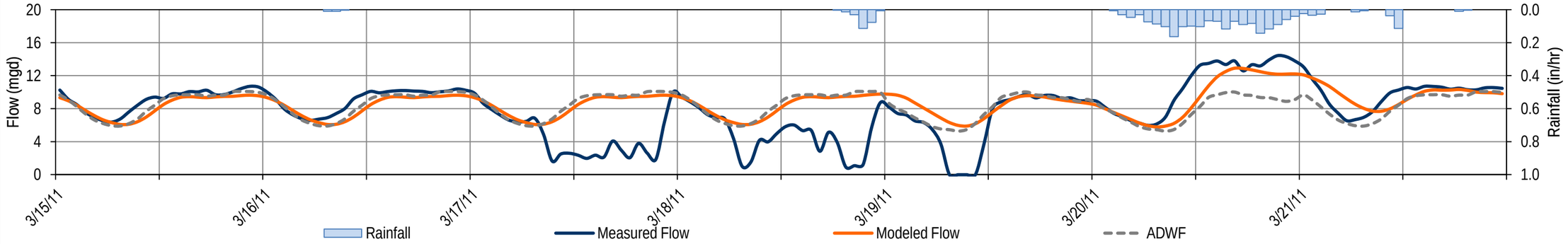


CITY OF FRESNO

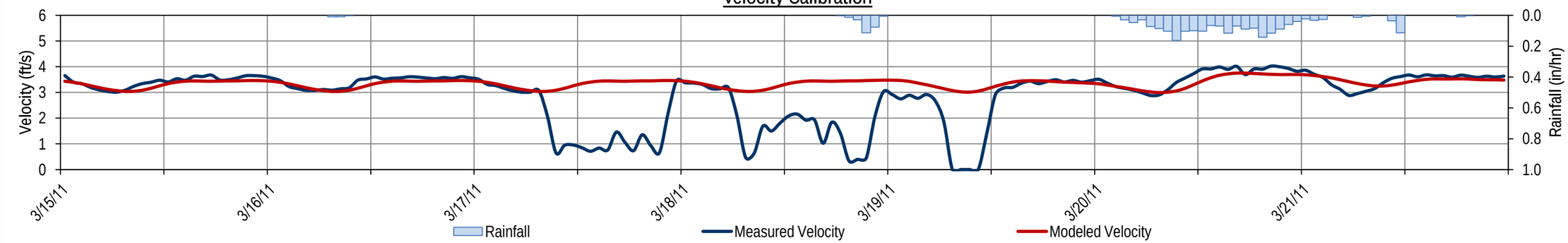
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR13 WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

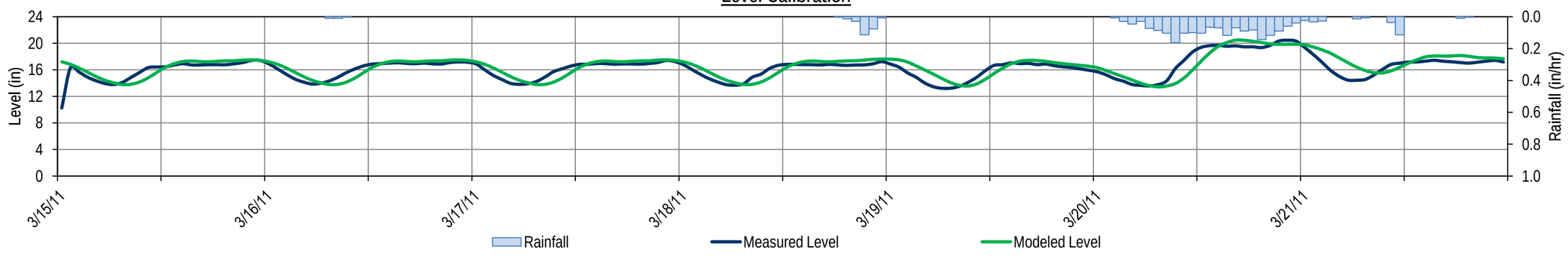
Flow Calibration



Velocity Calibration



Level Calibration

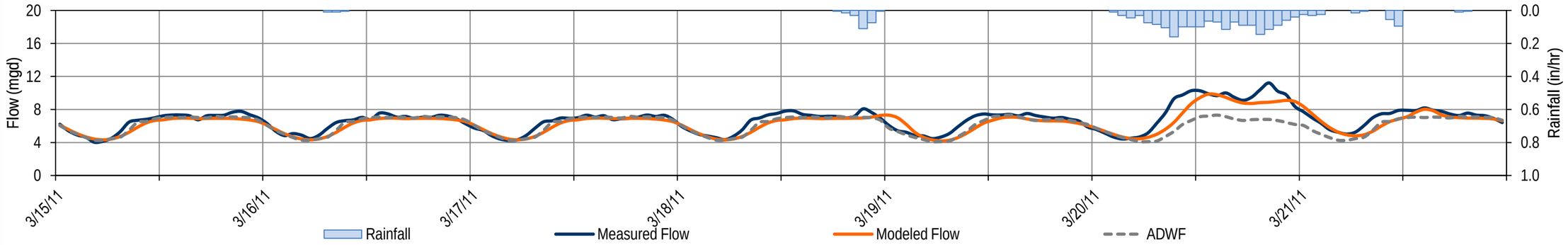


CITY OF FRESNO

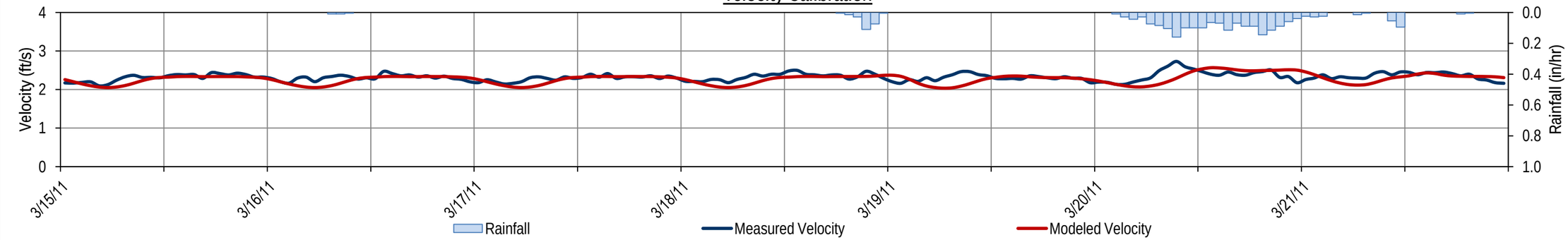
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR15 WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

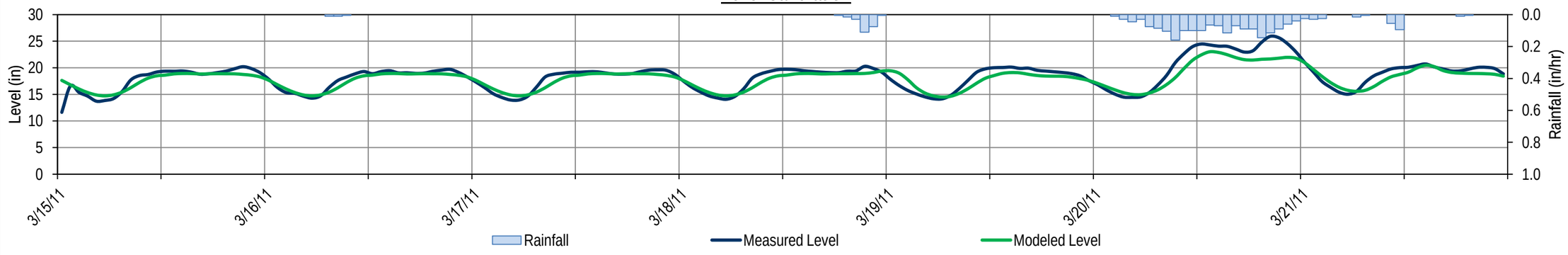
Flow Calibration



Velocity Calibration



Level Calibration

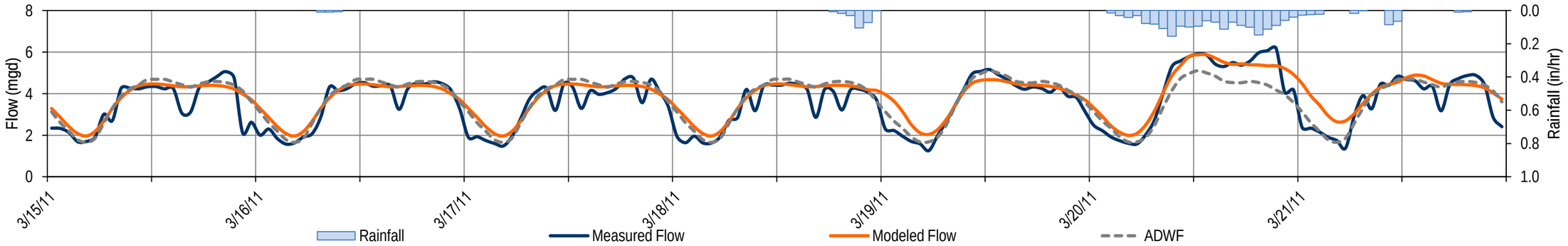


CITY OF FRESNO

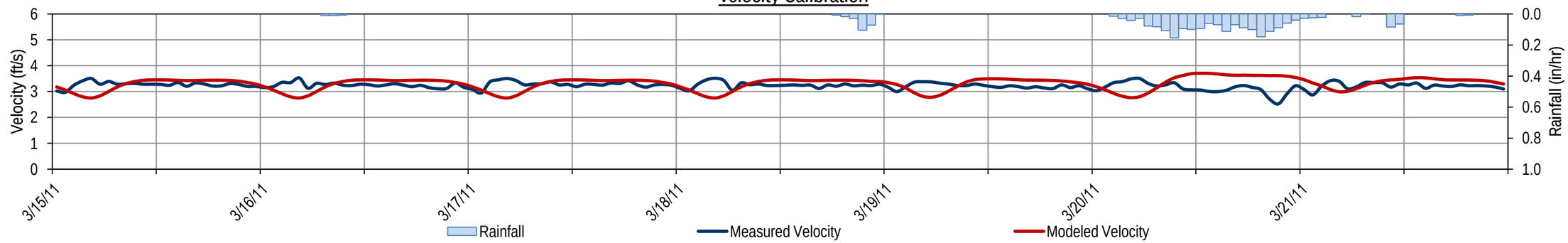
WASTEWATER COLLECTION SYSTEM MASTER PLAN UPDATE

FLOW MONITORING SITE FR16 WET WEATHER FLOW CALIBRATION (3/15/2011-3/21/2011)

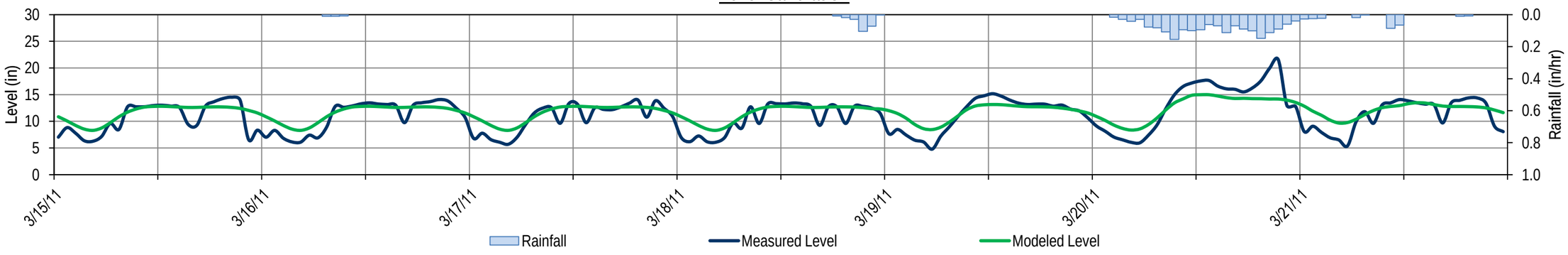
Flow Calibration



Velocity Calibration



Level Calibration



APPENDIX D – SIGNIFICANT INDUSTRIAL USER FLOW DATA

Available Monthly SIU Discharge Data
Wastewater Collection System Master Plan Update
City of Fresno

		Assumed Model Flows		Actual Monthly Flow, where Available (gpd)																												
		Model Flow	Model Flow	2011												2012												2013					
Name	Address	BWF (mgd)	PDWF (mgd)	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13
Ameripride	1050 W Whitesbridge	0.086	0.114	81,731	82,704	91,630	110,430	87,591	81,183	95,420	88,488	68,816	77,617	94,423	113,123	107,887	65,026	65,699	67,445	29,471	72,556	91,854	75,199	86,494	100,830	113,846	110,679	85,596	68,442	52,659	67,021	51,562	43,608		
Angelica	422 S Fruit	0.091	0.116	116,139	72,506	54,928	61,286	57,172	66,348	79,413	81,906	69,365	80,211	67,869	75,598	88,364	67,096	61,112	62,907	64,627	68,841	94,348	77,144	104,944	84,424	116,065	73,379	91,106	73,354	66,447	98,911	73,279	74,975		
Aramark	3333 N Sabre Dr	0.110	0.160	117,985	113,945	112,225	131,897	111,776	122,497	159,922	155,035	130,825	125,839	145,935	150,223	154,487	135,488	131,847	129,828	121,001	123,096	145,561	112,001	155,808	121,425	147,855	116,663	110,230	114,220	119,680	142,319	116,887	111,976		
Beef Packers	3115 S Fig	0.659	1.009	1,009,476	777,033	753,161	803,925	682,475	873,066	802,031	896,303	699,006	768,096	740,196	853,543	865,137	673,175	708,431	691,302	731,369	888,026	663,700	815,270	765,603	714,440	881,842	683,772	658,589	638,867	868,603	630,838	678,660	851,773		
Breckenridge, Durbin	1828 E Hedges Ave	0.020	0.020																																
Cal Dairies 15"	755 F St	0.787	1.216	896,653	700,745	757,494	890,644	742,515	895,206	815,320	906,052	671,056	733,589	736,531	960,208	1,101,629	882,640	914,355	910,939	1,182,613	1,215,650	1,006,160	918,444	647,967	573,317	780,114	654,575	787,469	823,997	1,087,692	865,212	901,490	1,382,030	946,370	
Cellulo	81 M St	0.076	0.152	95,306	67,198	98,676	72,648	144,721	100,058	54,029	82,430	130,250	73,229	59,937	88,439	72,076	87,993	107,297	115,712	85,716	100,801	117,922	95,882	93,536	125,938	152,255	92,702	75,827	106,222	115,317	106,359	116,278			
Clovis Connection	Ashlan and Peach	1.910	1.910																																
Clovis Connection	Fowler and Sussex	1.434	1.434																																
Clovis Connection	Herndon and Willow	1.582	1.582																																
Clovis Connection	Sierra and Willow	0.191	0.191																																
Community Hospital	202 N Valeria St	0.226	0.226																																
ConAgra	5626 E Shields	0.017	0.017																																
Costco Wholesale	4500 W Shaw Ave	0.011	0.011																																
Costco Wholesale #657	7100 N Abby St	0.014	0.014																																
CSUF Cedar	5241 N Maple Ave	0.150	0.150																																
CSUF Maple	5241 N Maple Ave	0.081	0.140																																
Darling	995 W Belgravia	0.068	0.086	86,269	79,193	77,119	76,570	61,012	75,448	64,677	75,623	57,970	67,170	67,220	80,211	85,172	66,447	65,026	69,888	63,381	79,288	60,638	68,143	62,209	62,882	77,792	67,569	67,968	62,682	91,081	73,678	69,439	84,000		
E&J Gallo Winery (A)	5610 E Olive	0.145	0.328	205,326	133,610	327,799	147,830	62,059	195,477	129,903	106,191	60,463	98,886	6,308	42,112	159,773	73,030	166,405	151,719	199,093	233,925	122,173	128,531	76,121	169,472	192,660	96,517	144,813	104,047	55,950	100,905	31,989	78,540		
E&J Gallo Winery (FATS)	5610 E Olive	0.154	1.348	375,097	749,478	384,622	848,407	446,855	641,086	515,048	645,491	1,002,470	1,334,233	1,347,672	820,357	318,872	570,874	398,534	341,562	909,468	461,666	440,896	720,698	955,221	1,152,344	1,102,178	671,978	154,836	409,256	846,088	330,067	499,465	494,403		
Foster Farms (Front)	900 W Belgravia	0.022	0.056	40,916	40,467	38,796	38,746	38,173	32,264	48,022	38,572	34,009	33,111	35,630	46,376	25,781	21,966	24,360	32,812	29,471	41,040	50,590	38,622	56,399	36,727	56,349	48,520	22,191	21,019	21,094	30,294	32,388	22,490		
Foster Farms (Pretreat)	900 W Belgravia	1.326	1.861	1,343,857	1,249,035	1,332,562	1,422,497	1,251,254	1,331,839	1,860,825	1,632,759	1,404,395	1,322,167	1,236,045	1,599,623	1,641,810	1,357,819	1,315,931	1,458,575	1,399,234	1,392,776	1,832,650	1,411,102	1,731,869	1,341,812	1,686,466	1,278,606	1,326,304	1,398,660	1,318,175	1,661,258	1,323,860	1,318,300		
Foster Farms Poultry	2960 S Cherry	1.492	1.951	1,712,995	969,558	1,293,167	1,290,325	1,246,791	1,364,078	1,691,677	1,735,036	1,550,429	1,299,675	1,525,970	1,741,469	1,749,173	1,568,132	1,618,921	1,639,092	1,446,831	1,327,401	1,726,758	1,368,242	1,682,776	1,511,110	1,951,058	1,433,866	1,492,410	1,386,094	1,263,372	1,637,322	1,328,697	1,251,703		
Fresno Bee	1626 E St	0.044	0.052	16,281	11,100	29,347	17,503	24,360	8,303	7,954	9,624	7,879	11,270	16,905	39,220	52,235	24,185	17,902	19,099	16,556	12,492	7,879	9,574	8,901	10,472	22,490	33,311	44,057	32,713	60,937	24,809	28,823	11,494		
Fruit Fillings	2531 E Edgar	0.016	0.023	15,209	14,486	14,885	18,501	13,364	13,838	18,949	20,071	17,054	16,207	19,623	19,573	18,426	16,207	16,032	15,234	16,356	15,583	13,663	15,359	21,218	14,312	23,288	16,456	16,207	17,628	15,808	20,021	15,509	19,822		
Kaiser Permanente Inc	7300 N Fresno St	0.066	0.066																																
Kraft-Capri Sun	2494 S Orange	0.079	0.137	126,836	104,577	111,427	118,533	112,724	136,660	126,985	136,136	104,321	120,902	117,361	103,423	111,552	91,032	126,337	90,259	97,988	121,326	89,087	133,717	99,010	93,600	105,368	52,161	78,615	93,375	143,766	95,769	109,632	131,473	86,195	108,011
Kraft-Cornnuts	4343 E Florence	0.186	0.312	124,318	100,793	187,125	209,664	137,881	166,430	199,517	163,488	197,372	124,118	120,403	148,578	193,632	166,505	219,239	186,651	232,254	236,941	312,415	195,303	226,644	129,254	170,818	182,886	185,654	143,766	175,506	155,409	122,223	146,508	214,526	
La Tapatia	104 E Belmont	0.017	0.027	14,935	11,619	20,246		17,503	16,057	19,672	18,650	24,135	18,326	19,523	19,947	21,094	15,035	13,663	11,395	18,999	20,296	27,452	20,171	26,778	25,831	25,407	24,285	17,578	18,875	18,226	30,942				
La Tapatia B	94 E Belmont	0.034	0.050	15,907	12,417	9,151	7,281	2,743	28,349	27,925	43,833	30,942	26,112	16,655	49,817	44,481	42,087	30,818	26,055	29,770	35,206	45,952	34,009	28,798	30,618	30,992	41,190	34,458	31,067	21,193	23,163				
LiDestri	568 S Temperance	0.205	0.326	236,617	240,688	227,217	178,523	219,737	249,707	217,319	303,663	195,926	183,484	282,345	277,807	205,176	201,935	216,571	168,649	247,239	326,452	202,533	323,510	267,634	257,836	283,642	224,500								
Louie, Jay	471 S Teilman Ave	0.016	0.016																																
Lyons PLT 1	1634 S Second St	0.109	0.204	89,361	126,136	217,618	282,569	347,122	391,927	358,292	556,063	276,411	191,064	187,923	223,178	177,027	211,659	229,486	270,901	378,588	436,583	392,501	610,767	317,775	194,330	255,791	188,147	114,120							
Lyons PLT 1	1635 S Second St	0.109	0.204																																
Lyons PLT 1	1636 S Second St	0.109	0.204																																
Mission Linen	2555 S Orange	0.020	0.055	20,296	21,717	22,664	26,729	33,386	45,927	49,418	47,573	55,452	42,960	41,115	41,140	44,606	30,319	21,742	16,855	18,127	35,630	52,061	36,901	44,182	35,879	35,954	35,680	20,445	13,913	10,946	6,183	34,533	28,025	36,577	29,247
New World Pasta	2704 S Maple	0.015	0.027	20,021	9,700	22,567	16,381	26,679	2,194	27,452	4,114	6,009	5,061	3,715	3,316	3,590	4,712	7,081	7,729	5,560	8,427	16,456	13,838	25,058	17,005	21,667	18,575	15,409	11,370	11,395	21,044	22,964	18,775	20,545	13,813
Pacific Choice	4667 E Date	0.096	0.230	112,375	54,978	166,555	154,936	119,630	167,826	229,611	202,957	203,431	187,000	193,782	147,705	121,849	64,054	91,555	75,199	105,717	119,481	166,181	111,477	211,160	177,575	158,003	108,734	95,644	57,421	91,206	97,065				
PepsiCo	1150 E North	0.126	0.277	123,993	131,847	163,014	173,312	208,343	196,674	250,231	201,536	181,789	152,991	149,824	180,717	157,404	138,679	144,937	150,797	162,815	204,852	277,458	226,370	203,082	171,417	171,716	115,741	126,487	139,053	181,839					
Producers Dairy	144 E Belmont	0.244	0.256	220,560	220,111	227,442	240,208	212,158	199,118	227,716	199,093	245,893	207,321	209,739	245,219	244,870	198,569	202,932	177,974	253,348	210,562	255,666													
Producers Dairy	144 E Belmont	0.220	0.220																																
Prudential	1260 E North	0.017	0.028	27,676	24,709	24,509	17,204	13,564	23,188	15,658	17,304	13,439	13,963	14,860	16,730	17,603	15,683	12,591	13,763	15,085	14,212	16,207	12,342	17,329	21,368	25,083									
Rich Products	320 O St	0.022	0.039	32,048	38,746	22,864	18,476	15,858	37,575	30,020	35,879	28,428	22,964	8,502	4,438	21,542	15,159	13,813	13,713	27,402	26,554	25,307	27,402	22,615	19,398										
San Joaquin Fig	3564 N Hazel	0.012	0.012																																
SJV Concentrate	5631 E Olive	0.013	0.013																																
St Agnes Hospital	1303 E Herndon Ave	0.274	0.274																																
VA Medical Ctr 134	2615 E Clinton Ave	0.090	0.090																																
Valley Fig	2028 S Third	0.045	0.201	91,406	45,867	53,158	59,865	49,567	56,200	76,795	127,359	86,544	71,235	62,358	127,260	105,742	200,564	46,925	71,459	95,195	99,334	70,312	60,339	46,376	74,975	114,643	55,826	44,855	58,494						
Wawona Fresno	2202 S Cedar	0.076	0.280	0	0	0	0	0	103,000	103,000	228,414	234,473	183,310	75,149							51,138	57,421	280,126	188,720										
Westlake		0.000	0.000																																
Yosemite	3330 E Church	0.019	0.049	19,523	27,393	35,380	44,157	27,851	22,989	25,806	31,217	18,351	22,141	28,948	27,402	34,433	26,030	30,344	26,579	38,123	48,795	46,251	46,900	30,244	28,623	38,572	20,620	18,974	21,019	34,583	28,723	30,967	30,194	31,815	
Zacky Packing	2950 E California	0.113	0.210	125,067	102,326	103,573	116,788	107,911	138,330	123,021	138,131	120,927	127,933	117,635	115,042	135,263	182,736	113,621	114,344	131,922	205,201	149,176	209,590	158,925	157,304	184,931	139,178	112,998	67,968	155,360					
Zacky Turkey	2222 S East	0.396	0.816	355,200	287,933	290,099	441,071	444,312	527,365	475,504	517,092	362,306	448,725	623,832	423,343	375,197	411,101	566,336	455,707	601,168	659,088	574,863	689,531	629,492	684,595	815,844	440,871	396,265	396,639	555,639	378,338				

APPENDIX E – FIELD RECONNAISSANCE DATA

Structure Information

Location	Manhole ID	Model ID	Time of Survey
Herndon Ave and Milburn Ave	1346-25	7780	11:30 AM

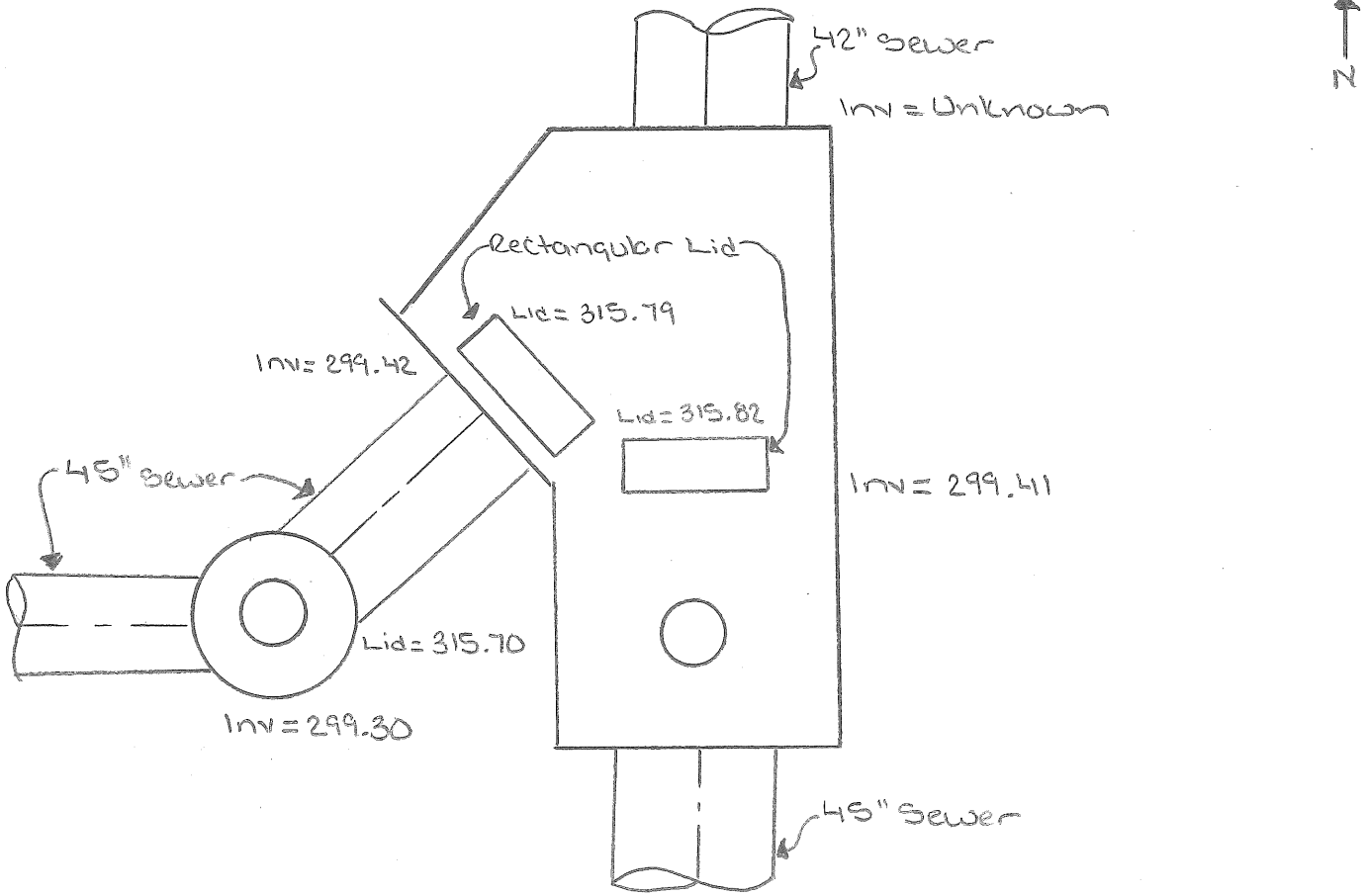
Rim and Invert Data	Elevation
North Rectangular Lid (avg 4 corners)	315.79
Southwest FL	299.42
East Rectangular Lid (avg 4 corners)	315.82
South FL	299.41
North FL	Unknown
West MH Rim	315.70
Northeast and West FL	299.30

Depth of Flow (estimated)	
West	50%
South	No flow to south, slide gate closed
Inlet Pipe	Could not be determined

Flow to Each Outlet Pipe (estimated)	
West	100%
South	0%

General Observations

Wastewater was swirling around inside junction structure, all flow goes to west as the slide gate to the south is closed. Invert for the inlet pipe could not be determined due to the location of the structure lids.



MH 1346-25 Herndon and Milburn





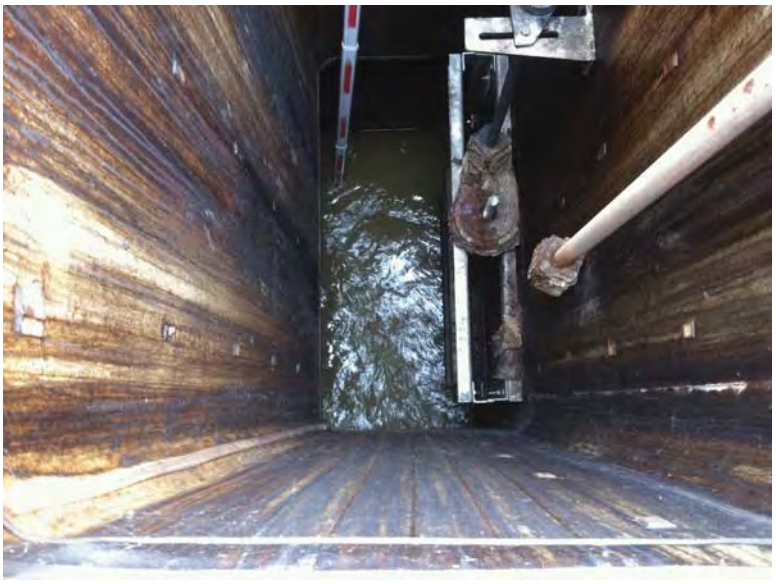


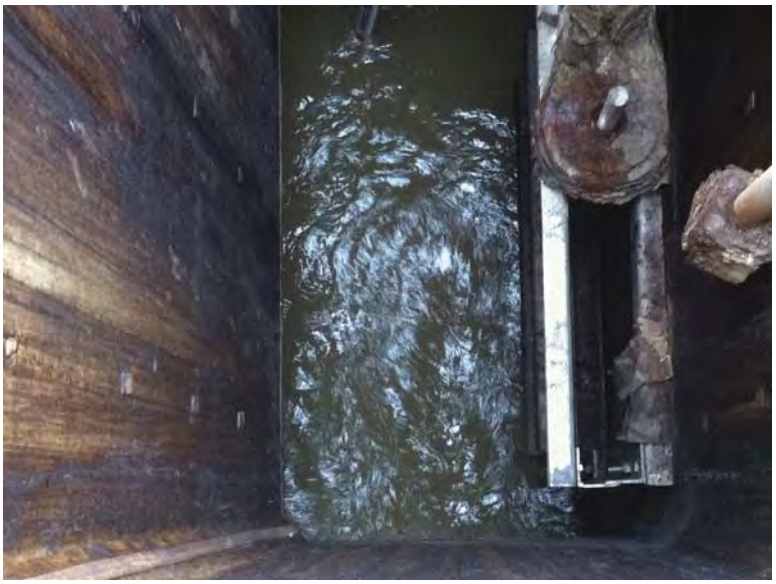


MH 1346-25 Herndon and Milburn









MH 1346-25 Herndon and Milburn









MH 1346-25 Herndon and Milburn









MH 1346-25 Herndon and Milburn









MH 1346-25 Herndon and Milburn



Structure Information

Location	Manhole ID	Model ID	Time of Survey
McKinley Ave and Harrison Ave	2253-15	25677	11:00 AM

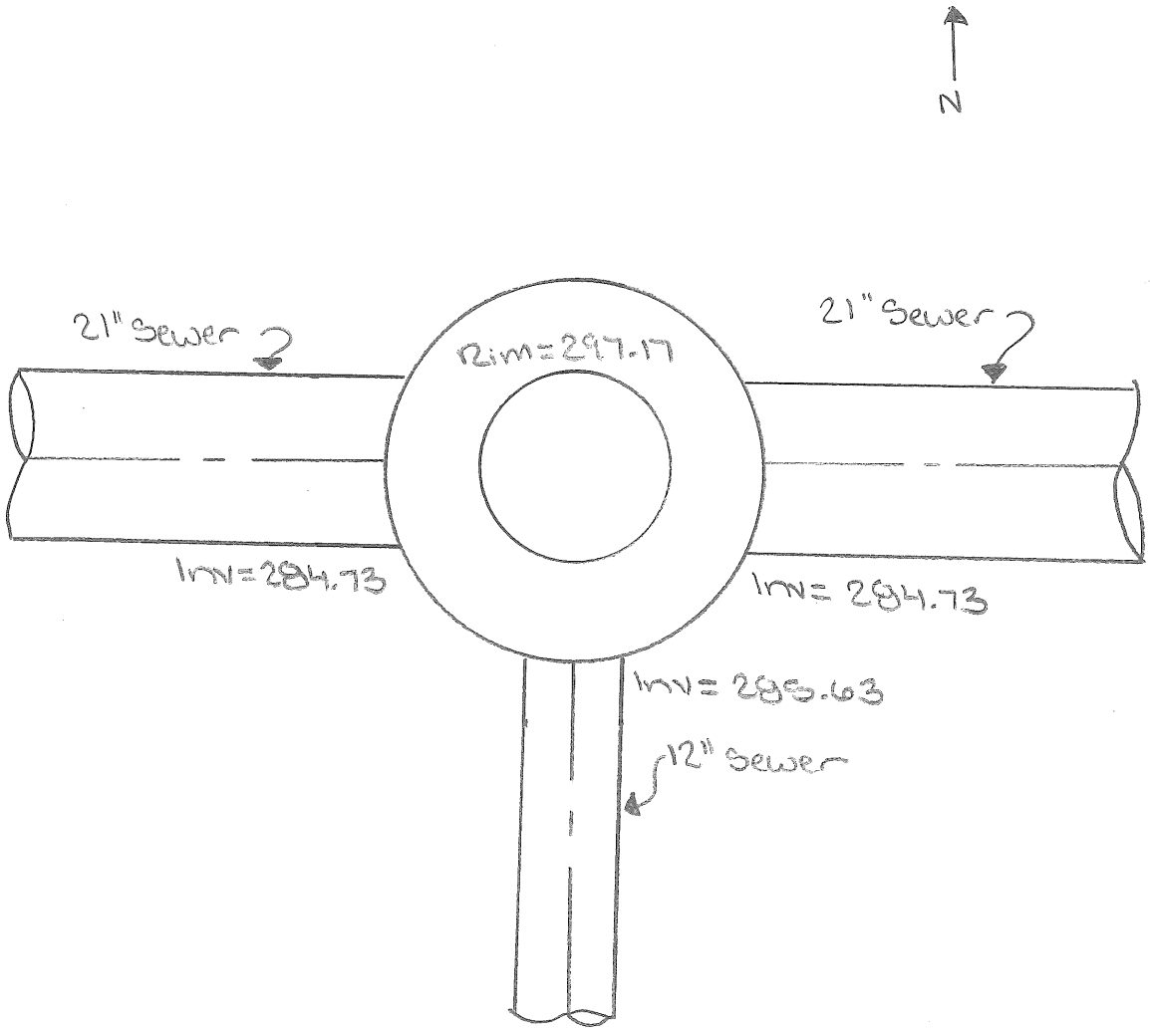
Rim and Invert Data	Elevation
Rim	297.17
East and West FL	284.73
South FL	285.63

Depth of Flow (estimated)	
East and West	30% to 50%

Flow to Each Outlet Pipe (estimated)	
West (only outlet)	100%

General Observations

No flow entering from southerly pipe into manhole, all flow to west. Obstruction in pipe included a storm drain valve which the City removed while we were on-site.

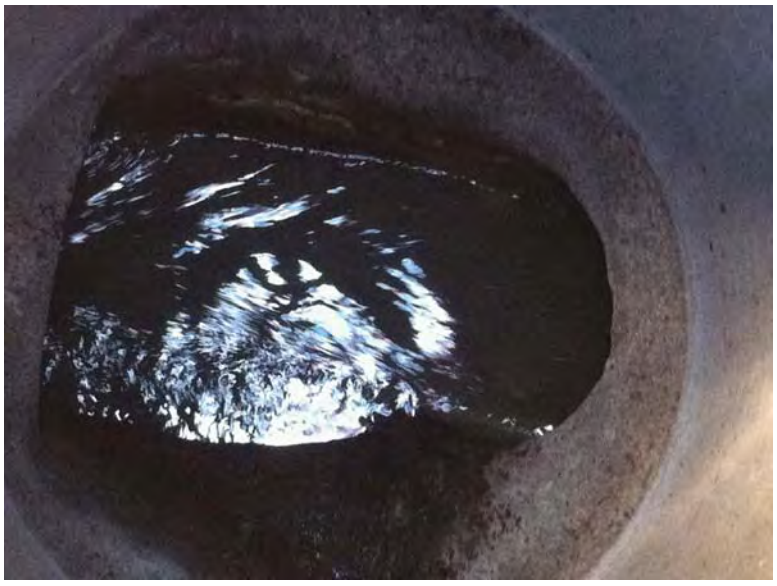


MH 2253-15 McKinley and Harrison









MH 2253-15 McKinley and Harrison







Structure Information

Location	Manhole ID	Model ID	Time of Survey
Chestnut Ave and Washington Ave	2561-21	32321	8:45 AM

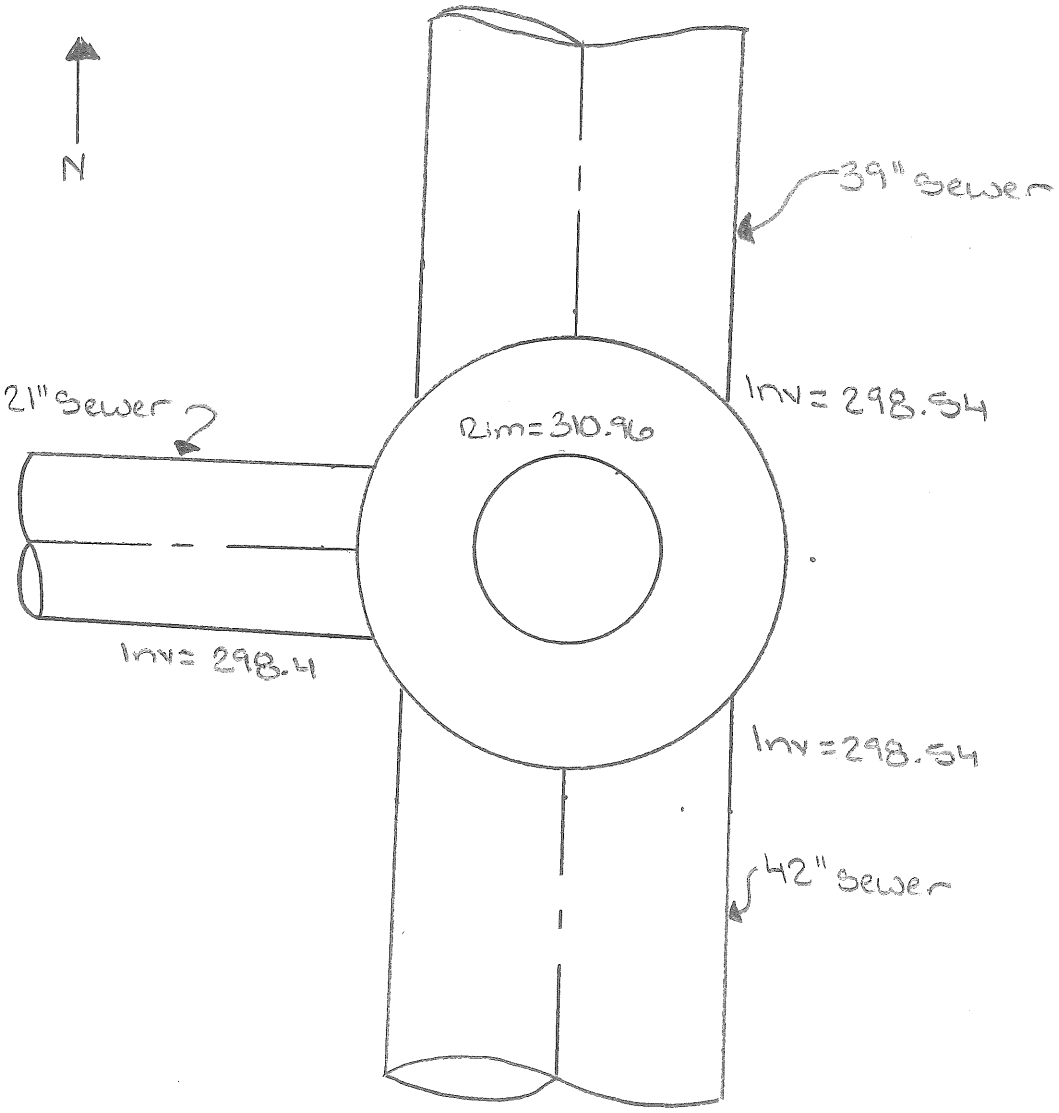
Rim and Invert Data	Elevation
Rim	310.96
North and South FL	298.54
West FL	298.41

Depth of Flow (estimated)	
South and West	50%

Flow to Each Outlet Pipe (estimated)	
South	70%
West	30%

General Observations

Flow through manhole was moving swiftly through pipe.



MH 2561-21 Chestnut and Washington









MH 2561-21 Chestnut and Washington









Structure Information

Location	Manhole ID	Model ID	Time of Survey
Chestnut Ave and Washington Ave	2562-59	N/A	8:45 AM

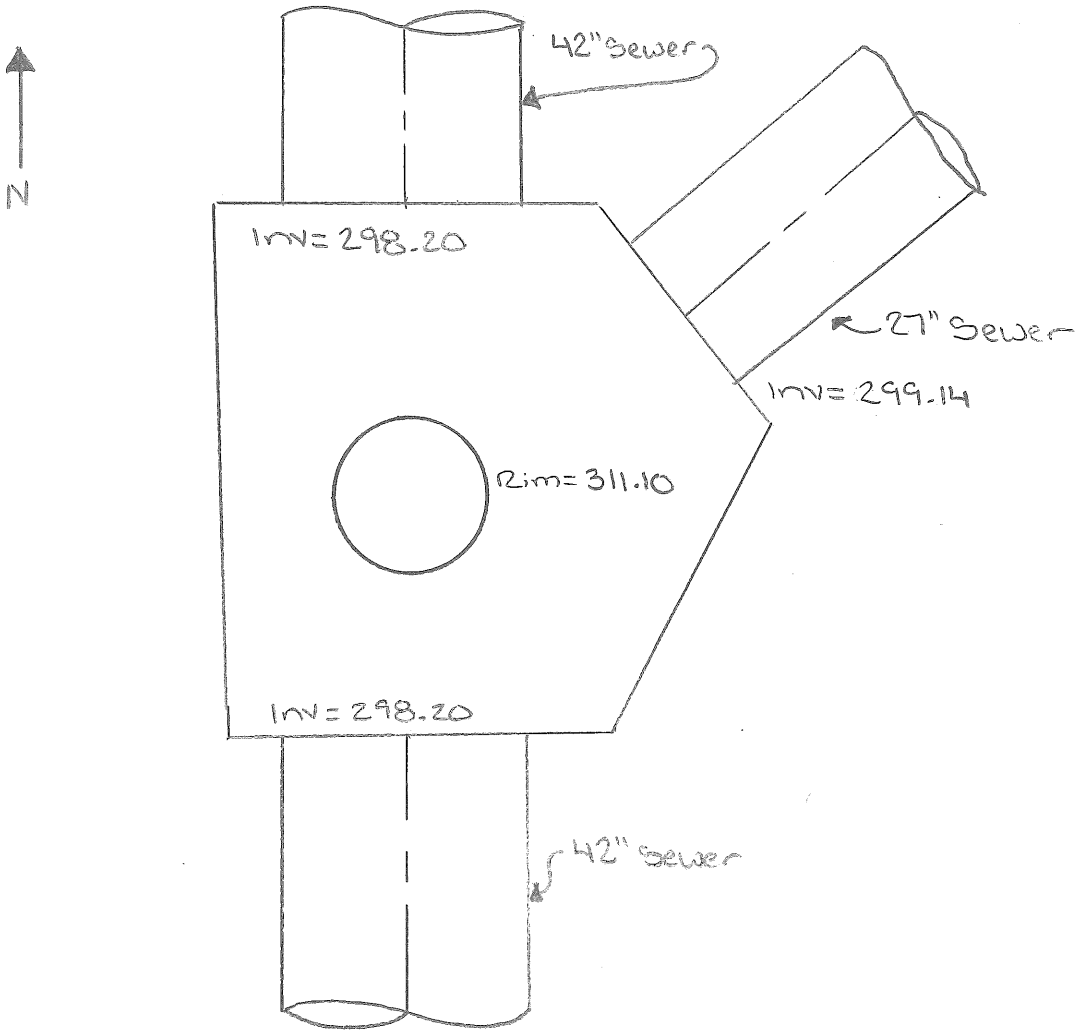
Rim and Invert Data	Elevation
Rim	311.10
North and South FL	298.20
East FL	299.14

Depth of Flow (estimated)	
North, South and Northeast	50%

Flow to Each Outlet Pipe (estimated)	
South (only outlet)	100%

General Observations

Flow through manhole was moving swiftly through pipe.



MH 2562-59 Chestnut and Washington









MH 2562-59 Chestnut and Washington





Structure Information

Location	Manhole ID	Model ID	Time of Survey
Whitesbridge Ave and Fruit Ave	2652-03	33197	8:00 AM

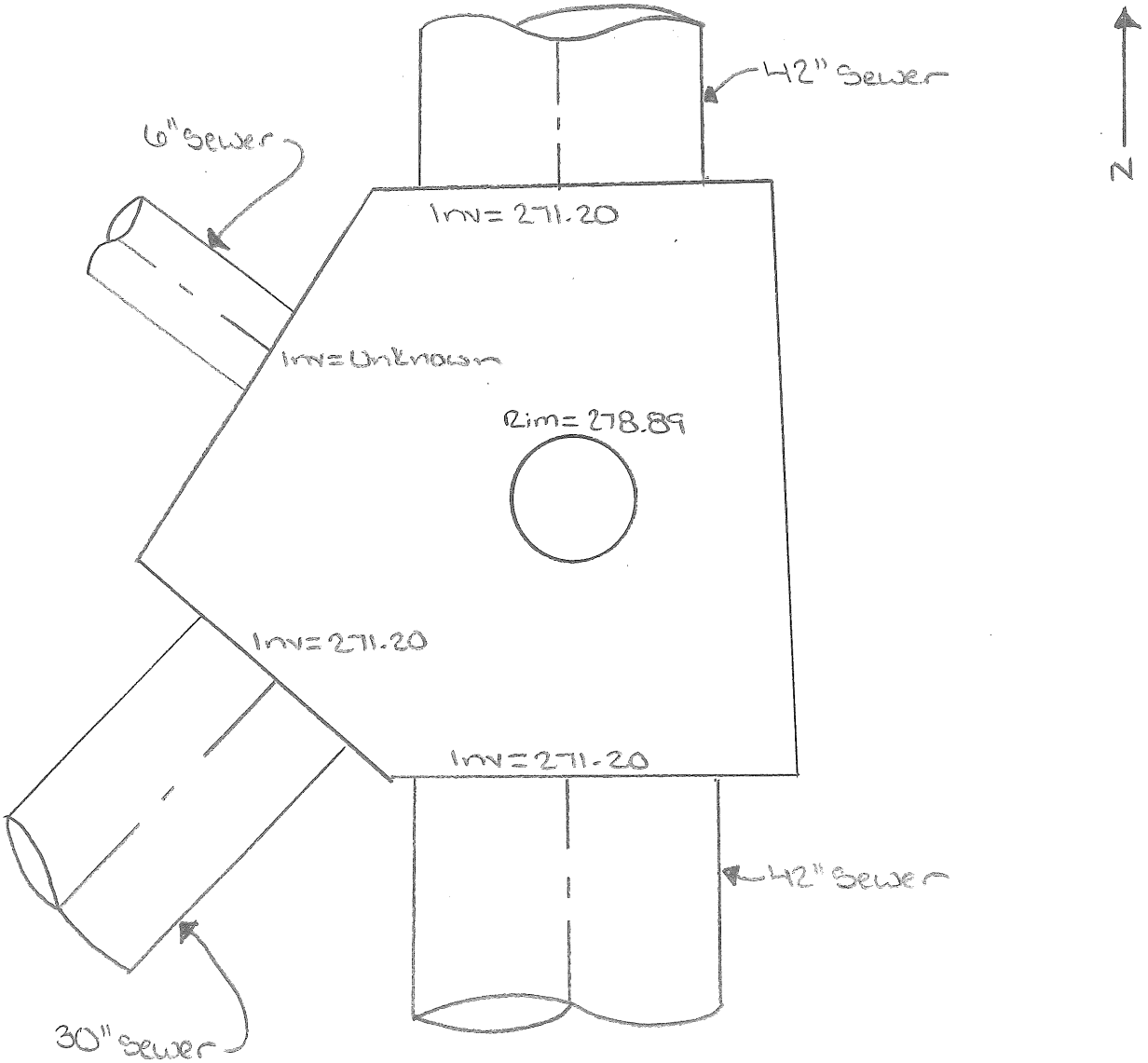
Rim and Invert Data	Elevation
Rim	278.89
North, South and Southwest FL	271.20
Northwest FL	Unknown

Depth of Flow (estimated)	
North and South	30%

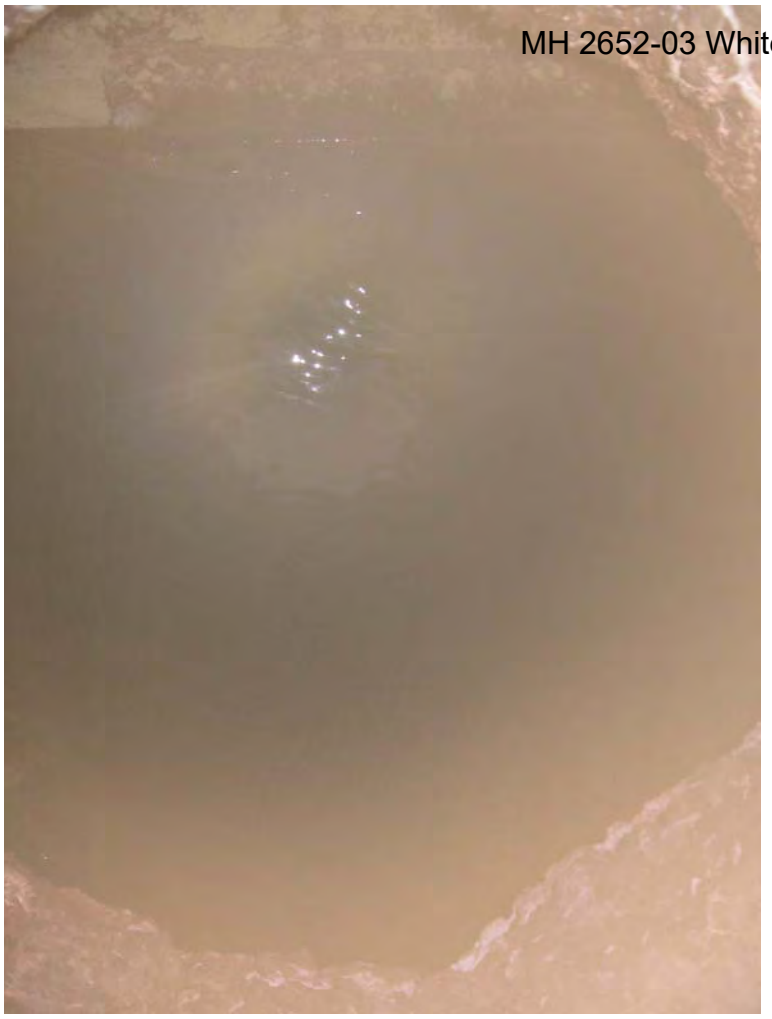
Flow to Each Outlet Pipe (estimated)	
South	50%
Southwest	50%

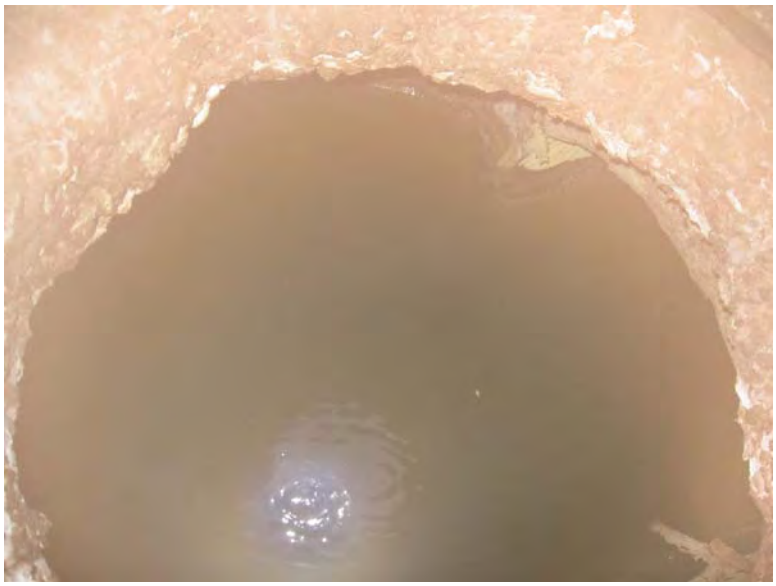
General Observations

Could not observe inlet pipe from northwest although View Fresno indicates there is a pipe from the northwest.



MH 2652-03 Whitesbridge and Fruit







Structure Information

Location	Manhole ID	Model ID	Time of Survey
Jensen Ave and Cherry Ave	3056-03	39753	9:45 AM

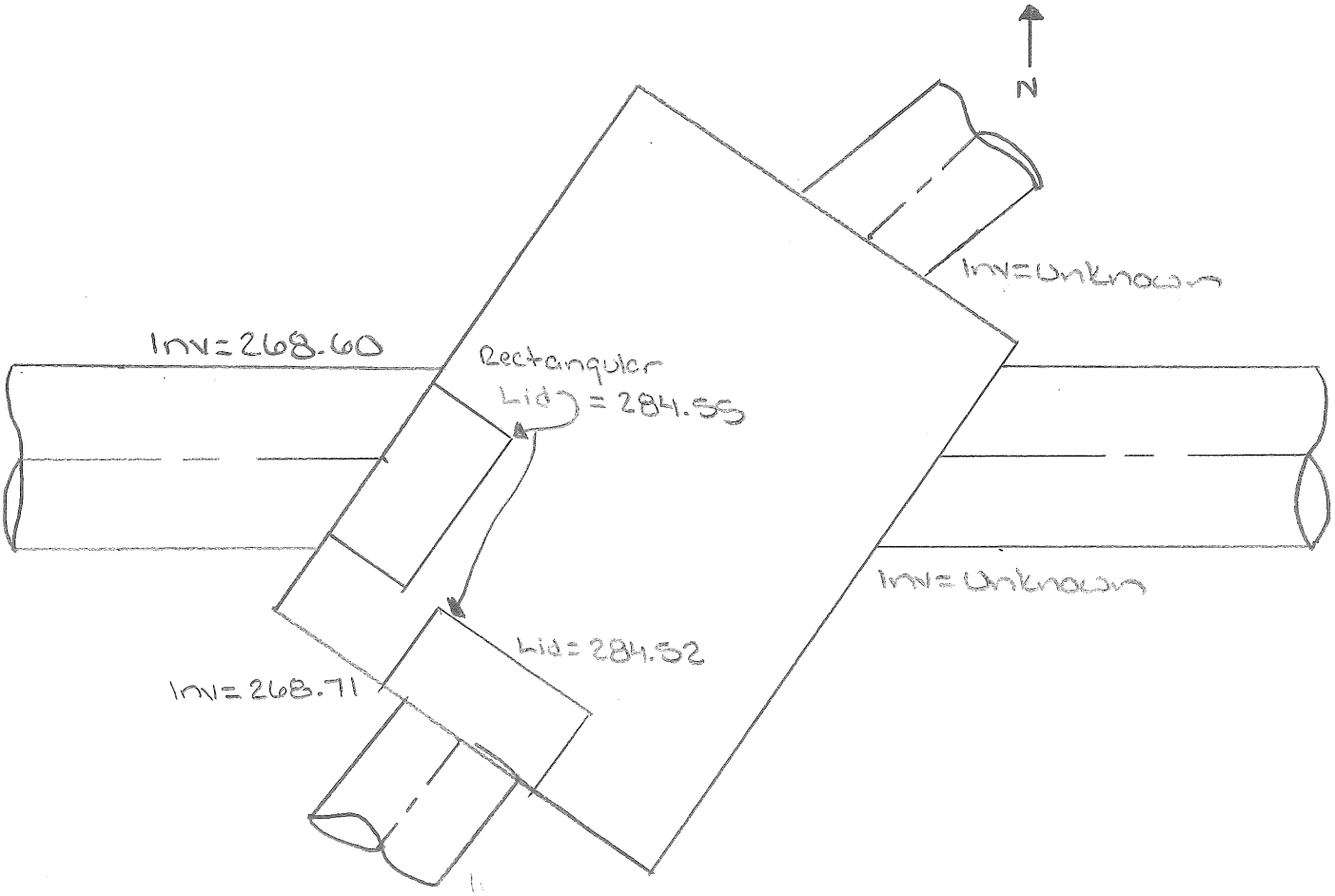
Rim and Invert Data	Elevation
North Rectangular Lid (avg 4 corners)	284.55
South Rectangular Lid (avg 4 corners)	284.52
West FL	268.60
South FL	268.71
Northeast FL	Unknown
East FL	Unknown

Depth of Flow (estimated)	
West	50%
South	50%
Inlet Pipes	Could not be determined

Flow to Each Outlet Pipe (estimated)	
West	50%
South	50%

General Observations

Inlet flowlines could not be determined due to location of junction structure steel lids. Debris in the structure included an abandoned air line for confined entry.



MH 3056-03 Jensen and Cherry









MH 3056-03 Jensen and Cherry



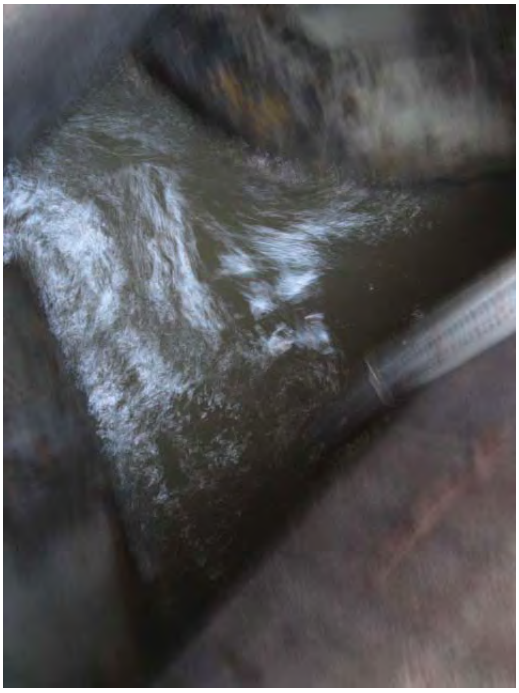






MH 3056-03 Jensen and Cherry









MH 3056-03 Jensen and Cherry







Structure Information

Location	Manhole ID	Model ID	Time of Survey
Cherry Ave s/o Church Ave	3057-07	39851	7:00 AM

Rim and Invert Data	Elevation
North Rectangular Lid (avg 4 corners)	282.97
South Rectangular Lid (avg 4 corners)	283.07
Northwest FL	270.74
West FL	270.69
East FL	Unknown

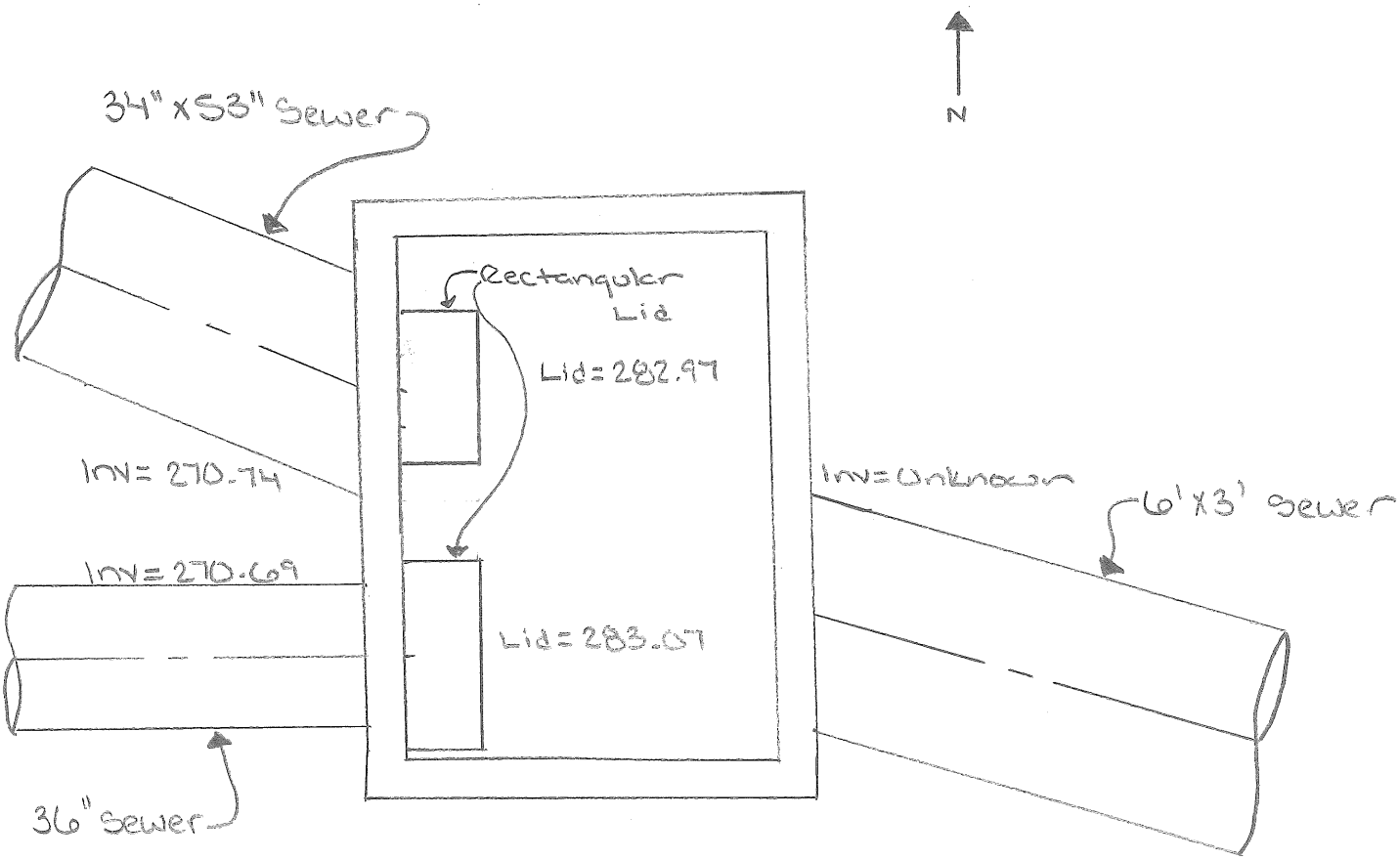
Depth of Flow (estimated)

Could not be determined due to buildup of debris and grease within outlet pipes

Flow to Each Outlet Pipe (estimated)	
Northwest	60%
West	40%

General Observations

A lot of debris and grease buildup within outlet pipes near westerly face of junction structure. Slots for redwood boards are present but no boards were in place. Flowline and photos of inlet pipe could not be observed due to location of lids to structure and angle to inlet pipe.



MH 3057-07 Cherry Near Church









MH 3057-07 Cherry Near Church









MH 3057-07 Cherry Near Church









MH 3057-07 Cherry Near Church









MH 3057-07 Cherry Near Church









APPENDIX F – BCF-PROJECT DATA SHEETS

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project:	**C-1A**
Sewer Plat No.	**2356, 2456**
Implementation Phase	**Phase 1 (2015-2020)**
Project Purpose:	Replacement of Existing Sewer Facilities
Project Location:	Hammond Avenue between Blackstone Avenue and Abby Street

Approximate Project Quantities:
Proposed Diameter: 24"

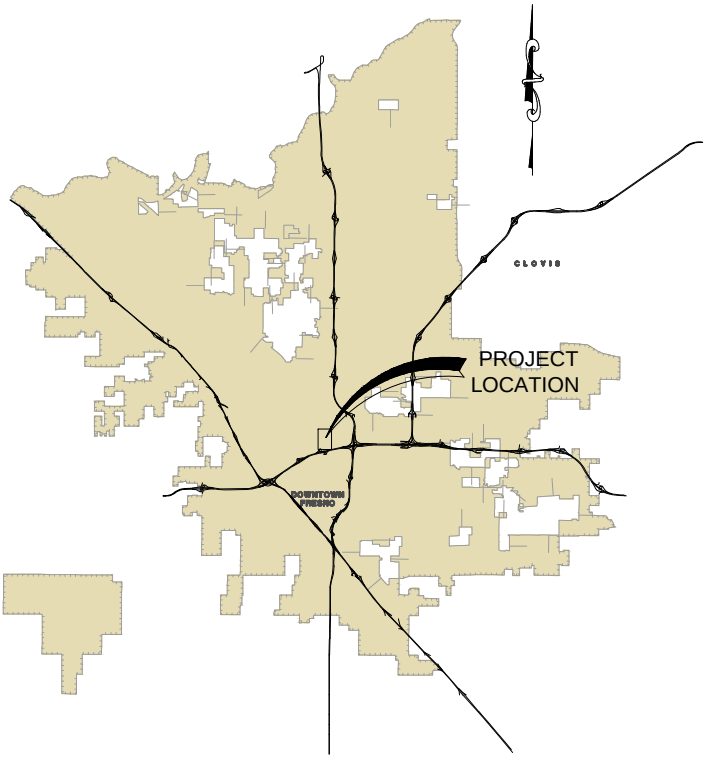
Project Conditions:
2-Lane Streets
Commercial Setting

Project Benefit:
Existing Customers: 93%
Future Development: 7%

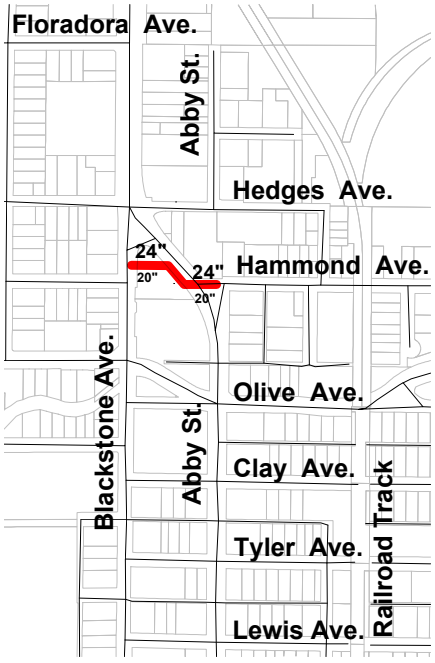
Estimated Project Costs:

Estimated Construction Cost:	$284,000.00
Estimated Contingencies Cost:	$71,000.00
Estimated Management and Engineering Cost:	$57,000.00
Total Estimated Project Cost:	$412,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 800'

Legend:

	Project Sewer
	Street
24"	**Proposed Pipe Diameter**
20"	**Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-1A)ECA-1-REP
Plot by: dmagill Jul 11, 2014 - 3:51pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

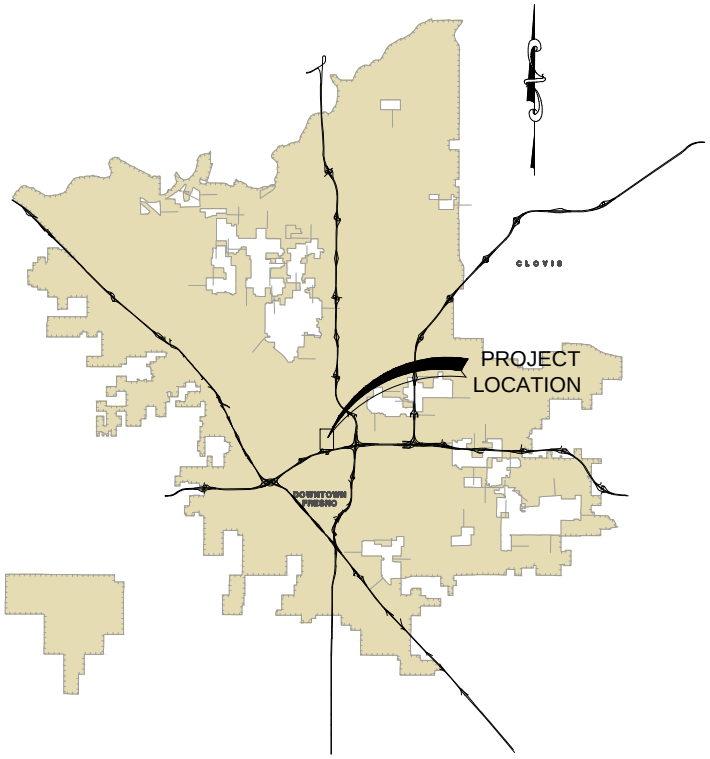
Project: C-1B

Sewer Plat No. 2356, 2456

Implementation Phase Phase 1 (2015-2020)

Project Purpose: Replacement of Existing Sewer Facilities

Project Location: Abby Street between Hammond Avenue and La Salle Avenue Alignment



Project Vicinity Map
Not to Scale

Approximate Project Quantities:
Proposed Diameter: 24"

Project Conditions:
2-Lane Streets
Commercial Setting

Project Benefit:
Existing Customers: 93%
Future Development: 7%

Estimated Project Costs:

Estimated Construction Cost:	$598,000.00
Estimated Contingencies Cost:	$150,000.00
Estimated Management and Engineering Cost:	$120,000.00
Total Estimated Project Cost:	$868,000.00

ENR CCI = 9,835x (20 City Average, July 2014)



Project Location Map
1" = 800'

Legend:

- Project Sewer
- Street
- 24" Proposed Pipe Diameter
- 20" Existing Pipe Diameter

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-1B)ECA-1-REP
Plot by: dmagill Jul 11, 2014 - 3:52pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project:	**C-2A**
Sewer Plat No.	**2455, 2555**
Implementation Phase	**Phase 1 (2015-2020)**
Project Purpose:	Replacement of Existing Sewer Facilities
Project Location:	Glenn Avenue between Bremer and Thomas Avenues

Approximate Project Quantities:
Proposed Diameter: 27"

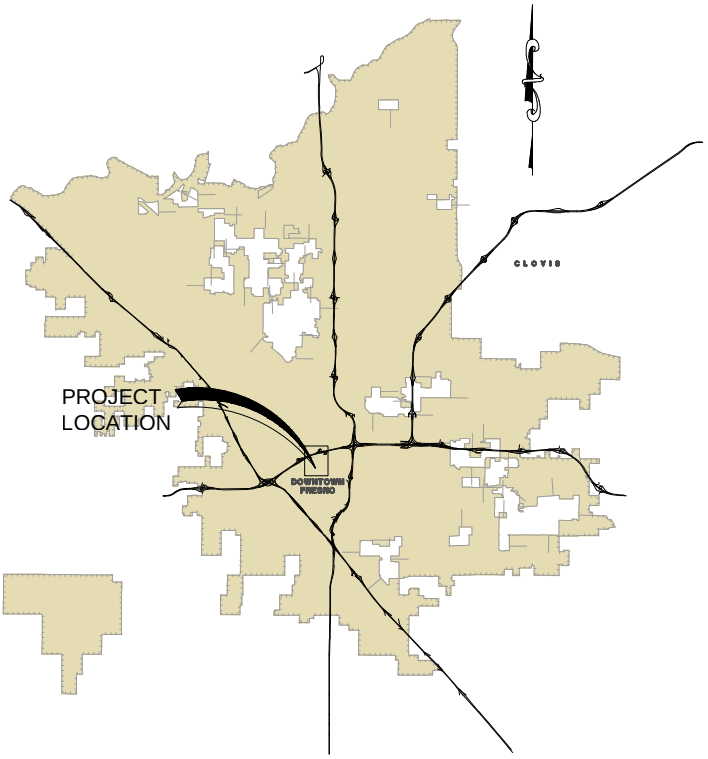
Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 93%
Future Development: 7%

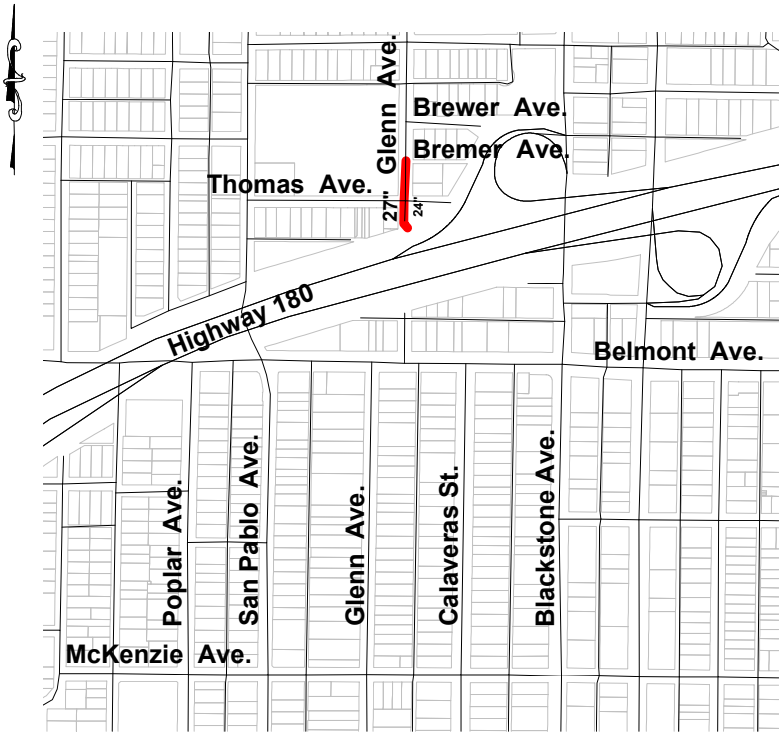
Estimated Project Costs:

Estimated Construction Cost:	$297,000.00
Estimated Contingencies Cost:	$74,000.00
Estimated Management and Engineering Cost:	$59,000.00
Total Estimated Project Cost:	$430,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 800'

Legend:

- **Project Sewer**
- **Street**
- 27" **Proposed Pipe Diameter**
- 24" **Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-2A)ECA-2-REP
Plot by: dmagill Jul 11, 2014 - 3:54pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

carollo

Blair, Church & Flynn

Project: C-2B

Sewer Plat No. 2455, 2555

Implementation Phase Phase 1 (2015-2020)

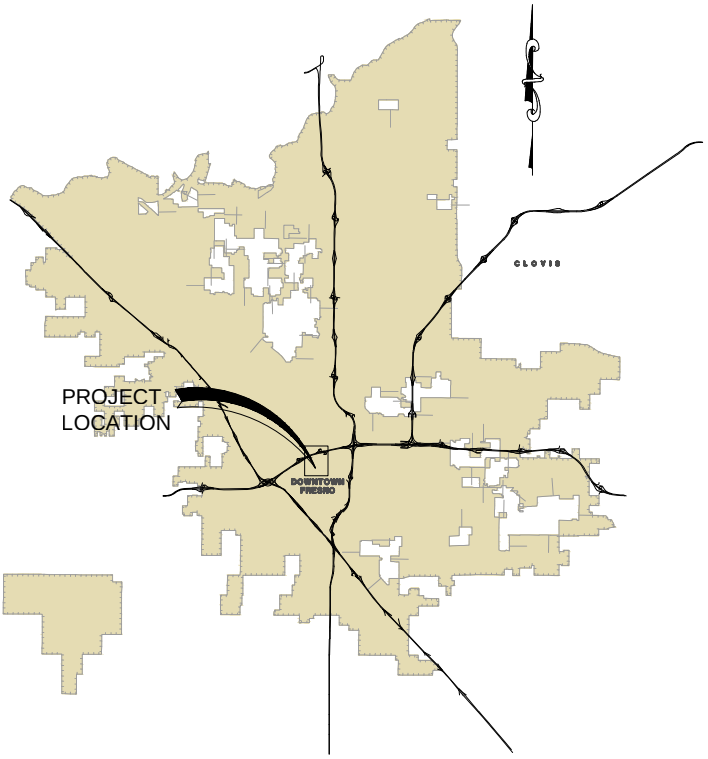
Project Purpose: Replacement of Existing Sewer Facilities

Project Location: Glenn Avenue from Highway 180 to Voorman Avenue

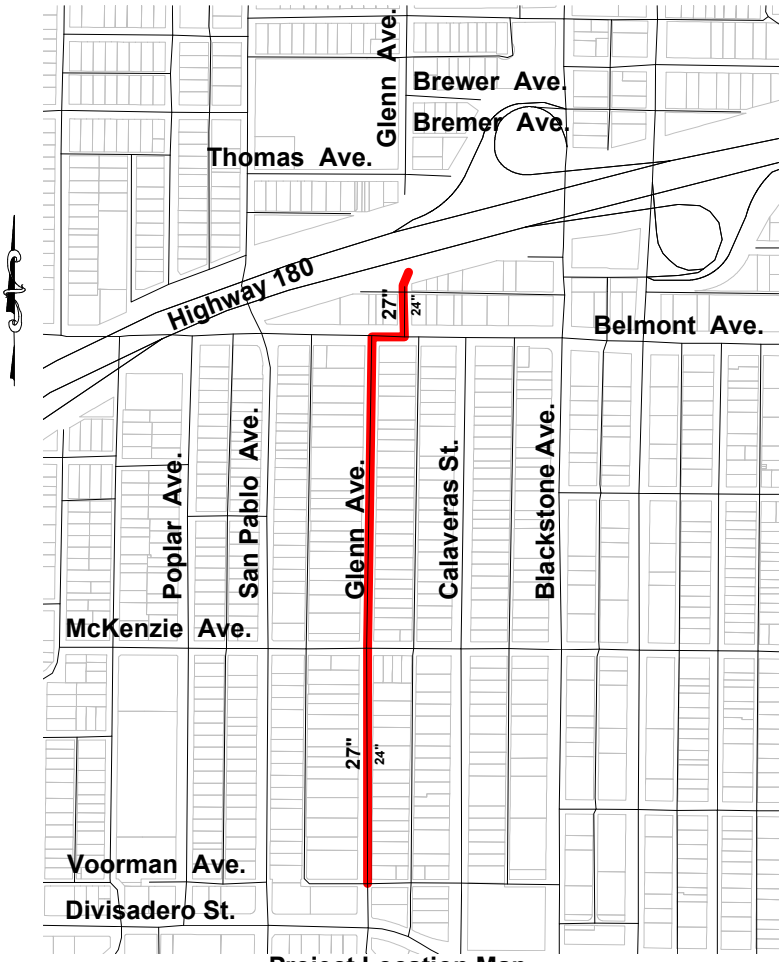
Approximate Project Quantities:
Proposed Diameter: 27"

Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 86%
Future Development: 14%



Project Vicinity Map
Not to Scale



Project Location Map
1" = 800'

Estimated Project Costs:

Estimated Construction Cost:	$1,090,000.00
Estimated Contingencies Cost:	$272,000.00
Estimated Management and Engineering Cost:	$218,000.00
Total Estimated Project Cost:	$1,580,000.00

ENR CCI = 9,835 (20 City Average, July 2014)

Legend:

- **Project Sewer**
- **Street**
- 27" **Proposed Pipe Diameter**
- 24" **Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-2B)ECA-2-REP
Plot by: dmagill Jul 11, 2014 - 3:55pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project: C-3

Sewer Plat No. 2555, 2655

Implementation Phase Phase 2 (2021-2025)

Project Purpose: Replacement of Existing Sewer Facilities

Project Location: Glenn Avenue and N Street between Voorman Avenue and Tuolumne Street

Approximate Project Quantities:
Proposed Diameter: 30"

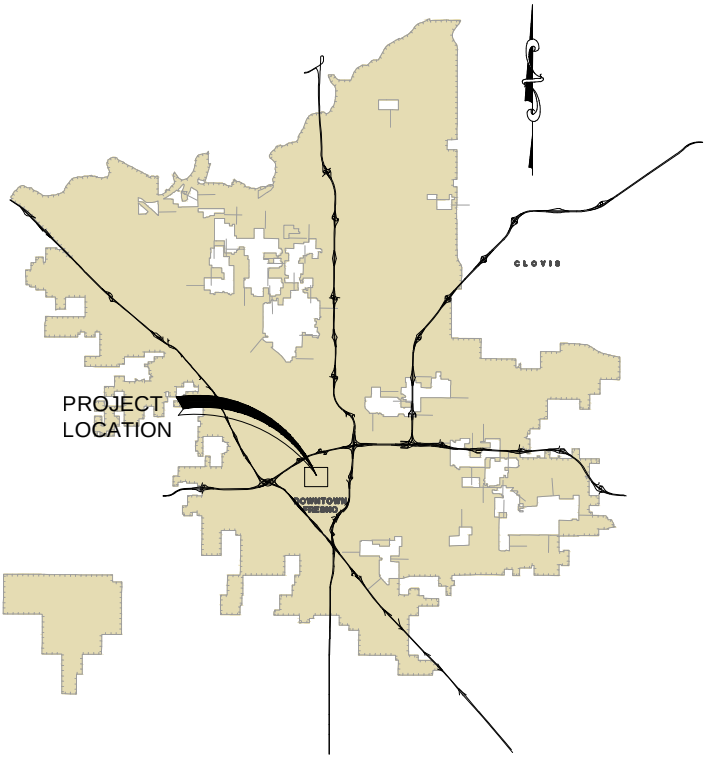
Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 81%
Future Development: 19%

Estimated Project Costs:

Estimated Construction Cost:	$792,000.00
Estimated Contingencies Cost:	$198,000.00
Estimated Management and Engineering Cost:	$158,000.00
Total Estimated Project Cost:	$1,148,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 800'

Legend:

- Project Sewer
- Street
- 30" Proposed Pipe Diameter
- 27" Existing Pipe Diameter

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-3)ECA-3-REP.d
Plot by: dmagill Jul 11, 2014 - 3:55pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project:	**C-4**
Sewer Plat No.	**2757, 2856, 2857**
Implementation Phase	**Phase 3 (2026-2030)**
Project Purpose:	Replacement of Existing Sewer Facilities
Project Location:	Monterey Street between N Street Fulton Streets

Approximate Project Quantities:
Proposed Diameter: 10"

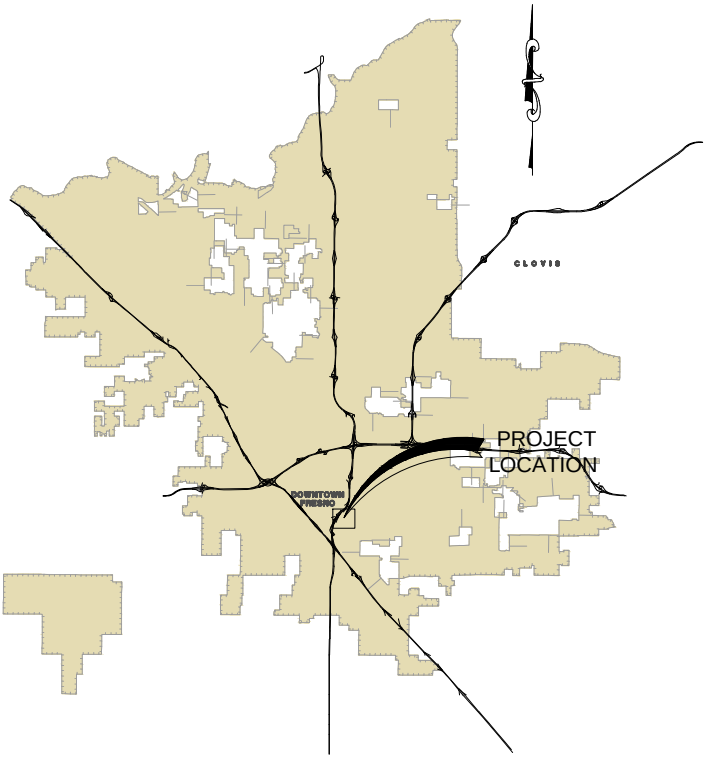
Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 100%
Future Development: 0%

Estimated Project Costs:

Estimated Construction Cost:	$471,000.00
Estimated Contingencies Cost:	$118,000.00
Estimated Management and Engineering Cost:	$94,000.00
Total Estimated Project Cost:	$683,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 800'

Legend:

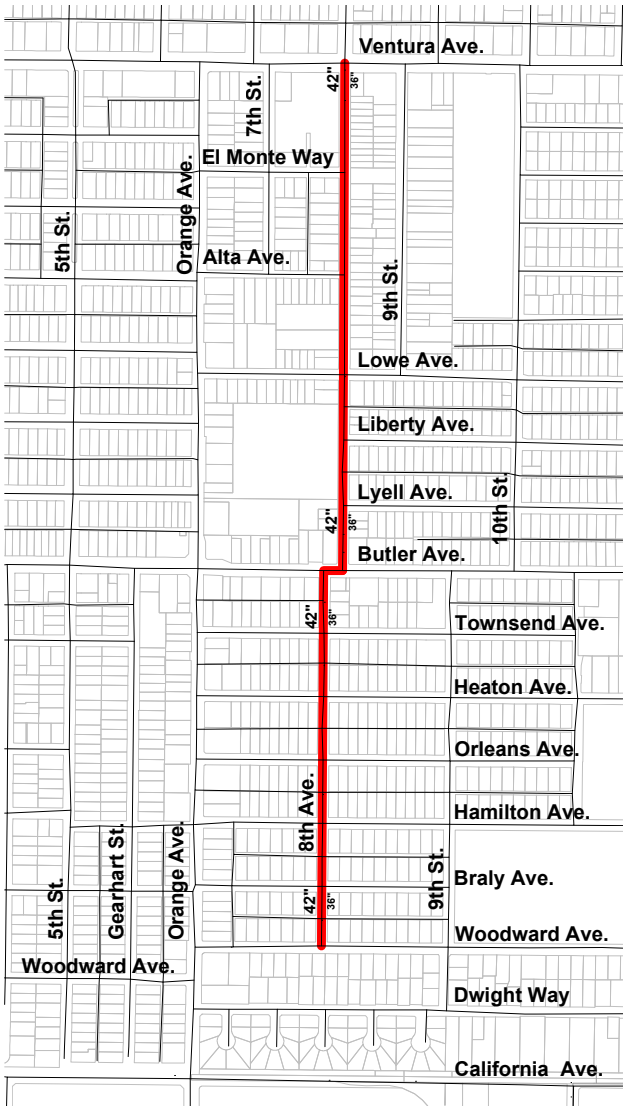
	Project Sewer
	Street
10"	**Proposed Pipe Diameter**
8"	**Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-4)ECA-5-REP.d
Plot by: dmagill Jul 11, 2014 - 3:56pm

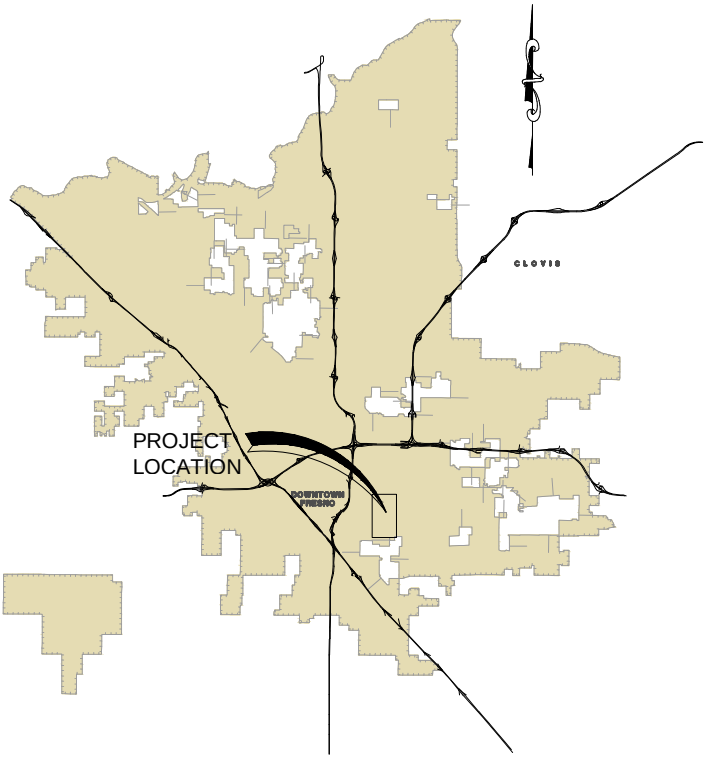
City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project:	**C-5A**
Sewer Plat No.	**2759, 2859**
Implementation Phase	**Phase 4 (2031-2035)**
Project Purpose:	Replacement of Existing Sewer Facilities
Project Location:	Eighth Street between Ventura Street and Woodward Avenue

Approximate Project Quantities:
Proposed Diameter: 42"



Project Location Map
1" = 1,000'



Project Vicinity Map
Not to Scale

Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 83%
Future Development: 17%

Estimated Project Costs:

Estimated Construction Cost:	$2,638,000.00
Estimated Contingencies Cost:	$659,000.00
Estimated Management and Engineering Cost:	$528,000.00
Total Estimated Project Cost:	$3,825,000.00

ENR CCI = 9,835 (20 City Average, July 2014)

Legend:

- **Project Sewer**
- **Street**
- 42" **Proposed Pipe Diameter**
- 36" **Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-5A)ECA-4-REP
Plot by: dmagill Jul 11, 2014 - 3:57pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project: C-5B

Sewer Plat No. 2759, 2859

Implementation Phase Phase 4 (2031-2035)

Project Purpose: Replacement of Existing Sewer Facilities

Project Location: Woodward Avenue between Eighth and Orange Avenues

Approximate Project Quantities:
Proposed Diameter: 42"

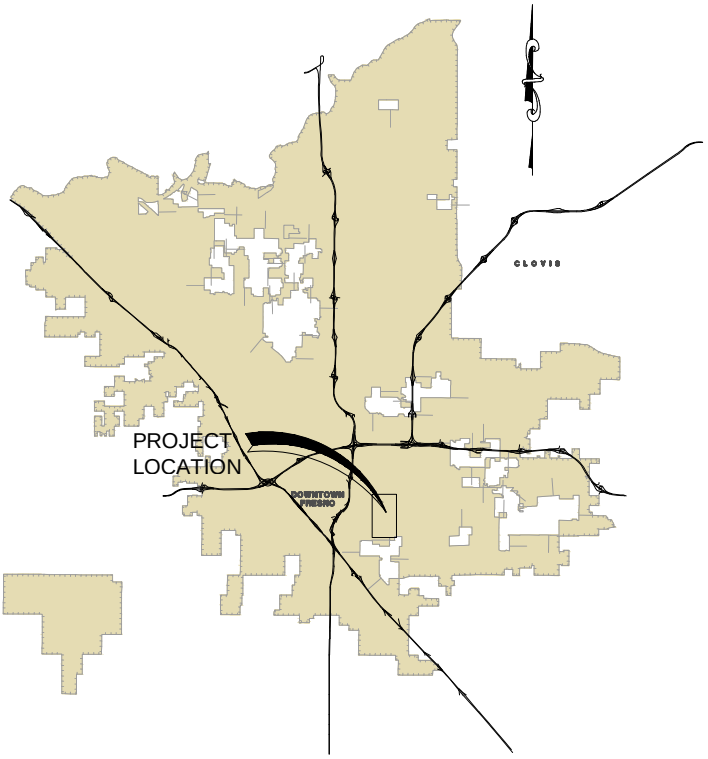
Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 83%
Future Development: 17%

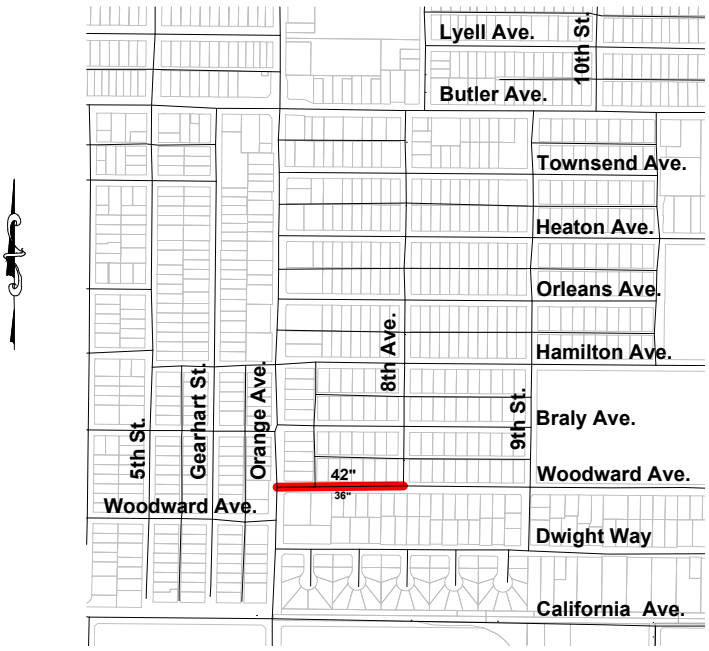
Estimated Project Costs:

Estimated Construction Cost:	$506,000.00
Estimated Contingencies Cost:	$126,000.00
Estimated Management and Engineering Cost:	$101,000.00
Total Estimated Project Cost:	$733,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 1,000'

Legend:

- Project Sewer
- Street
- 42" Proposed Pipe Diameter
- 36" Existing Pipe Diameter

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-5B)ECA-4-REP
Plot by: dmagill Jul 11, 2014 - 3:58pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project: C-5C

Sewer Plat No. 2759, 2859

Implementation Phase Phase 4 (2031-2035)

Project Purpose: Replacement of Existing Sewer Facilities

Project Location: Orange Avenue between Woodward and California Avenues

Approximate Project Quantities:
Proposed Diameter: 42"

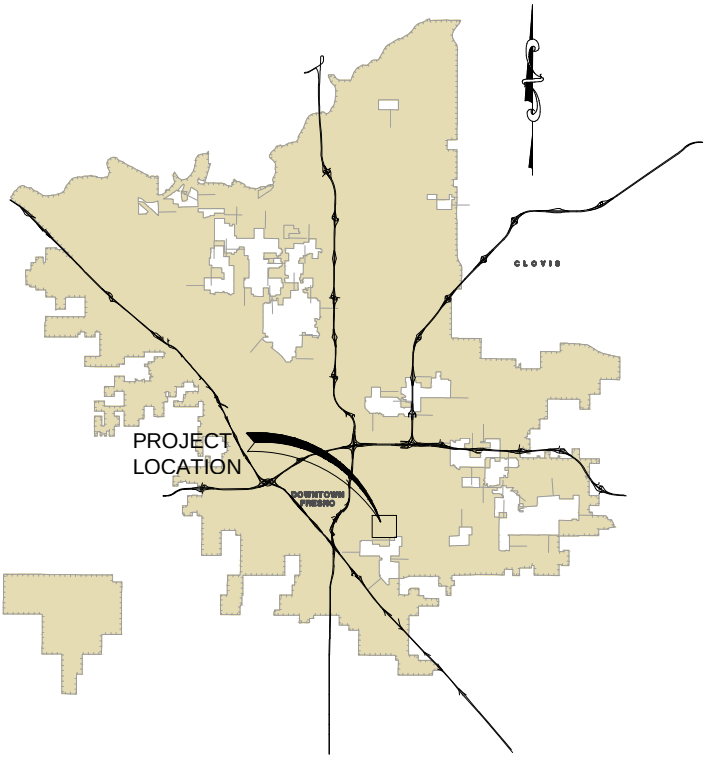
Project Conditions:
2-Lane Streets
Residential Setting

Project Benefit:
Existing Customers: 83%
Future Development: 17%

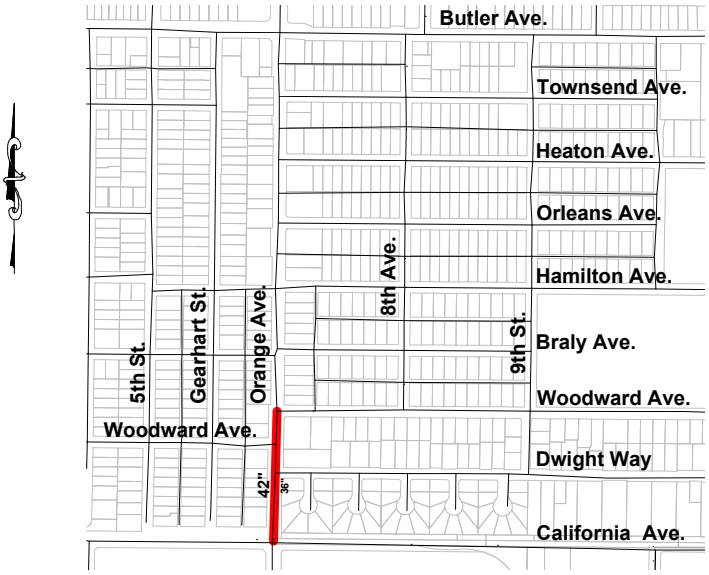
Estimated Project Costs:

Estimated Construction Cost:	$537,000.00
Estimated Contingencies Cost:	$134,000.00
Estimated Management and Engineering Cost:	$107,000.00
Total Estimated Project Cost:	$778,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 1,000'

Legend:

	Project Sewer
	Street
42"	Proposed Pipe Diameter
36"	Existing Pipe Diameter

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-5C)ECA-4-REP
Plot by: dmagill Jul 11, 2014 - 3:59pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
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Project:	**C-6**
Sewer Plat No.	**2553**
Implementation Phase	**Phase 4 (2031-2035)**
Project Purpose:	Replacement of Existing Sewer Facilities
Project Location:	Alley between Producers Dairy and H Street

Approximate Project Quantities:
Proposed Diameter: 8"

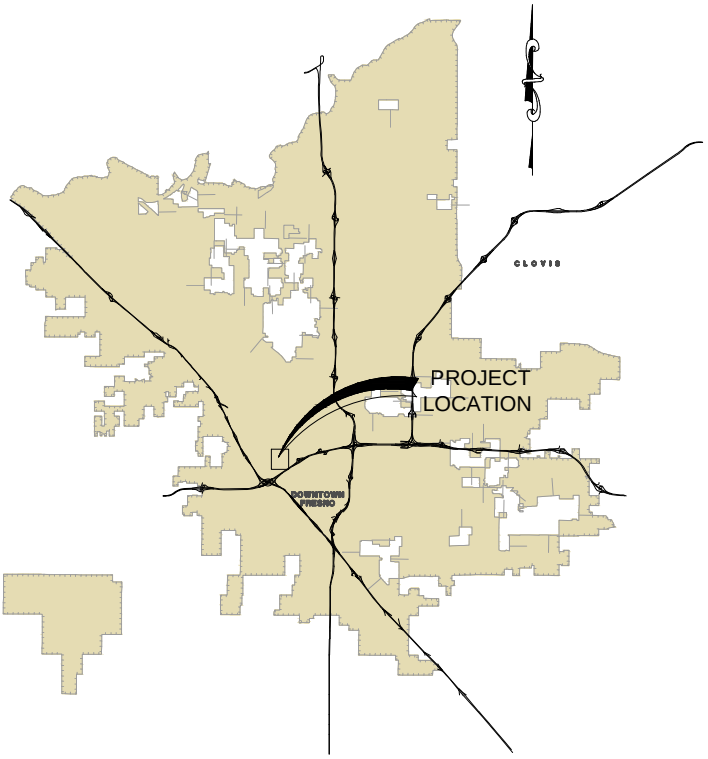
Project Conditions:
2-Lane Streets
Commercial Setting

Project Benefit:
Existing Customers: 100%
Future Development: 0%

Estimated Project Costs:

Estimated Construction Cost:	$227,000.00
Estimated Contingencies Cost:	$57,000.00
Estimated Management and Engineering Cost:	$45,000.00
Total Estimated Project Cost:	$329,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale



Project Location Map
1" = 800'

Legend:

	Project Sewer
	Street
8"	**Proposed Pipe Diameter**
6"	**Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-6)ECA-6-REP.d
Plot by: dmagill Jul 11, 2014 - 4:00pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

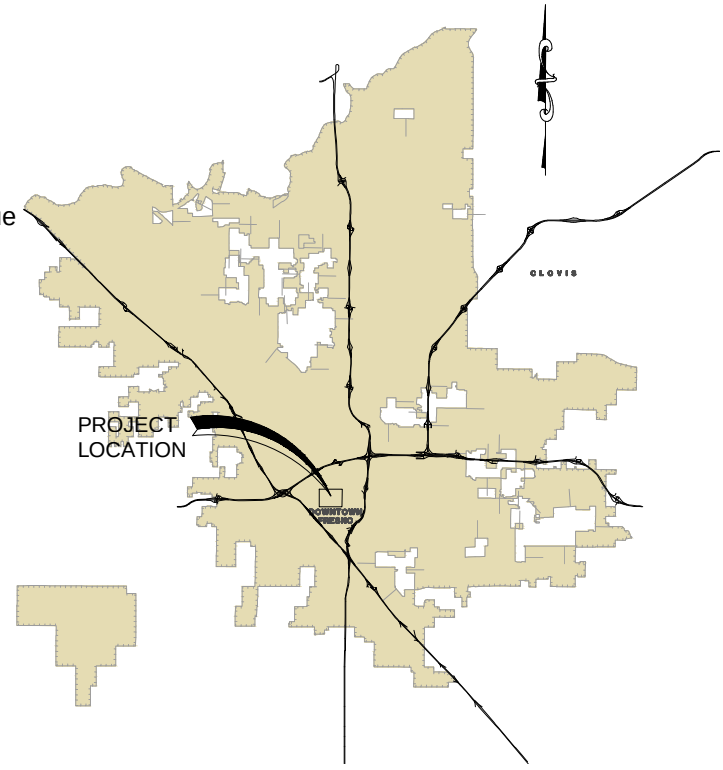
Project: C-7

Sewer Plat No. 2655

Implementation Phase Phase 4 (2031-2035)

Project Purpose: Replacement of Existing Sewer Facilities

Project Location: Tuolumne Street and Van Ness Avenue between N and Merced Streets



Project Vicinity Map
Not to Scale

Approximate Project Quantities:
Proposed Diameter: 30"

Project Conditions:
2-Lane Streets
Commercial Setting

Project Benefit:
Existing Customers: 0%
Future Development: 100%

Estimated Project Costs:

Estimated Construction Cost:	$847,000.00
Estimated Contingencies Cost:	$212,000.00
Estimated Management and Engineering Cost:	$169,000.00
Total Estimated Project Cost:	$1,228,000.00

ENR CCI = 9,835 (20 City Average, July 2014)



Project Location Map
1" = 800'

Legend:

- **Project Sewer**
- **Street**
- 30" **Proposed Pipe Diameter**
- 27" **Existing Pipe Diameter**

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-7)FCA-1-REP.d
Plot by: dmagill Jul 11, 2014 - 4:01pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project: C-8

Sewer Plat No. 3245, 3246, 3247, 3248, 3249, 3250, 3251, 3252

Implementation Phase Phase 4 (2031-2035)

Project Purpose: Relief Line for Existing Sewer Facilities

Project Location: North Avenue between Polk Avenue Alignment and Fruit Avenue

Approximate Project Quantities:
Proposed Diameter: 60"

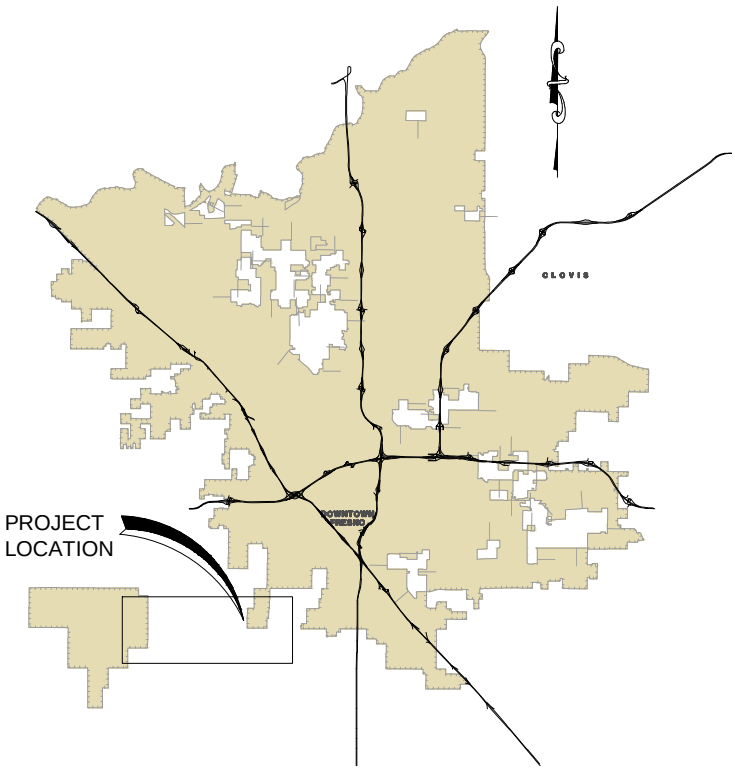
Project Conditions:
2-Lane Streets
Rural Setting

Project Benefit:
Existing Customers: 0%
Future Development: 100%

Estimated Project Costs:

Estimated Construction Cost:	$13,527,000.00
Estimated Contingencies Cost:	$3,382,000.00
Estimated Management and Engineering Cost:	$,2706,000.00
Total Estimated Project Cost:	$19,615,000.00

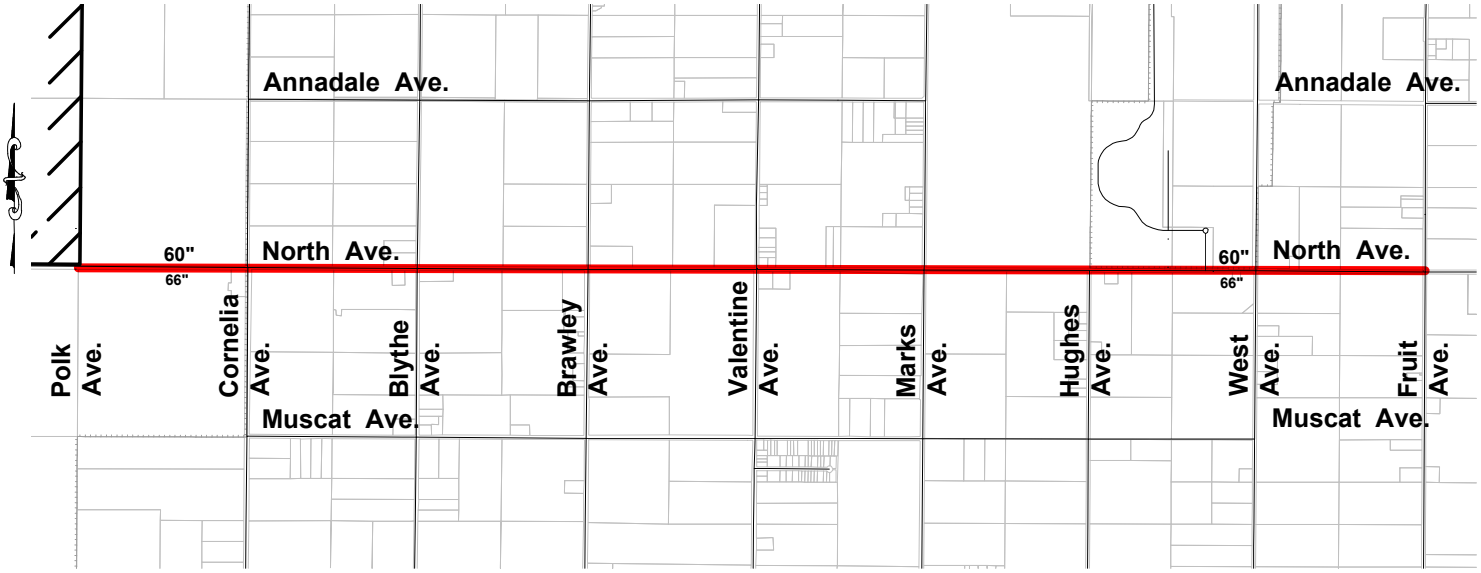
ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale

Legend:

- **Project Sewer**
- **Street**
- 60" **Proposed Pipe Diameter**
- 66" **Existing Pipe Diameter**



Project Location Map
1" = 3,000'

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-8)FCA-2-REL
Plot by: dmagill Jul 11, 2014 - 4:01pm

City of Fresno
Wastewater Collection System Master Plan Update
CAPITAL IMPROVEMENT PLAN
PROJECT SHEET

Project: C-9

Sewer Plat No. 3253, 3254, 3255, 3256 3257, 3258

Implementation Phase Phase 4 (2031-2035)

Project Purpose: Rehabilitate Line for Existing Sewer Facilities

Project Location: North Avenue between Fruit and Orange Avenues

Approximate Project Quantities:
Proposed Diameter: 60"

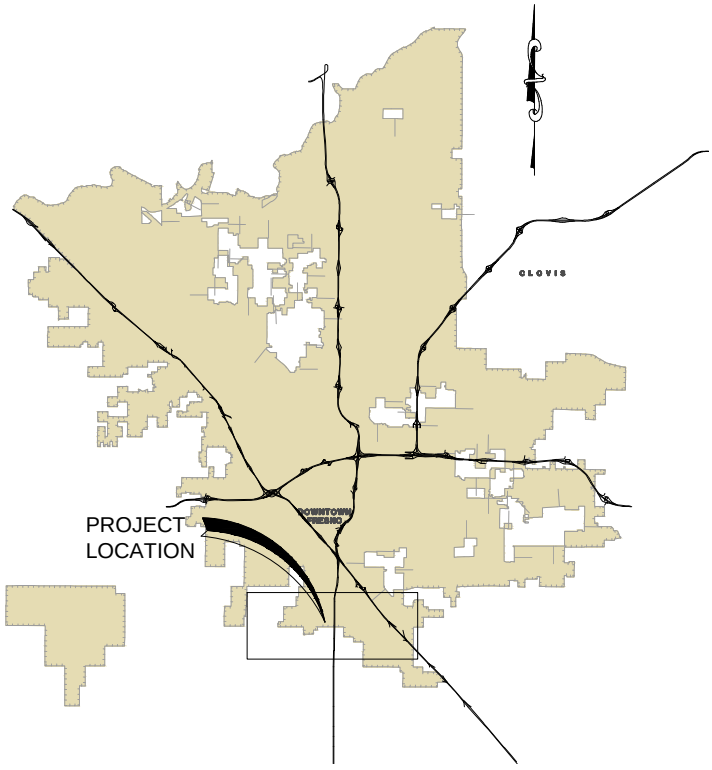
Project Conditions:
2-Lane Streets
Rural Setting

Project Benefit:
Existing Customers: 0%
Future Development: 100%

Estimated Project Costs:

Estimated Construction Cost:	$10,604,000.00
Estimated Contingencies Cost:	$2,651,000.00
Estimated Management and Engineering Cost:	$2,121,000.00
Total Estimated Project Cost:	$15,376,000.00

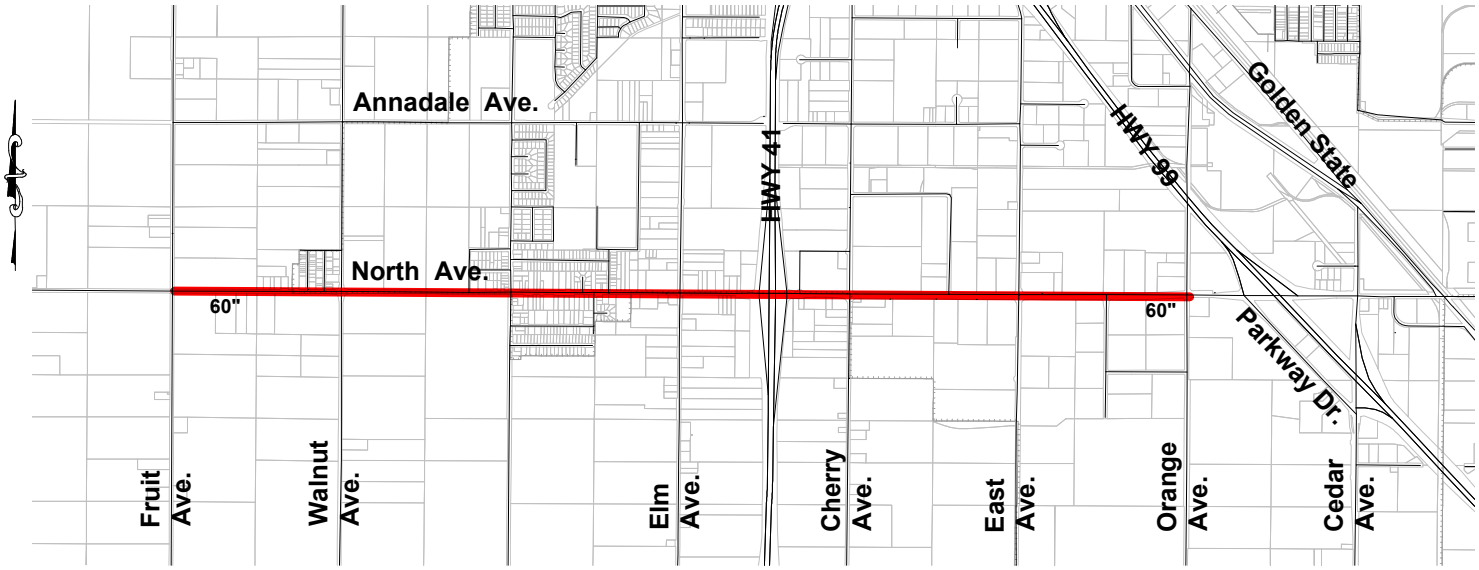
ENR CCI = 9,835 (20 City Average, July 2014)



Project Vicinity Map
Not to Scale

Legend:

Project Sewer
Street
60" **Proposed Pipe Diameter**



Project Location Map
1" = 3,000'

Drawing: P:\213-0242\Site\Exhibits\Project Jobs\213242_(C-9)FCA-3-REH
Plot by: dmagill Jul 11, 2014 - 4:02pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: B

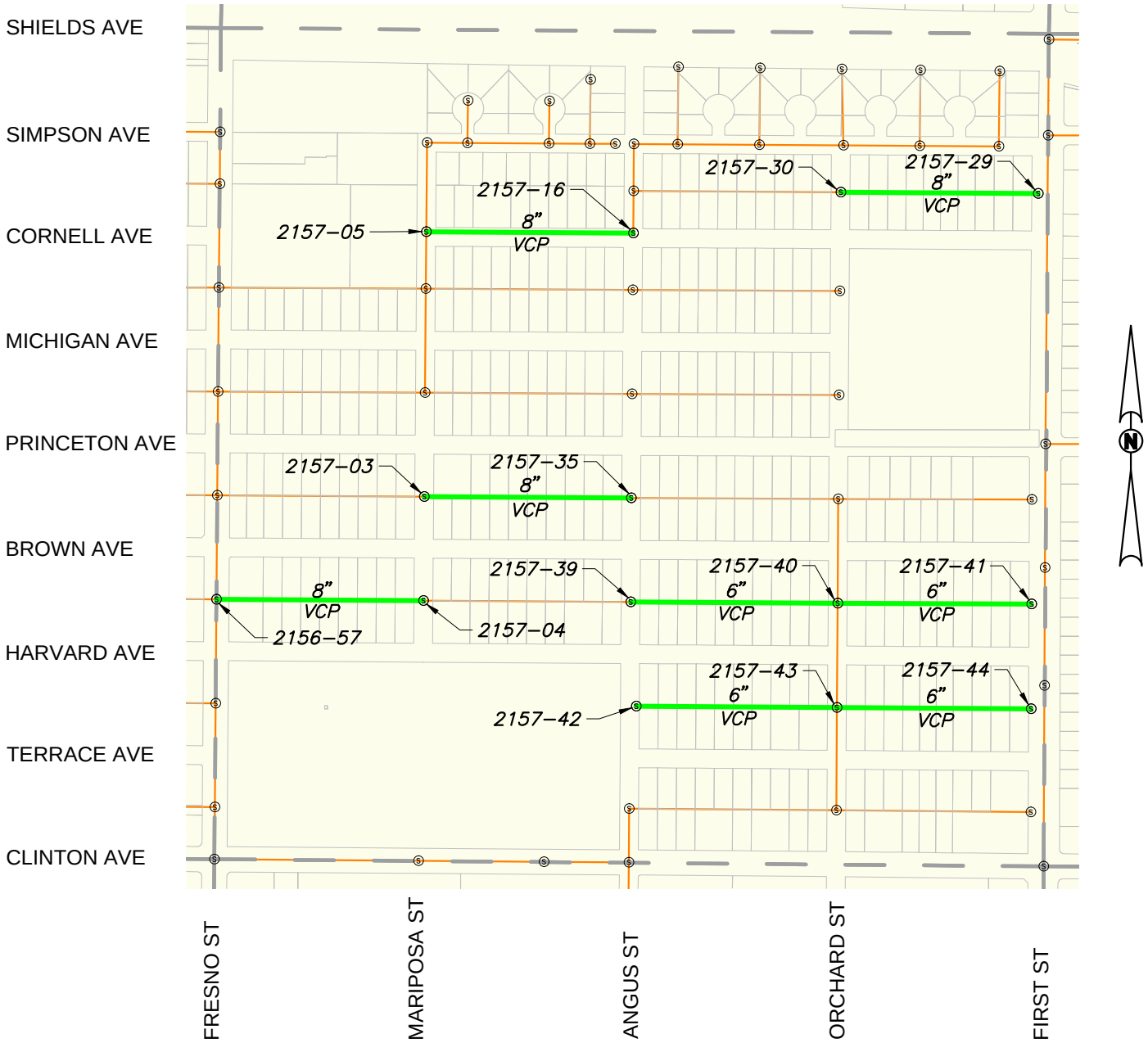
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2157

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	2,603 LF
6"	2,530 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2157 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:39pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

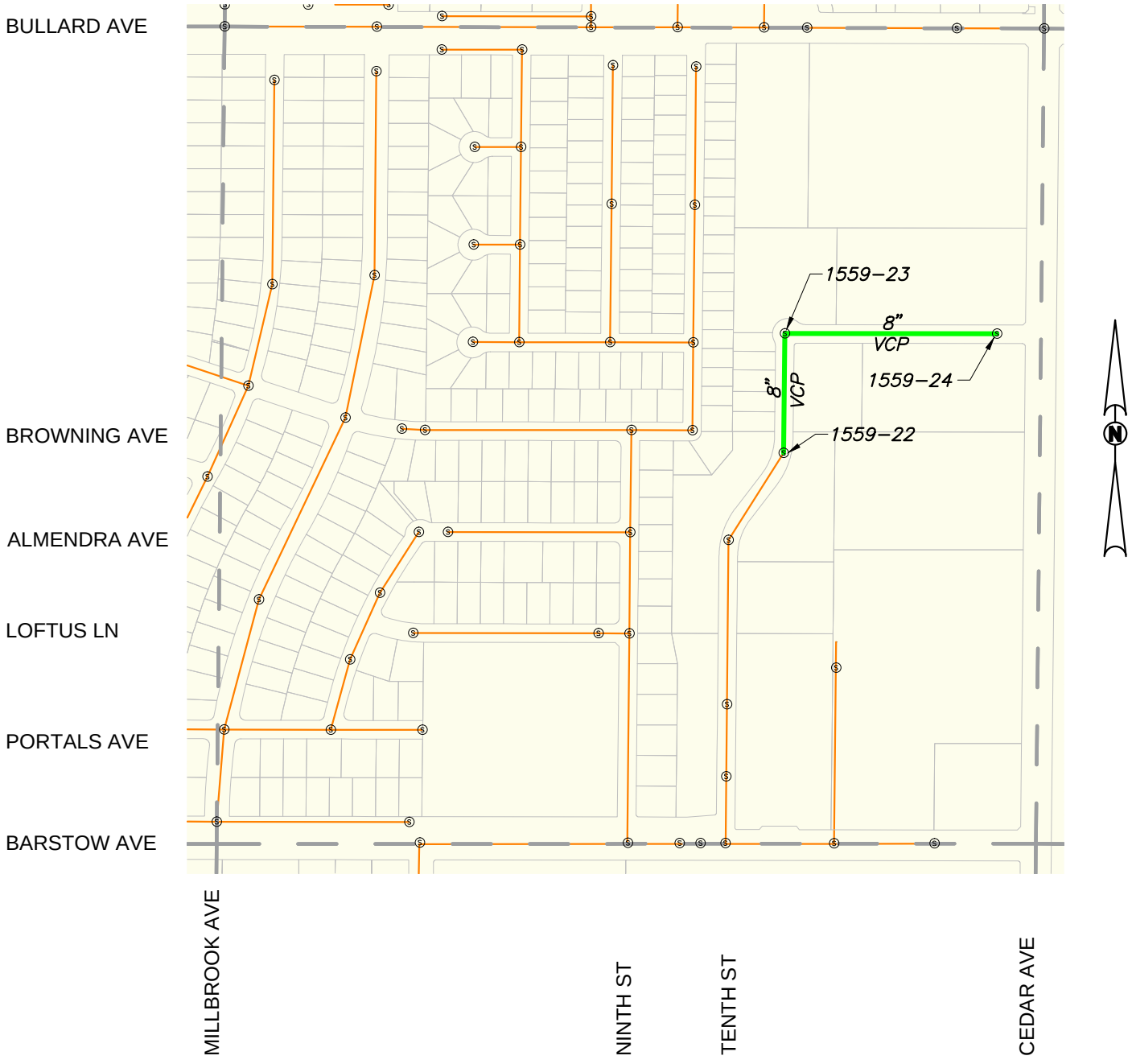
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1559

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	1,074 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1559 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:39pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1358

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:
6" 200 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1358 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:39pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

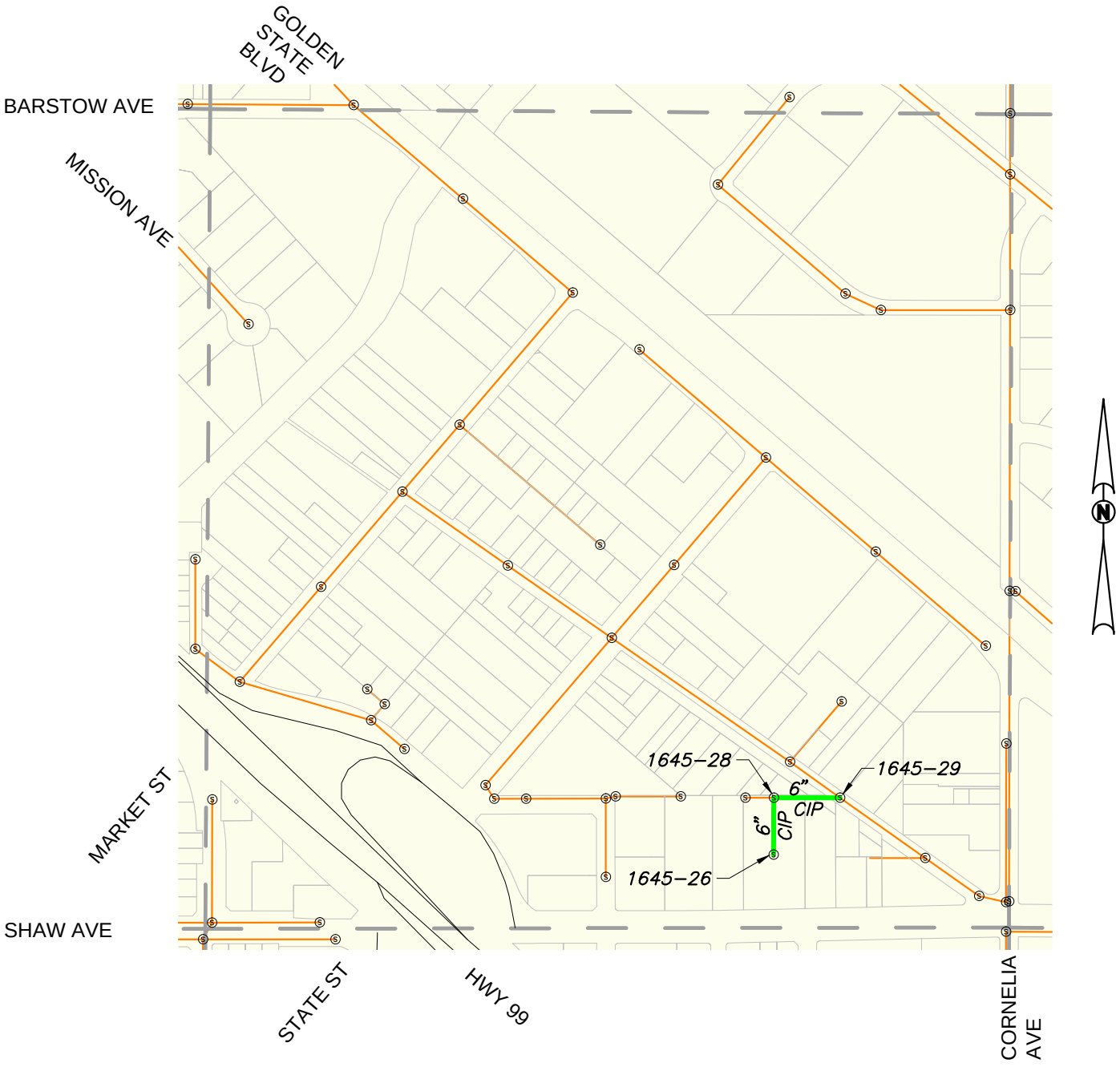
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1645

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	100 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
CIP — Cast In Place	1358–23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1645 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:39pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: B

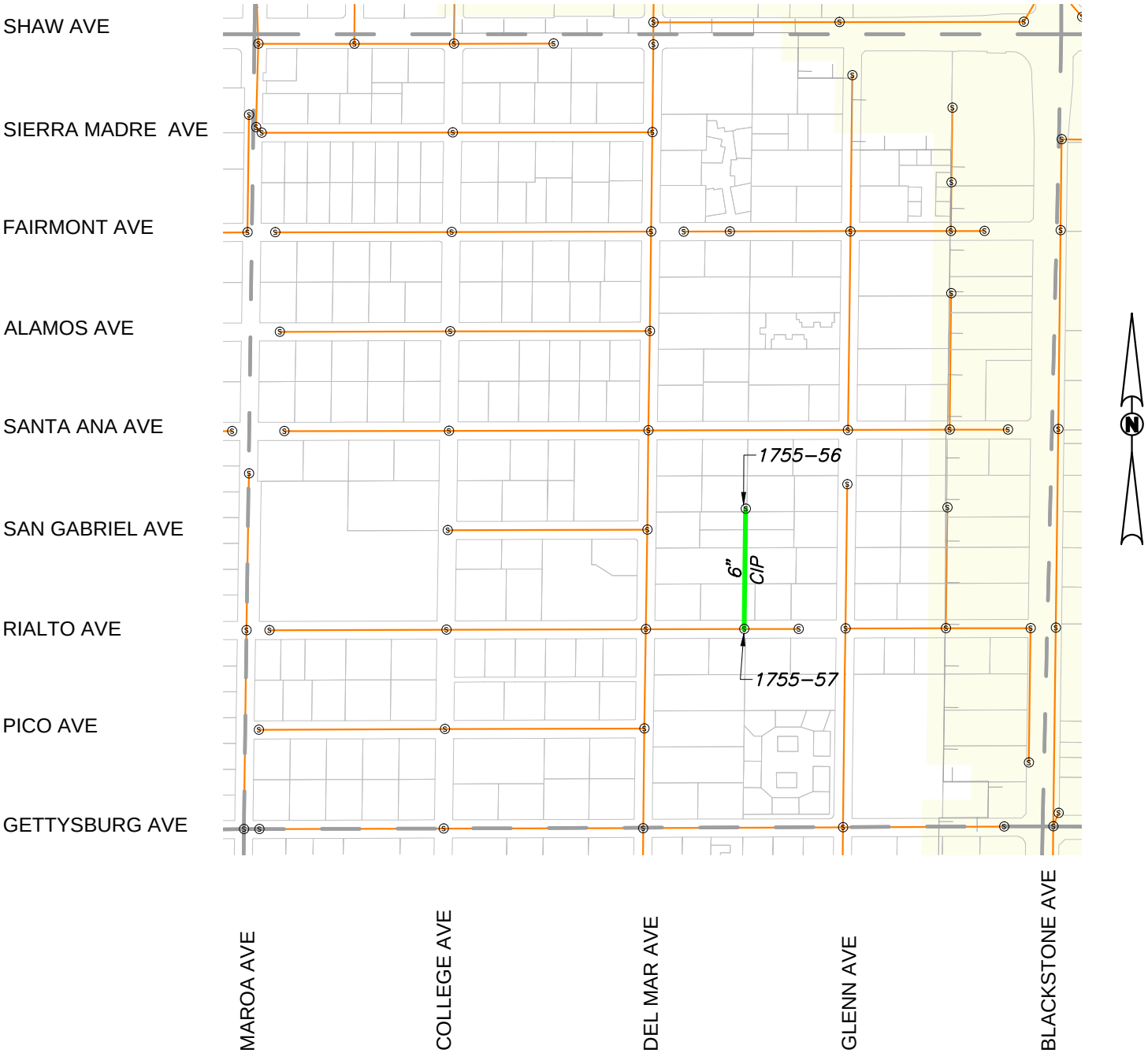
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1755

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	398 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
CIP — Cast In Place	1358–23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1755 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:40pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: B

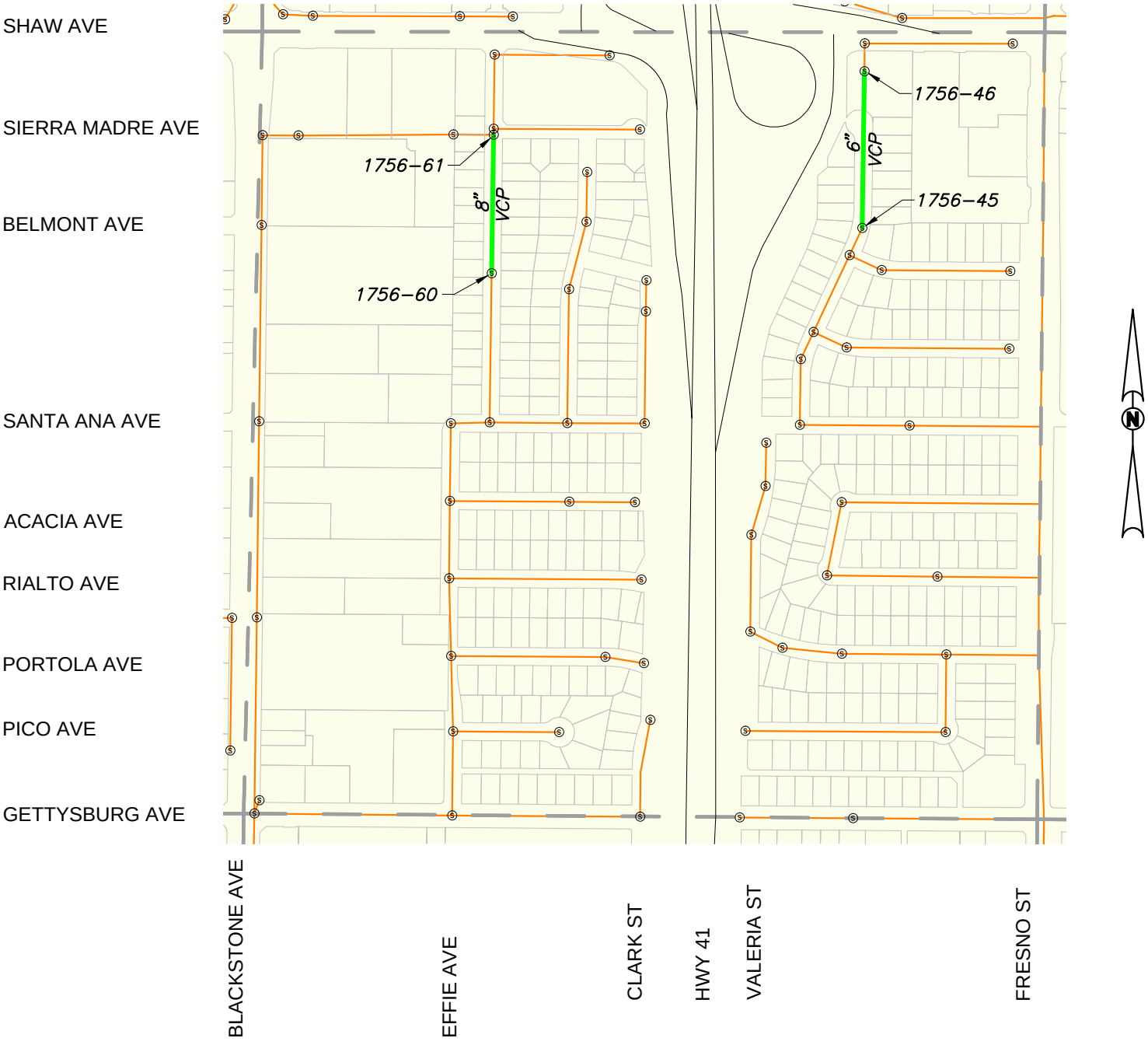
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1756

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	464 LF
6"	525 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1756 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:40pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

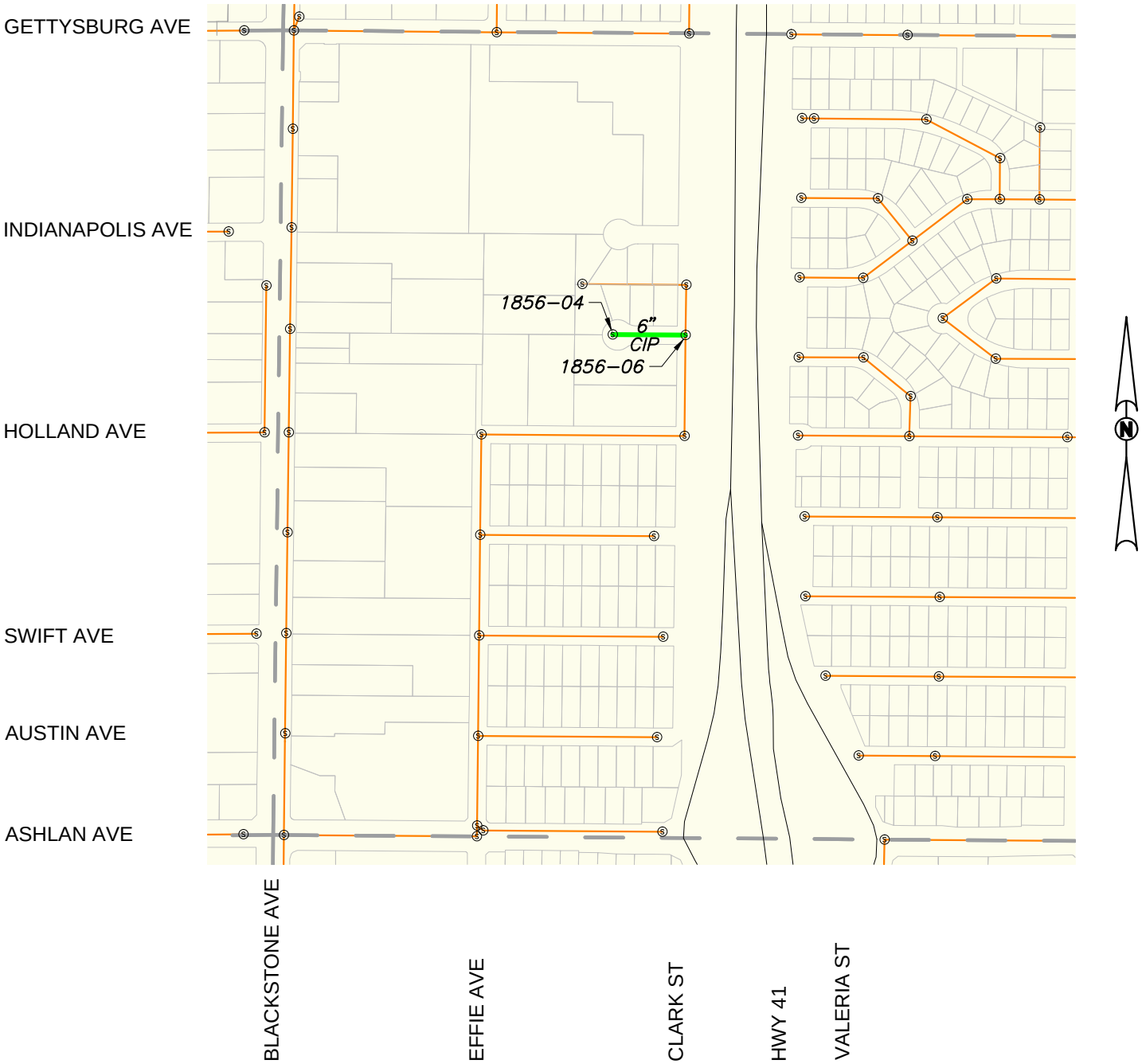
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1856

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	239 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
CIP — Cast In Place	1358-23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1856 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:40pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 1957

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

12"	813 LF
8"	272 LF



Legend

	Rehabilitation Required		Plat Boundary
	Other Sewers		City Limits
	Parcel Boundary	Ⓢ	Sewer Manhole
VCP	Vitrified Clay Pipe	1358–23	Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 1957 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:40pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

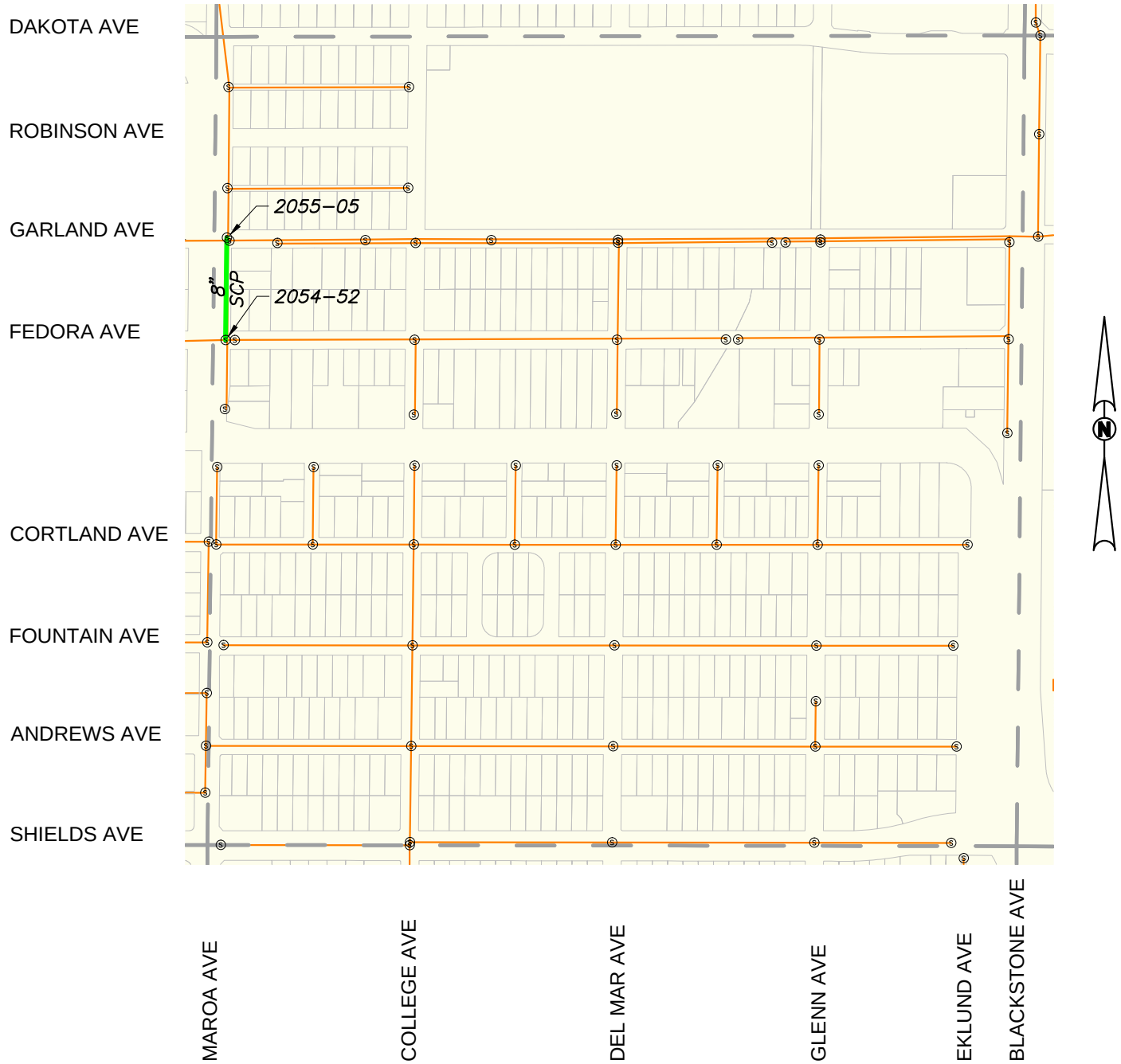
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2055

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	335 LF



Legend

Rehabilitation Required		Plat Boundary	
Other Sewers		City Limits	
Parcel Boundary	Ⓢ	Sewer Manhole	
SCP	Standard Concrete Pipe	1358-23	Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2055 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:40pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

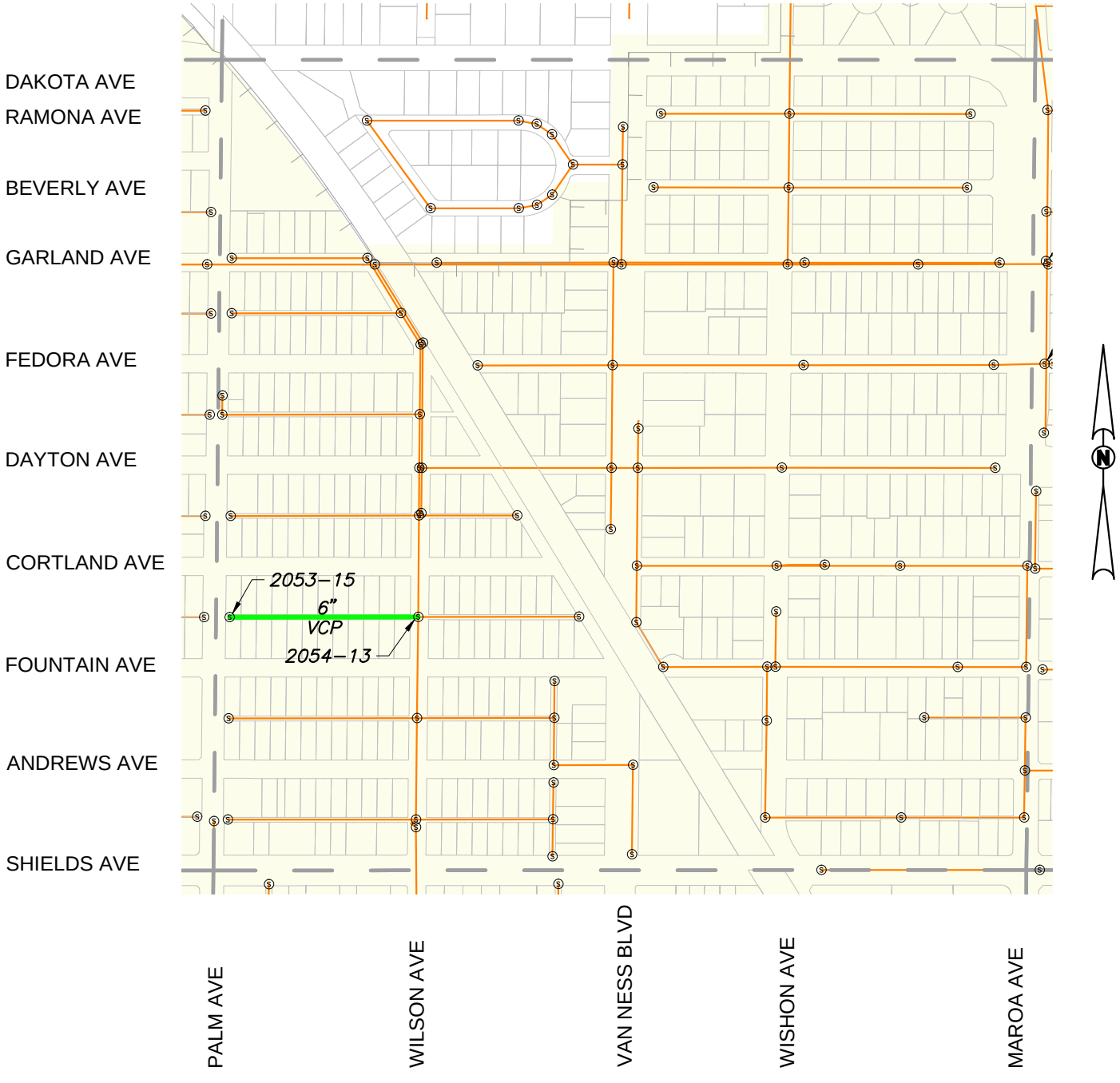
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2054

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	615 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2054 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:40pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

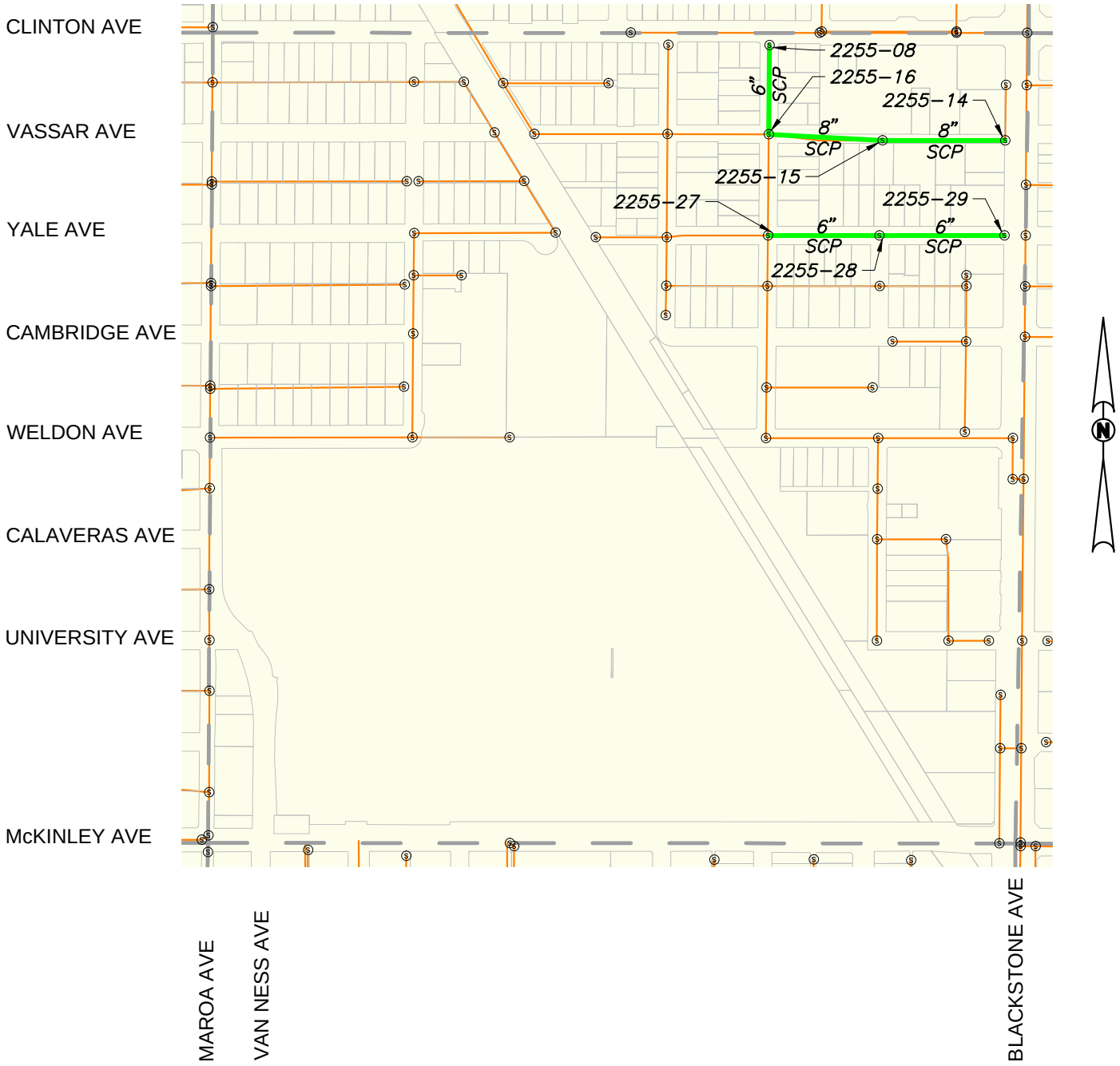
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2255

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	771 LF
6"	1,061 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2255 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:41pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2057

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

12"	953 LF



Legend

	Rehabilitation Required		Plat Boundary
	Other Sewers		City Limits
	Parcel Boundary	Ⓢ	Sewer Manhole
VCP	Vitrified Clay Pipe	1358–23	Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2057 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:41pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

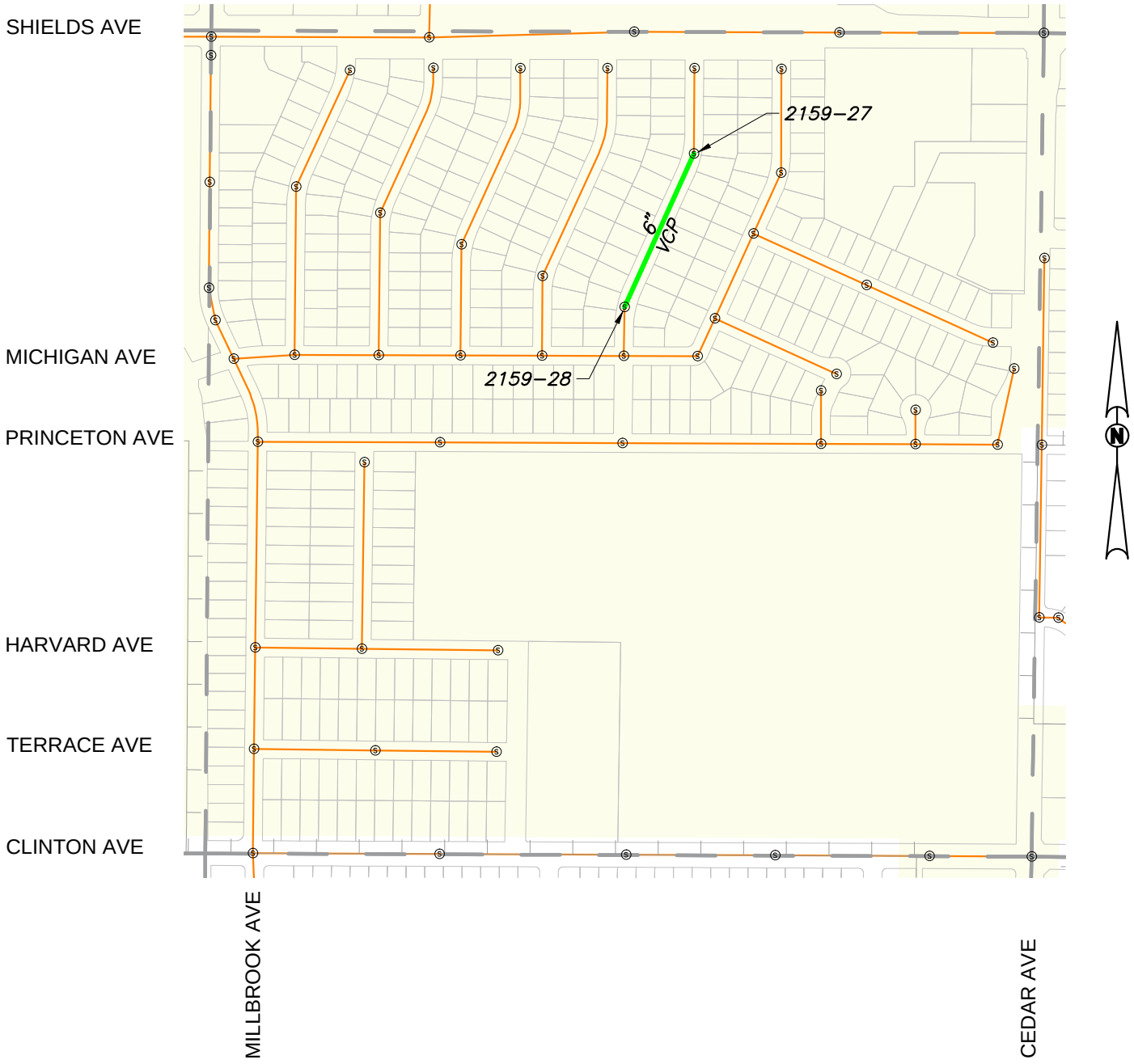
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2159

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	543 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2159 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:41pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

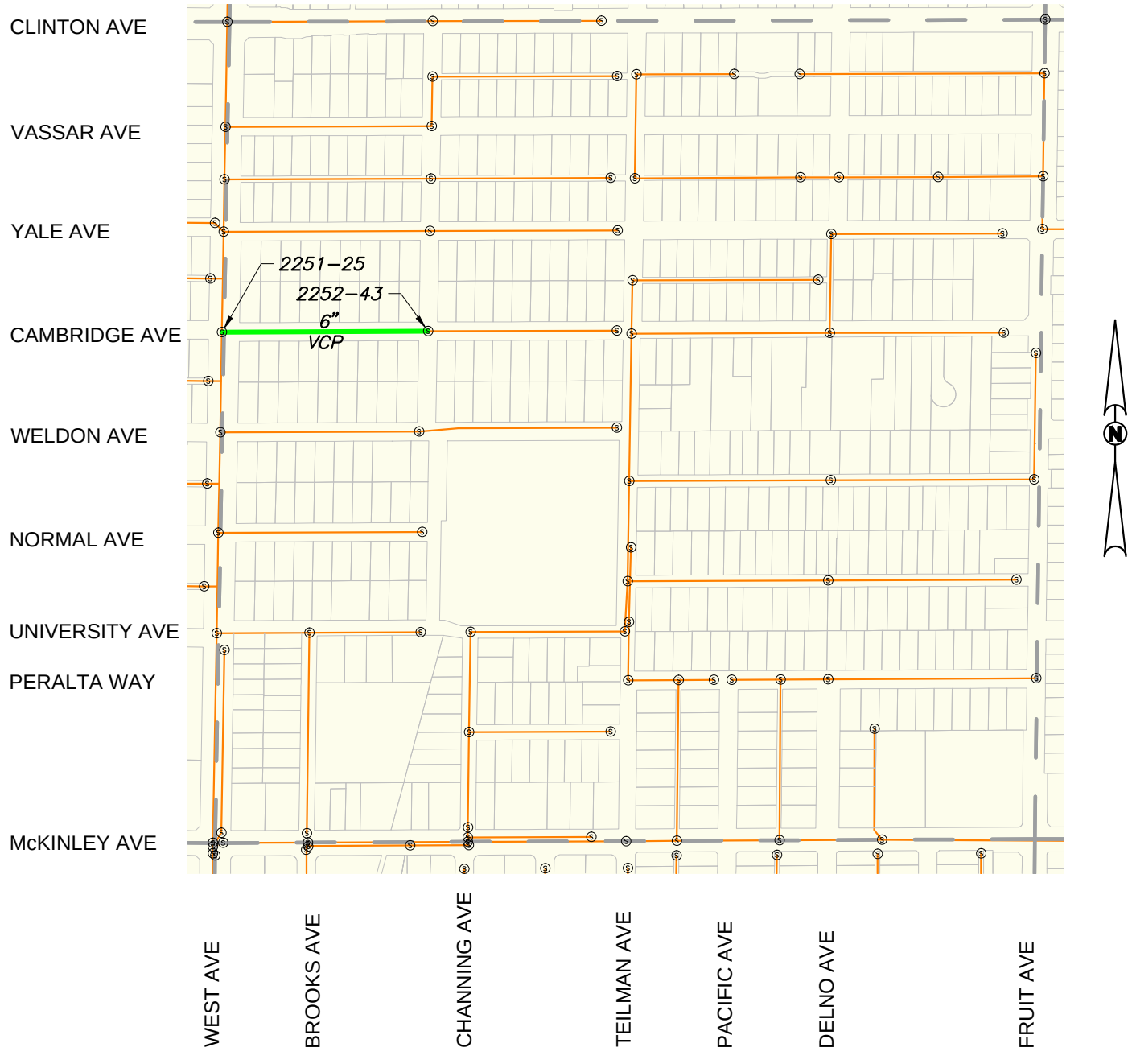
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2252

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	668 LF



Legend

	Rehabilitation Required		Plat Boundary
	Other Sewers		City Limits
	Parcel Boundary	Ⓢ	Sewer Manhole
VCP	Vitrified Clay Pipe	1358–23	Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2252 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:41pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: B

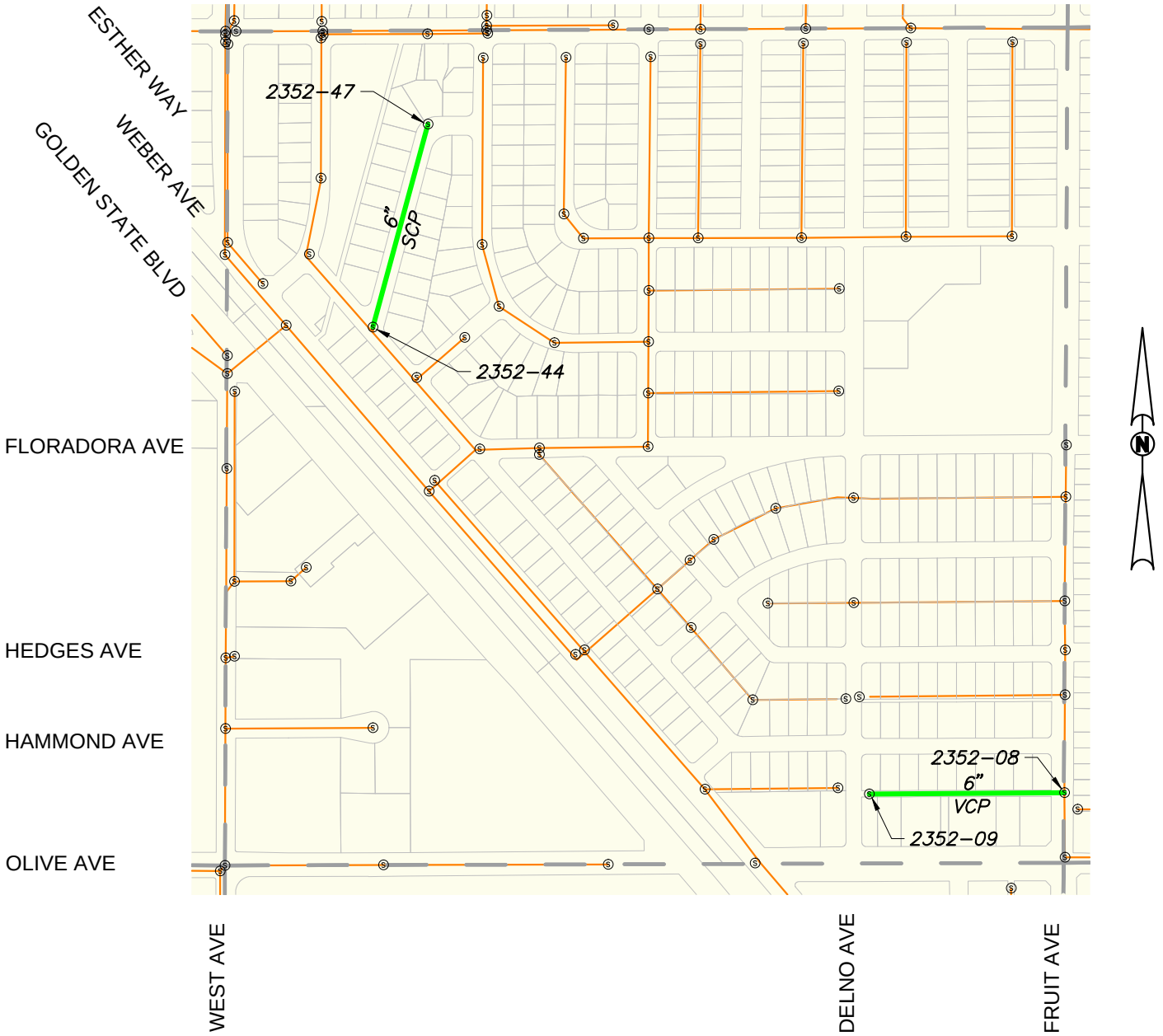
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2352

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	1,281 LF



Legend

	Rehabilitation Required		Plat Boundary
	Other Sewers		City Limits
	Parcel Boundary	Ⓢ	Sewer Manhole
SCP	Standard Concrete Pipe	1358–23	Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2352 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:41pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

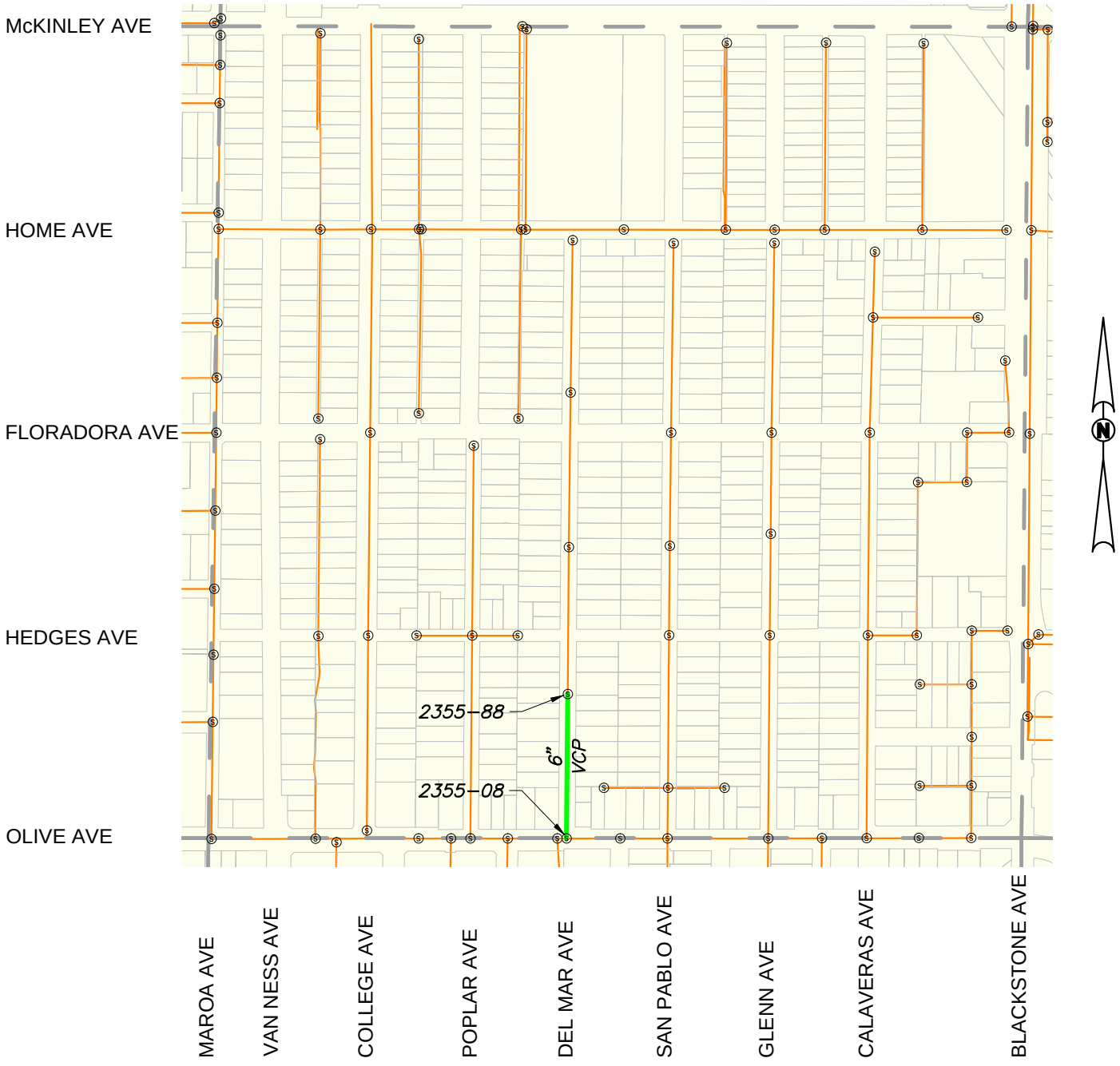
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2355

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	471 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP — Vitrified Clay Pipe	1358-23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2355 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:41pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

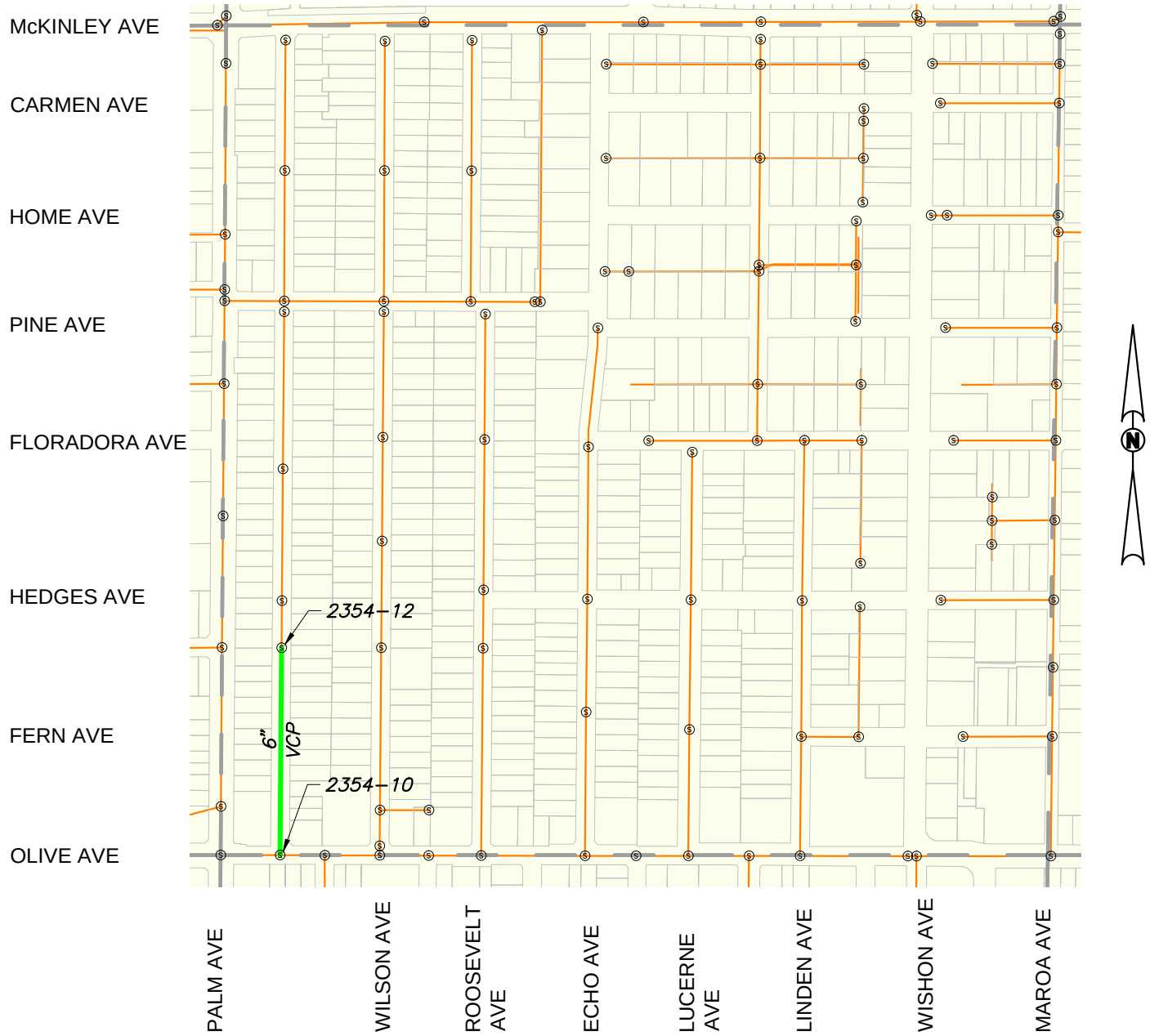
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2354

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

6"	661 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2354 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2361

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	637 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
CIP — Cast In Place	1358–23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2361 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

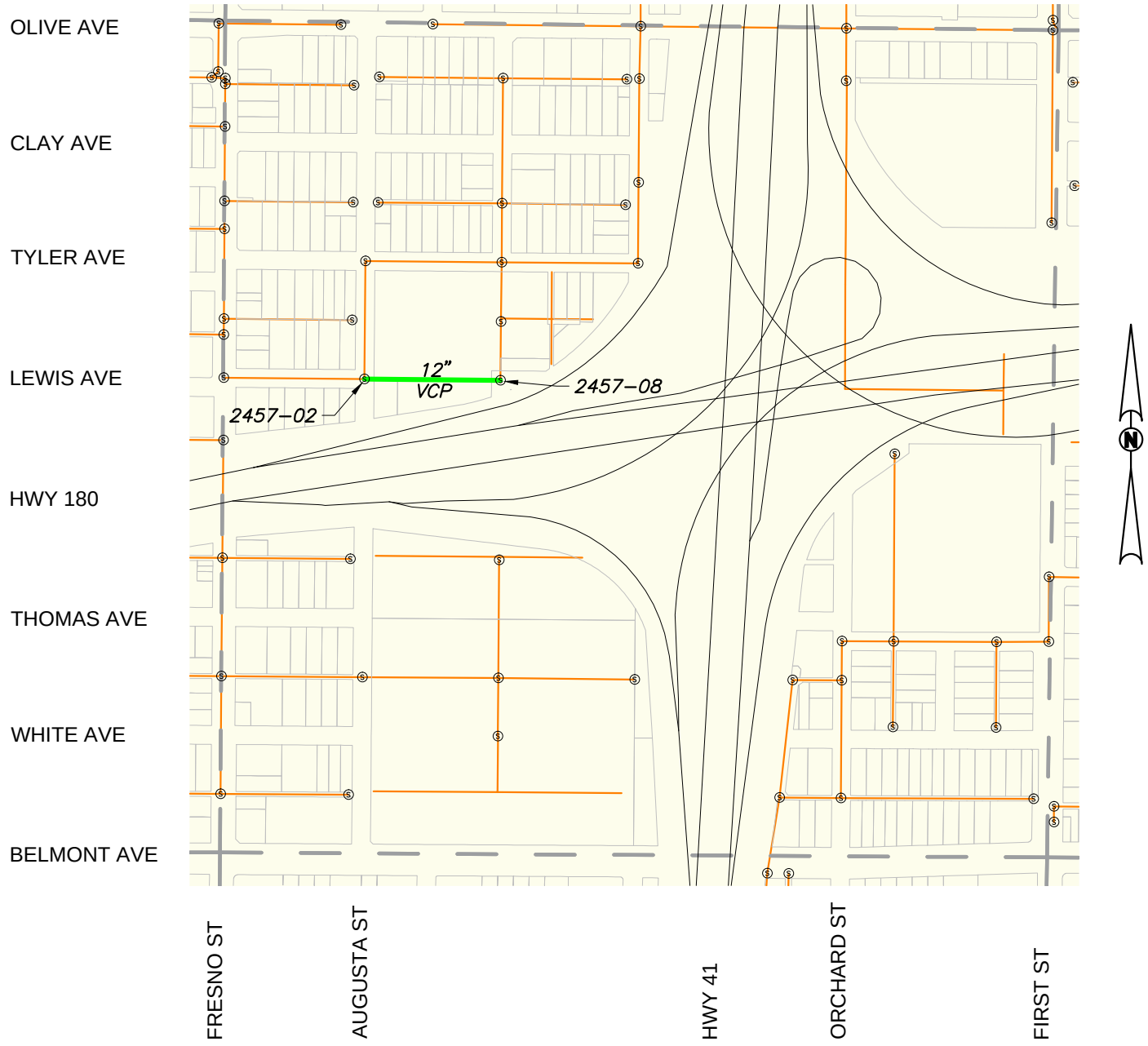
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2457

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

12"	435 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2457 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

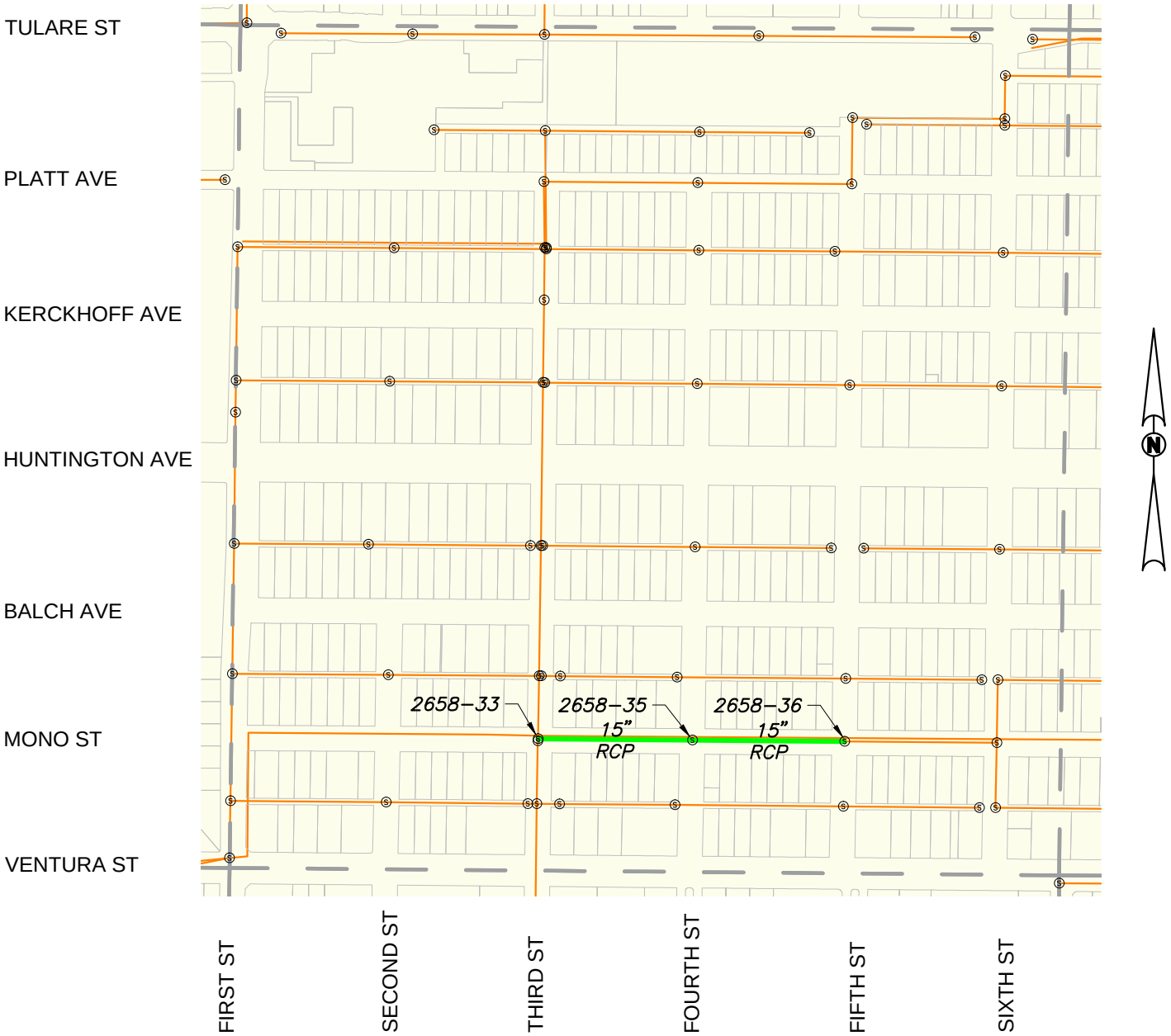
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2658

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

15"	967 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
RCP Reinforced Concrete Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2658 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2856

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

18"	925 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2856 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

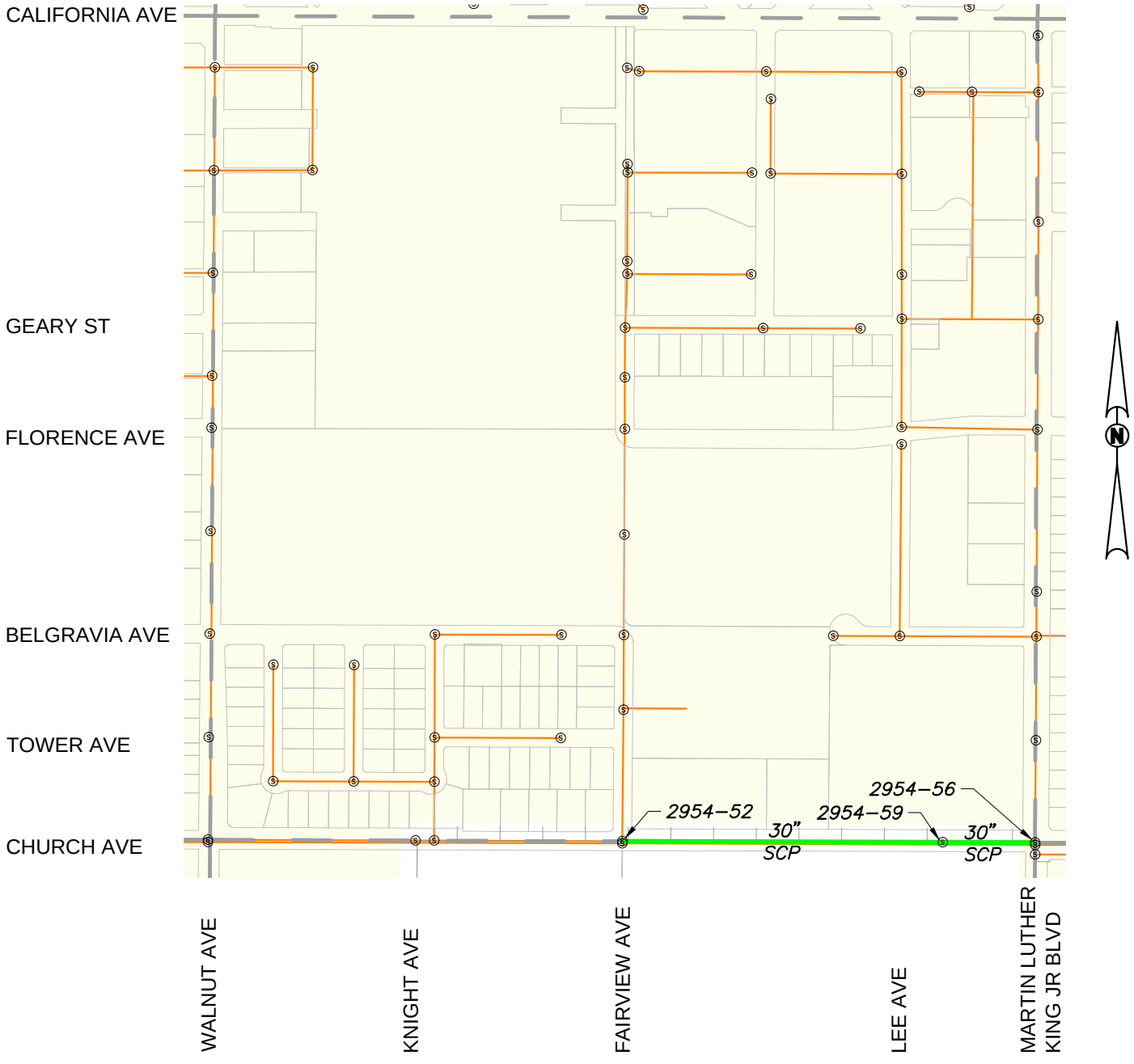
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2954

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

30"	1,329 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
SCP Standard Concrete Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2954 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

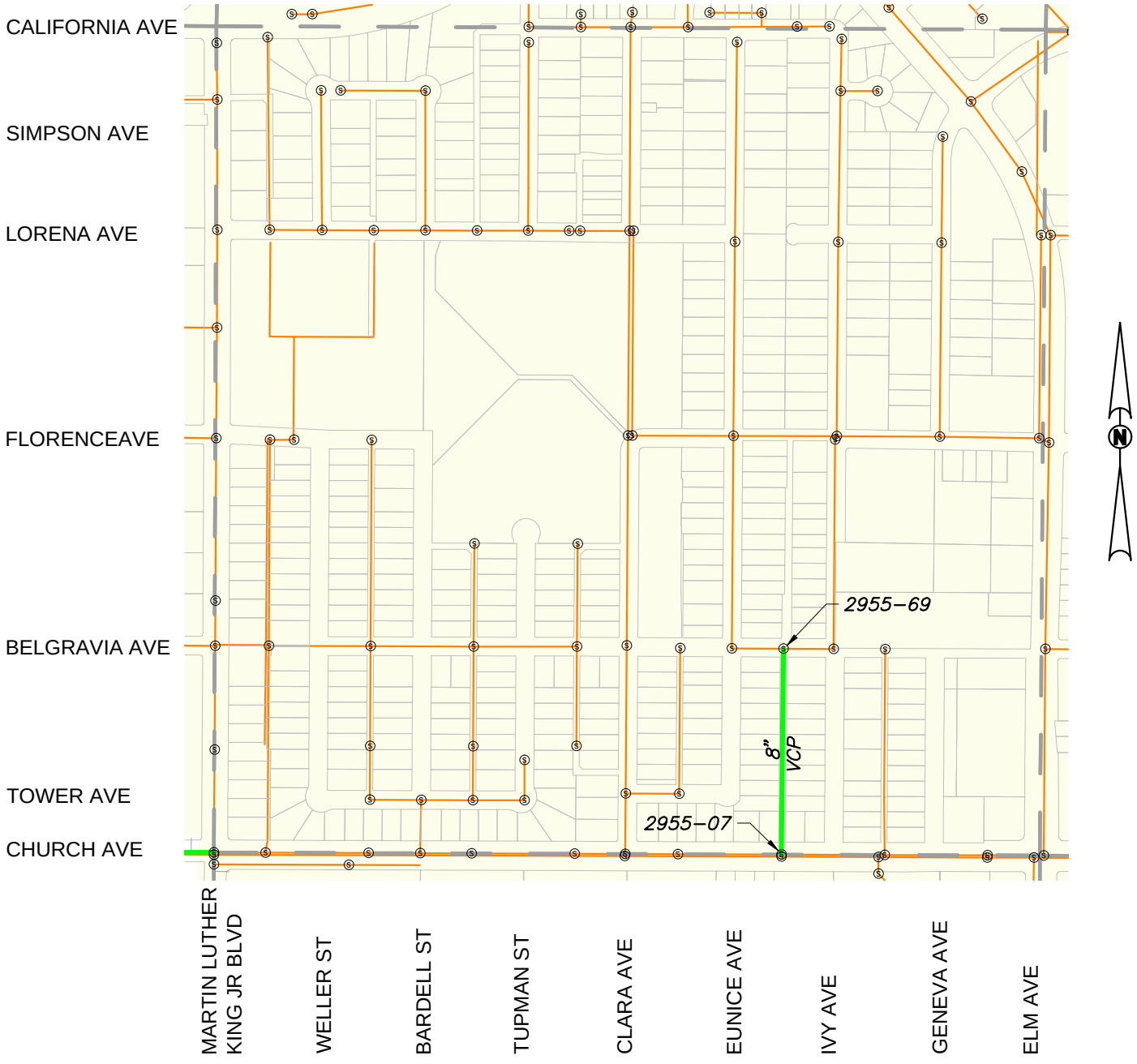
Project Phase: C

Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2955

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:
8" 661 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2955 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:42pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: B

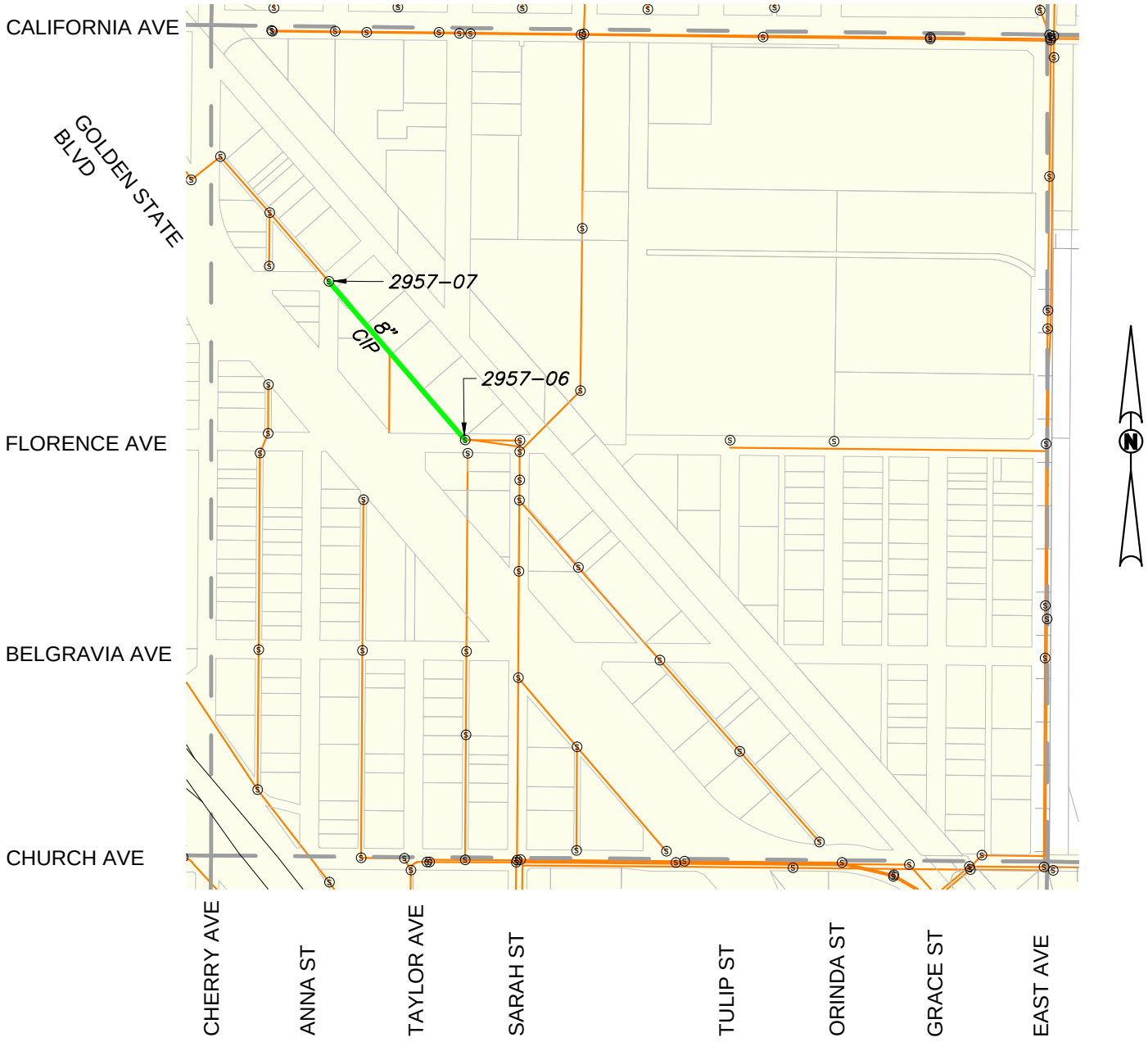
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 2957

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	665 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
CIP — Cast In Place	1358–23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 2957 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:43pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: B

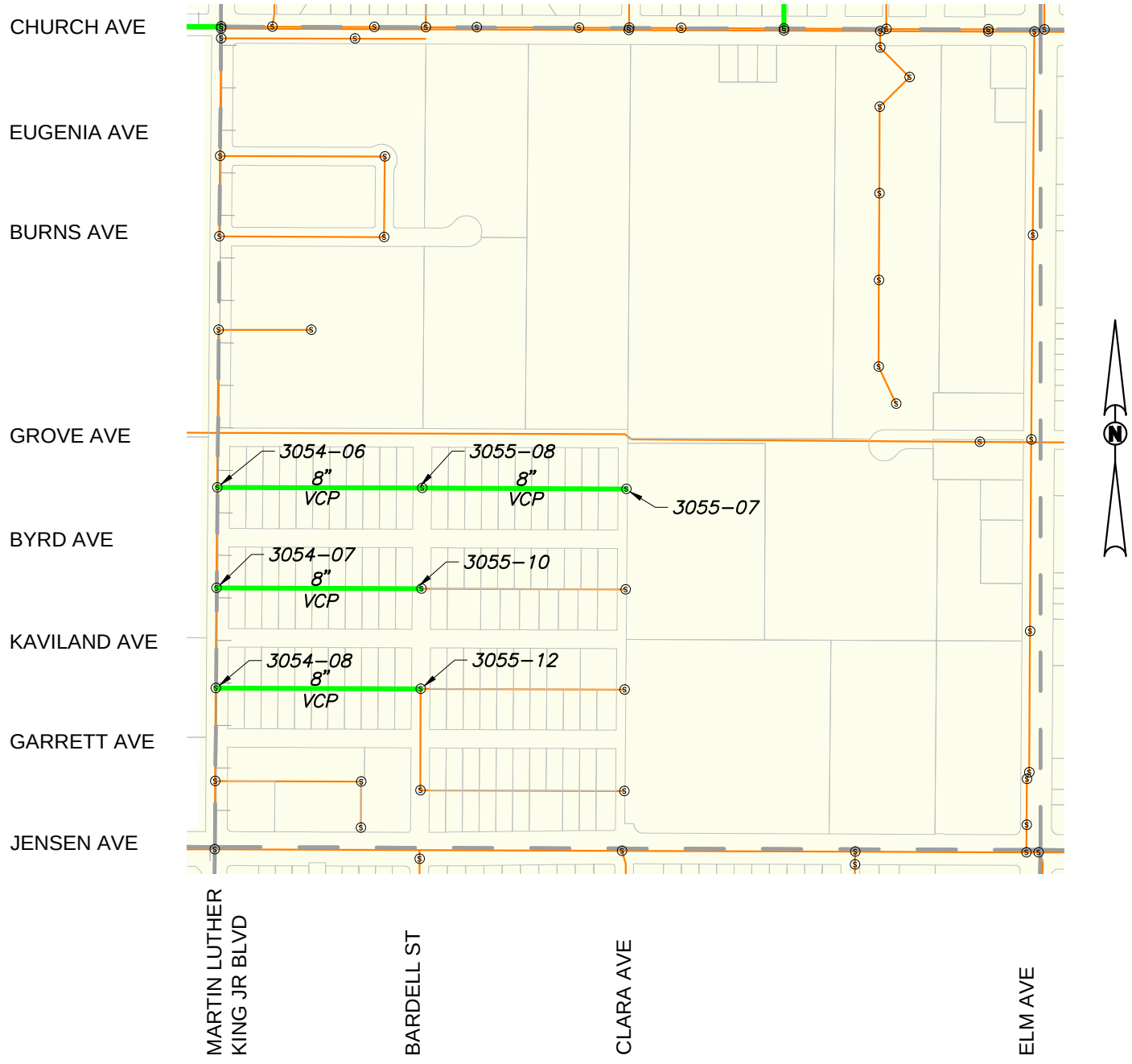
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 3055

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	1,991 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP — Vitrified Clay Pipe	1358–23 — Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 3055 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:43pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: C

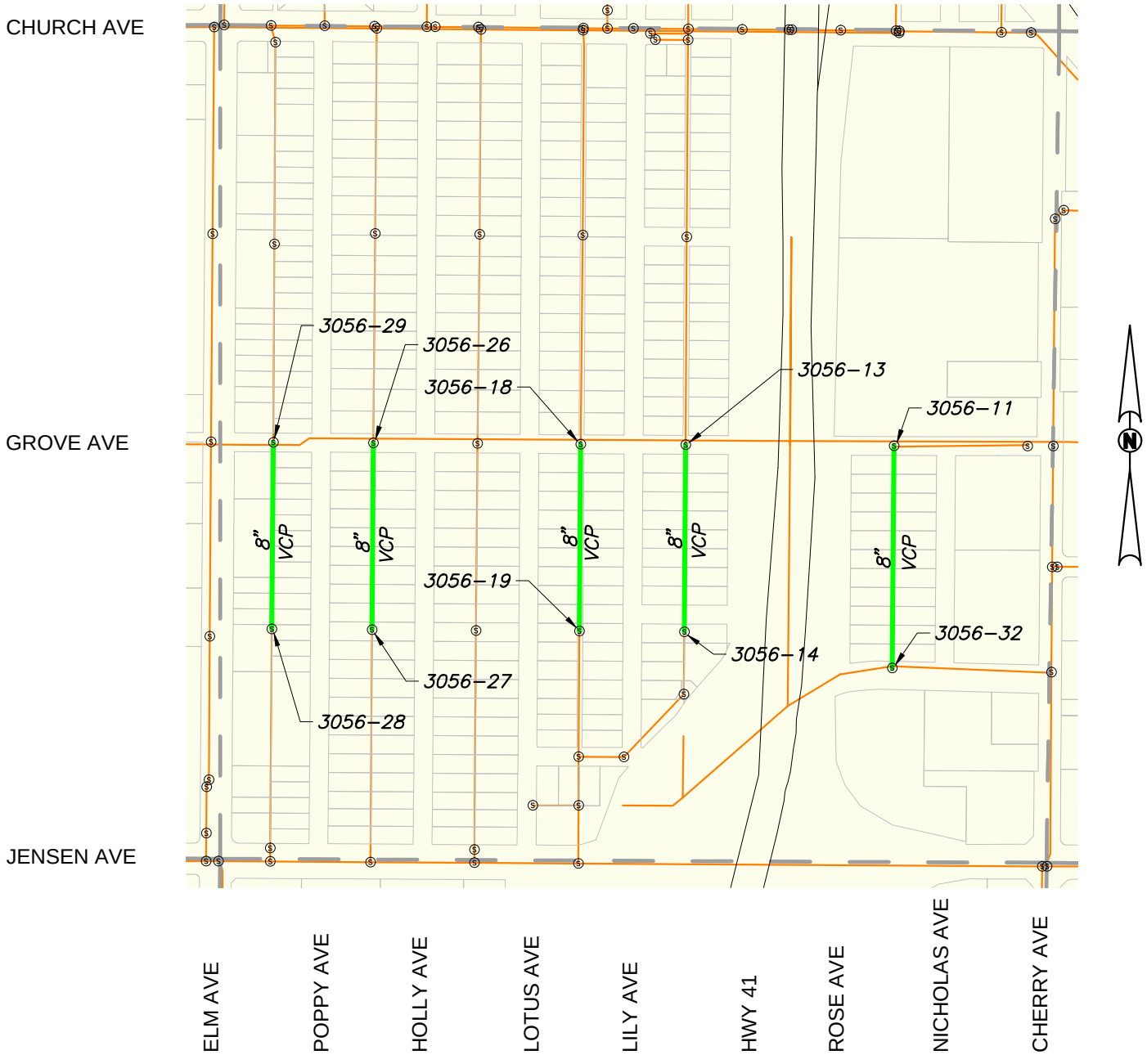
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 3056

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	3,087 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358–23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 3056 – BCF.ctb
Plot by: dmagill Jul 11, 2014 – 4:43pm

City of Fresno
Wastewater Collection System Master Plan
CAPITAL IMPROVEMENT PLAN
HIGH MOSR SEWER REPAIRS

Project Phase: A

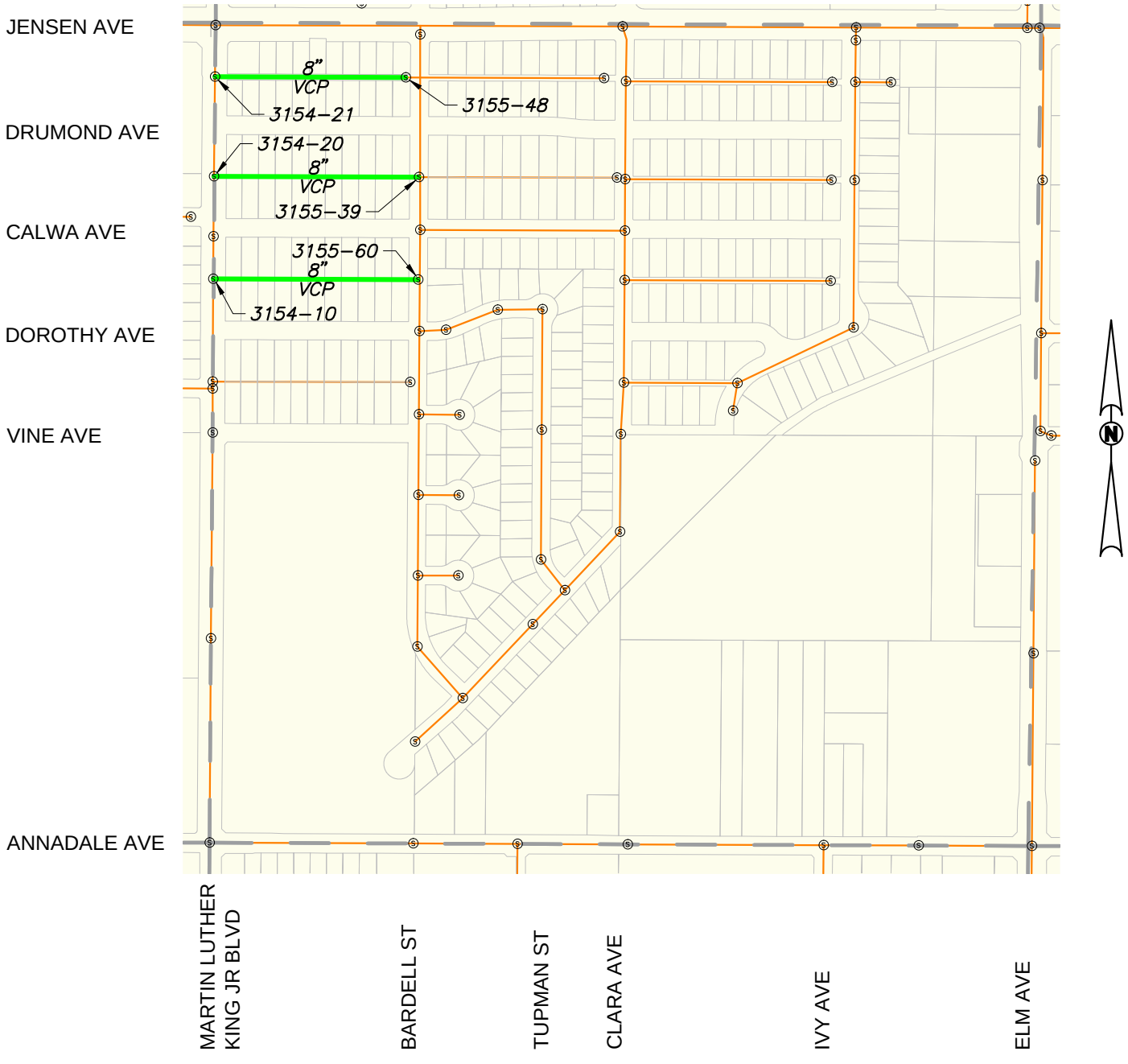
Project Purpose: Rehabilitation of Existing Sewer Facilities

Plat Area: 3155

Reccomendation: Install Cured-In-Place (CIPP) Liner

Pipe Diameter Quantities:

8"	1,945 LF



Legend

Rehabilitation Required	Plat Boundary
Other Sewers	City Limits
Parcel Boundary	Sewer Manhole
VCP Vitrified Clay Pipe	1358-23 Sewer Manhole Number

0 100 250 500 1000
SCALE IN FEET

PRELIMINARY

Drawing: P:\213-0242\Site\Exhibits\213242_MOSR Pipe Rehab CIPP Plats.dwg; Plat 3155 - BCF.ctb
Plot by: dmagill Jul 11, 2014 - 4:43pm

APPENDIX G –BCF-PACP RATING SYSTEM

PACP© Condition Grading System

The Pipeline Assessment and Certification Program (PACP) developed by NASSCO provides a mechanism for creating reliable descriptions of pipe conditions. NASSCO has also developed a system based on the PACP codes to assign a condition rating to pipelines. Requirements of the grading system were as follows:

1. Like the PACP, the grading system should be direct and objective.
2. Provide the ability to qualitatively identify differences in pipe condition between one inspection and subsequent inspections, and to prioritize based on the significance of the defects different pipe segments.

Many other approaches to sewer pipe grading have been used in the United States as well as in other parts of the World. These approaches generally use some type of defect grading that is then used to calculate an overall pipe rating.

It is problematic to develop a single pipe segment rating that fully describes all of the important aspects of a pipe. Therefore the PACP Condition Grading System uses more than one method of rating pipe segment condition including a rating that considers the number of total defects within the pipe segment and a rating that considers the most severe defects within the pipe segment.

The PACP Condition Grading System only considers internal pipe conditions obtained from TV inspection. While other factors such as pipe material, depth, soils, and surface conditions also affect pipe survivability, those factors have not been included in the PACP Condition Grading System. The PACP Condition Grading System should be used only as a tool for screening pipe segment inspections, allowing the User to quickly determine which pipe segments have significant defects. It is expected that as the PACP further develops the PACP Condition Grading System will expand to include other factors.

The PACP Condition Grading System provides condition ratings for Structural Defects and Operation and Maintenance Defects.

Approach

Using the PACP Code Matrix, Each PACP defect code is assigned a condition grade of from 1 to 5. Grades are assigned based on the significance of the defect, extent of

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damage, percentage of flow capacity restriction, or the amount of wall loss due to deterioration.

The PACP Condition Grading System alone is inadequate for determining if a pipe segment should be rehabilitated or replaced. Many other factors in addition to the internal condition of the segment should be considered. The fact that a segment has significant Grade 4 or Grade 5 defects does not necessarily mean the pipe segment should be immediately rehabilitated. Recent experience by PACP Users has shown that pipe segments with serious defects such as hinge failures may remain largely unchanged for many decades if no deterioration factors such as surcharging, roots, or groundwater are present.

What is needed is improved estimates of remaining life or mean time before failure that are based on close monitoring of pipe segments over time. Once we know how much change occurs in pipe segments we can better understand the relationship between defects, deterioration factors, and pipe segment life expectancy. PACP continues to be an excellent tool for benchmarking pipe condition between one inspection and subsequent inspections of the same pipe.

Grades are assigned for two categories, Structural, and O&M defects.
Grades are as follows;
5 - Most significant defect grade
4 – Significant
3 – Moderate defect grade
2 – Minor to Moderate
1 –Minor defect grade

The PACP Condition Grading System results are entirely dependent on the quality of the PACP defect coding. Errors in the coding will directly result in errors in the Grading. All utilities, engineers, and contractors should make sure the data they are using was coded by experienced technicians who have successfully demonstrated their competence through a formal or informal apprenticeship program. PACP data from inexperienced technicians should be checked and corrected as needed. Errors found in coding should be corrected and the errors brought to the attention of the technician.

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Grading of Continuous Defects

The PACP continuous defect feature is used to denote where long portions of a sewer pipe are affected by the same defect, without the User having to repetitively enter point defects. However to develop a grade for the pipe segment, a mechanism is needed to translate a continuous defect into an equivalent number of point defects.

The equivalent number (quantity) of "uninterrupted" and "joint repeating" continuous defects is calculated by dividing the length of the continuous defect by 5. Example, a 6-meter long continuous defect, grade 3, should equate to four Grade 3 defects. Fractions are rounded to the nearest whole number.

Pipe Ratings

The pipe rating is based on the number of occurrences for each condition grade. Ratings are calculated separately for **Structural Defects** and **O&M Defects**. Several ways of expressing pipe segment condition are used by the PACP Condition Grading System as follows.

Segment Grade Scores - Each pipe segment will have a Segment Grade Score for each of the five grades. The number of occurrences of each pipe grade is multiplied by the pipe grade to calculate the segment grade score. Example, six Grade 5 defects would be 6 times 5 and equates to a Segment Grade 5 Score of 30. If a pipe segment had no defects of a particular grade, then the Segment Grade Score for that grade would be 0.

Overall Pipe Rating –The five Segment Grade Scores are added together to calculate the **Overall Pipe Rating. Structural Pipe Ratings** are calculated using only Structural Defect grades, while **O&M Pipe Ratings** are calculated using only O&M Defect grades.

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PACP Quick Rating – The PACP Quick Rating is a shorthand way of expressing the number of occurrences for the two highest severity grades. The PACP Quick Rating is a four character score as follows:

1. The first character is the highest severity grade occurring along the pipe length.
2. The second character is the total number of occurrences of the highest severity grade. If the total number exceeds 9, then alphabetic characters are used as follows- 10 to 14 – A; 15 to 19 – B; 20 to 24 – C; etc.
3. The third character is the next highest severity grade occurring along the pipe length.
4. The fourth character is the total number of the second highest severity grade occurrences, derived as in item 2 above.

For Example

4B27

This immediately shows that no grade 5 defects or grade 3 defects, however 15 to 19 grade 4 defects and seven grade 2 defects were found.

Another Example

3224

Two grade 3 defects and four grade 2 defects, however no grade 5 or grade 4 defects were found.

If a pipe segment only has defects of one grade, the first two characters are the grade and the quantity of defects, and the last two characters are 00 (denoting no other defect grades). A pipe segment with no defects would have a Quick Score of 0000 (all zeros).

The PACP Quick Rating provides the ability to summarize the number and severity of defects found within a pipe segment. As with the Pipe Rating, Quick Structural Ratings

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are calculated using only Structural Defect Grades, and Quick O&M Ratings are calculated using only O&M Defect Grades.

The Quick Rating is an excellent screening tool to determine which pipe segments require closer scrutiny. If a pipe has not defects greater than Grade 1 or 2, then the pipe segment probably does not need any further investigation.

Pipe Ratings Index – This is an indicator of the distribution of defect severity. The Pipe Ratings Index is calculated by dividing the Pipe Rating by the number of defects. For example, the Structural Pipe Ratings Index would be the Structural Pipe Rating divided by the number of structural defects. Pipe Ratings Indexes are calculated for Structural, O&M, and Overall. A pipe segment with a Pipe Rating of zero (0) would have a Pipe Rating Index of zero (0).

Summary

The following procedures are used to calculate pipe segment ratings using the PACP Condition Grading System:

1. Determine the number of occurrences for each condition grade within the pipe segment. Calculate separately for Structural Defect Grades and O&M Defect Grades.
2. Calculate the Segment Grade Score by multiplying the number of occurrences by the respective grade 1 through 5. Calculate the Structural Segment Grade Score and the O&M Segment Grade Score separately, and then add together for the Overall Segment Grade Score.
3. Calculate the Pipe Rating for the pipe segment by adding the Segment Grade Scores. Add all five Structural Segment Grade Scores for the Structural Pipe Rating, and add all five O&M Segment Grade Scores for the O&M Pipe Rating. Add all five Overall Segment Grade Scores for the Overall Pipe Rating.
4. Determine the PACP Quick Rating by calculating the number of occurrences of the two highest severity grades.

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5. Calculate the Pipe Ratings Index by dividing the Pipe Rating by the number of defects. If the pipe has no defects, the Pipe Ratings Index is zero.
6. Verify the PACP defect data used in accurate. The grading is a direct calculation from the defect data, and coding errors will be reflected in grading errors.

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
Structural	Crack (C)	Circumferential (C)		CC	1	
		Longitudinal (L)		CL	2	
		Multiple (M)		CM	3	
		Hinge (CH2)		CH2	4	
		Hinge (CH3)		CH3	5	
		Hinge (CH4)		CH4	5	
		Spiral (S)		CS	2	
Structural	Fracture (F)	Circumferential (C)		FC	2	
		Longitudinal (L)		FL	3	
		Multiple (M)		FM	4	
		Hinge (H2)		FH2	4	
		Hinge (H3)		FH3	5	
		Hinge (H4)		FH4	5	
		Spiral (S)		FS	3	
Structural	Pipe Failures (Silent)	Broken (B)		B	1 clock pos - 3, 2 clock pos - 4, >=3 clock pos - 5	
		Broken (B)	Soil Visible (SV)	BSV	5	
		Broken (B)	Void Visible (V V)	BVV	5	
		Hole (H)		H	1 clock pos - 3, 2 clock pos - 4, >= 3 clock pos - 5	
		Hole (H)	Soil Visible (SV)	HSV	5	
		Hole (H)	Void Visible (V V)	HVV	5	
Structural	Collapse (X)	Pipe (P)		XP	5	
		Brick (B)		XB	5	
Structural	Deformed (D)	(Pipe)		D	<=10% - 4,>10% - 5	
		(Brick)	Horizontally (H)	DH	5	
		(Brick)	Vertically (V)	DV	5	
Structural	Joint (J)	Offset (displaced) (O)	Med (M)	JOM	1	
			Large (L)	JOL	2	
		Separated (open) (S)	Med (M)	JSM	1	
			Large (L)	JSL	2	
		Angular (A)	Med (M)	JAM	1	
			Large (L)	JAL	2	
Structural	Surface Damage Chemical (S)	Roughness Increased (RI)	C	SRIC	1	
		Surface Spalling (SS)	C	SSSC	2	
		Aggregate Visible (AV)	C	SAVC	3	
		Aggregate Projecting (AP)	C	SAPC	3	
		Aggregate Missing (AM)	C	SAMC	4	

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Reinforcement Visible (RV)	C	SRVC	5	
		Reinforcement Projecting (RP)	C	SRPC	3	
		Reinforcement Corroded (RC)	C	SRCC	5	
		Missing Wall (MW)	C	SMWC	5	
		Other (Z)	C	SZC		
Structural	Surface Damage Mechanical (M)	Roughness Increased (RI)	M	SRIM	1	
		Surface Spalling (SS)	M	SSSM	2	
		Aggregate Visible (AV)	M	SAVM	3	
		Aggregate Projecting (AP)	M	SAPM	3	
		Aggregate Missing (AM)	M	SAMM	4	
		Reinforcement Visible (RV)	M	SRVM	5	
		Reinforcement Projecting (RP)	M	SRPM	3	
		Reinforcement Corroded (RC)	M	SRCM	5	
		Missing Wall (MW)	M	SMWM	5	
		Other (Z)	M	SZM	N/A	
Structural	Surface Damage Not Evident (Z)	Roughness Increased (RI)	Z	SRIZ	1	
		Surface Spalling (SS)	Z	SSSZ	2	
		Aggregate Visible (AV)	Z	SAVZ	3	
		Aggregate Projecting (AP)	Z	SAPZ	3	
		Aggregate Missing (AM)	Z	SAMZ	4	
		Reinforcement Visible (RV)	Z	SRVZ	5	
		Reinforcement Projecting (RP)	Z	SRPZ	3	
		Reinforcement Corroded (RC)	Z	SRCZ	5	
		Missing Wall (MW)	Z	SMWZ	5	
		Other (Z)	Z	SZZ	N/A	
Structural	Surface Damage (Metal Pipes)	Corrosion (CP)		SCP	3	
Structural	Lining Features (LF)	Detached (D)		LFD	3	
		Defective End (DE)		LFDE	3	
		Blistered (B)		LFB	3	
		Service Cut Shifted (CS)		LFCS	3	
		Abandoned Connection (AC)		LFAC		
		Overcut Service (OC)		LFOC	3	
		Undercut Service (UC)		LFUC	3	
		Buckled (BK)		LFBK	3	
		Annular Space (AS)		LFAS	3	
		Bulges (BU)		LFBU	3	
		Discoloration (DC)		LFDC	3	
		Delamination (DL)		LFDL	3	
		Pinholes (PH)		LFPH	3	
		Resin Slug (RS)		LFRS	3	
		Wrinkled (W)		LFW	3	
		Other (Z)		LFZ	N/A	
Structural	Weld Failure (WF)	Circumfrential (C)		WFC	2	
		Longitudinal (L)		WFL	2	

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Multiple (M)		WFM	3	
		Spiral (S)		WFS	2	
Structural	Point Repair (RP)	Localized Pipeliner (L)		RPL		
		Localized Pipeliner (L)	Defective (D)	RPLD	4	
		Patch Repair (P)		RPP		
		Patch Repair (P)	Defective (D)	RPPD	4	
		Pipe Replaced (R)		RPR		
		Pipe Replaced (R)	Defective (D)	RPRD	4	
		Other (Z)		RPZ		
		Other (Z)	Defective (D)	RPZD		
Structural	Brickwork (Silent)	Displaced (DB)		DB	3	
		Missing (MB)		MB	4	
		Dropped Invert (DI)		DI	5	
		Missing Mortar	Small	MMS	2	
			Medium	MMM	3	
			Large	MML	3	
O&M	Deposits (D)	Deposits Attached (DA)	Encrustation (E)	DAE		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Grease (G)	DAGS		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Ragging (R)	DAR		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Other (Z)	DAZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Deposits Settled (DS)	Hard/Compacted (C)	DSC		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Fine silt/sand (F)	DSF		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Gravel (G)	DSGV		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Other (Z)	DSZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Deposits Ingress (DN)	Fine silt/sand (F)	DNF		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Gravel (GV)	DNGV		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
			Other (Z)	DNZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
O&M	Roots (R)	Fine (F)	Barrel (B)	RFB		2
			Lateral (L)	RFL		1
			Connecfion (C)	RFC		1
	Roots (R) at a Joint		N/A	RFJ	in software with a J	1
		Tap (T)	Barrel (B)	RTB		3
			Lateral (L)	RTL		2
			Connecfion (C)	RTC		2
	Roots (R) at a Joint		N/A	RTJ		2
		Medium (M)	Barrel (B)	RMB		4
			Lateral (L)	RML		3
			Connecfion (C)	RMC		3
	Roots (R) at a Joint		N/A	RMJ		3
		Ball (B)	Barrel (B)	RBB		5
			Lateral (L)	RBL		4
			Connecfion (C)	RBC		4
	Roots (R) at a Joint		N/A	RBJ		4
O&M	Infiltration (I)	Weeper (W)		IW		2
		Dripper (D)		ID		3
		Runner (R)		IR		4
		Gusher (G)		IG		5
		Stain (S)		IS		
O&M	Obstacles/Obstructions (OB)	Brick or Masonry (B)		OBB		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Pipe Material in Invert (M)		OBM		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Object Intruding Thru Wall (I)		OBI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Object Wedged in Joint (J)		OBJ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Object Thru Connection (C)		OBC		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		External Pipe or Cable In Sewer (P)		OBP		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Built Into Structure (S)		OBS		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Construction Debris (N)		OBN		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Rocks (R)		OBR		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other Objects (Z)		OBZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
O&M	Vermin (V)	Rat (R)		VR		2
		Cockroach (C)		VC		1
		Other (Z)		VZ		1
O&M	Grout Test and Seal (G)	Grout Test Pass (GTP)				
			Joint (J)	GTPJ		
			Lateral (L)	GTPL		
		Grout Test Fail (GTF)				
			Joint (J)	GTFJ		
			Lateral (L)	GTFL		
		Grout Test Unable to Test (GTU)				
			Joint (J)	GTUJ		
			Lateral (L)	GTUL		
		Grout at a Location (not a joint) (GRT)		GRT		
Construction Features	Tap (T)	Factory Made (F)		TF		
			Capped (C)	TFC		
			Abandoned (B)	TFB		
			Defective (D)	TFD		2
			Intruding (I)	TFI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Activity (A)	TFA		
		Break-In/Hammer (B)		TB		
			Capped (C)	TBC		2
			Abandoned (B)	TBB		
			Defective (D)	TBD		3
			Intruding (I)	TBI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Activity (A)	TBA		
		Saddle (S)		TS		
			Capped (C)	TSC		
			Abandoned (B)	TSB		

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
			Defective (D)	TSD		2
			Intruding (I)	TSI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Activity (A)	TSA		
		Rehabilitated (R)		TR		
			Defective (D)	TRD		2
			Intruding (I)	TRI		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
Construction Features	Intruding Seal Material (IS)			IS		
		Sealing Ring (SR)		ISSR		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Hanging (H)	ISSRH		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
			Broken (B)	ISSRB		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Loose, Poorly Fitting (SRL)		ISSRL		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Grout (GT)		ISGT		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
		Other (Z)		ISZ		<=10% - 2, <=20% - 3, <=30% - 4, >30% - 5
Construction Features	Line (L)	Left (L)		LL		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Left/Up (LU)		LLU		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Left/Down (LD)		LLD		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Right (R)		LR		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4

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NASSCO PACP Condition Grading System
Code Matrix

Family	Group	Descriptor	Modifier	Code	Structural Grade	O&M Grade
		Right/Up (RU)		LRU		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Right/Down (RD)		LRD		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Up (U)		LU		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
		Down (D)		LD		<=10 Deg - 1, <=20 Deg 2, >20 Deg - 4
Construction	Access Points (A)					
		Cleanout (CO)		ACO		
			Mainline (M)	ACOM		
			Property (P)	ACOP		
			House (H)	ACOH		
		Discharge Point (DP)		ADP		
		Junction Box (JB)		AJB		
		Meter (M)		AM		
		Manhole (MH)		AMH		
		Other Special Chamber (OC)		AOC		
		Tee Connection (TC)		ATC		
		WW Access Device (WA)		AWA		
		Wet Well (WW)		AWW		
		Catch Basin (CB)		ACB		
		End of Pipe (EP)		AEP		
Other	Miscellaneous (M)	Camera Underwater (CU)		MCU		4
		Dimension/Diam/Shape Change (SC)		MSC		
		General Observation (GO)		MGO		
		General Photograph (GP)		MGP		
		Material Change (MC)		MMC		
		Lining Change (LC)		MLC		
		Pipe Joint Length Change (JL)		MJL		
		Survey Abandoned (SA)		MSA		
		Water Level (WL)		MWL		
			Sag (S)	MWLS	<=30% - 2, <=50% - 3, >50% - 4	
		Water Mark (WM)		MWM		>=50% 4, >=75% 5
		Dye Test (Y)		MY		
			Visible (V)	MYV		5
			Not Visible (N)	MYN		3

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APPENDIX H – BCF-POINT REPAIRS

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

DRAFT

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1	533 W AUDUBON	1054-02	1054-01	8	Polyvinyl Chloride	605	5	HVV
2	5622 W ATHENS AVE	1145-12	1145-09	8	Polyvinyl Chloride	247	4	D
3	7653 N ELLENDALE AVE	1145-43	1145-42	6	Polyvinyl Chloride	339	13	D
4	7653 N ELLENDALE AVE	1145-43	1145-42	6	Polyvinyl Chloride	339	13	D
5	7653 N ELLENDALE AVE	1145-43	1145-42	6	Polyvinyl Chloride	339	13	D
6	4897 W BLUFF AVE	1146-13	1146-12	8	Polyvinyl Chloride	194	4	D
7	2865 W DECATUR AVE	1150-25	1150-24	8	Asbestos Cement Pipe	141	9	H
8	2865 W DECATUR AVE	1150-25	1150-24	8	Asbestos Cement Pipe	141	9	H
9	2865 W DECATUR AVE	1150-25	1150-24	8	Asbestos Cement Pipe	141	9	H
10	7581 N MONTE AVE	1150-33	1150-25	8	Asbestos Cement Pipe	315	8	HSV
11	2483 W BLUFF AVE	1151-06	1151-07	8	Vitrified Clay Pipe	280	5	B
12	7341 N BOND ST	1258-23	1258-24	6	Vitrified Clay Pipe	374	5	B
13	6716 N DANTE AVE	1345-60	1345-61	6	Polyvinyl Chloride	153	8	D
14	6716 N DANTE AVE	1345-60	1345-61	6	Polyvinyl Chloride	153	8	D
15	6776 N VAN NESS BLVD	1350-03	1350-02	8	Vitrified Clay Pipe	272	5	BVV
16	570 E MAGILL AVE	1357-15	1357-16	8	Vitrified Clay Pipe	140	5	BVV
17	705 E PAUL AVE	1357-39	1357-44	8	Vitrified Clay Pipe	528	18	B
18	705 E PAUL AVE	1357-39	1357-44	8	Vitrified Clay Pipe	528	18	B
19	705 E PAUL AVE	1357-39	1357-44	8	Vitrified Clay Pipe	528	18	D
20	637 E PAUL VE	1357-42	1357-43	8	Vitrified Clay Pipe	282	13	B
21	637 E PAUL VE	1357-42	1357-43	8	Vitrified Clay Pipe	282	13	D
22	1155 E FREMONT AVE	1358-12	1358-13	8	Vitrified Clay Pipe	50	5	B
23	6510 N FOURTH ST	1358-21	1358-22	6	Vitrified Clay Pipe	337	5	B
24	6414 N FOURTH ST	1358-23	1358-22	6	Vitrified Clay Pipe	200	104	B
25	6414 N FOURTH ST	1358-23	1358-22	6	Vitrified Clay Pipe	200	104	H
26	1023 E WATHEN AVE	1358-30	1357-54	8	Vitrified Clay Pipe	400	5	BVV
27	1019 E LOS ALTOS AVE	1358-32	1357-56	8	Vitrified Clay Pipe	450	8	B
28	6410 N FLORA AVE	1358-37	1358-47	8	Vitrified Clay Pipe	405	16	B
29	6410 N FLORA AVE	1358-37	1358-47	8	Vitrified Clay Pipe	405	16	B
30	1674 E MAGILL AVE	1359-06	1359-08	8	Vitrified Clay Pipe	500	17	B
31	1580 E MAGILL AVE	1359-09	1359-11	8	Vitrified Clay Pipe	631	8	XP
32	1612 E PALO ALTO AVE	1359-17	1359-19	8	Vitrified Clay Pipe	289	5	B
33	1660 E PALO ALTO AVE	1359-22	1359-23	8	Vitrified Clay Pipe	142	5	B
34	1663 E LOS ALTOS AVE	1359-52	1359-72	8	Vitrified Clay Pipe	630	5	B
35	6057 N POLK AVE	1444-03	1444-02	8	Polyvinyl Chloride	156	5	B
36	5509 W STUART AVE	1444-08	1444-10	6	Polyvinyl Chloride	75	4	D
37	6399 N CLEO AVE	1445-13	1445-14	6	Polyvinyl Chloride	413	5	D

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
38	6178 N MITRE AVE	1446-02	1446-03	6	Polyvinyl Chloride	520	5	B
39	6068 N GENTRY AVE	1448-04	1448-02	8	Vitrified Clay Pipe	134	4	D
40	3645 W ATWATER AVE	1448-56	1448-90	6	Polyvinyl Chloride	400	5	H
41	122 E BULLARD AVE	1456-01	1456-02	6	Cast Iron	450	5	SRC
42	781 E STUART AVE	1457-64	1457-63	8	Vitrified Clay Pipe	450	10	B
43	781 E STUART AVE	1457-64	1457-63	8	Vitrified Clay Pipe	450	10	BVV
44	1411 E ESCALON AVE	1458-24	1458-36	12	Vitrified Clay Pipe	663	5	BVV
45	6307 N EIGHTH ST	1459-04	1459-05	6	Vitrified Clay Pipe	142	10	B
46	6307 N EIGHTH ST	1459-04	1459-05	6	Vitrified Clay Pipe	142	10	B
47	1449 E SAMPLE AVE	1459-10	1459-11	6	Vitrified Clay Pipe	475	5	B
48	4433 W BULLARD AVE	1547-25	1546-13	12	Polyvinyl Chloride	604	5	BSV
49	5610 N ARTHUR AVE	1553-16	1553-17	8	Vitrified Clay Pipe	318	5	BSV
50	5424 N PALM AVE	1553-21	1553-01	8	Vitrified Clay Pipe	489	5	BVV
51	590 W ROBINWOOD LN	1554-31	1554-11	6	Vitrified Clay Pipe	368	5	B
52	5680 N MAROA AVE	1554-44	1554-21	10	Vitrified Clay Pipe	656	15	B
53	5680 N MAROA AVE	1554-44	1554-21	10	Vitrified Clay Pipe	656	15	B
54	5680 N MAROA AVE	1554-44	1554-21	10	Vitrified Clay Pipe	656	15	BSV
55	5422 N BLACKSTONE AVE	1555-28	1555-01	10	Vitrified Clay Pipe	610	5	B
56	50 W BULLARD AVE	1555-41	1555-42	12	Vitrified Clay Pipe	327	5	BVV
57	715 E ROBINWOOD LN	1557-12	1557-13	6	Vitrified Clay Pipe	469	23	B
58	715 E ROBINWOOD LN	1557-12	1557-13	6	Vitrified Clay Pipe	469	23	B
59	715 E ROBINWOOD LN	1557-12	1557-13	6	Vitrified Clay Pipe	469	23	B
60	715 E ROBINWOOD LN	1557-12	1557-13	6	Vitrified Clay Pipe	469	23	B
61	19 E WRENWOOD LN	1557-18	1557-17	6	Vitrified Clay Pipe	469	12	B
62	5563 N FIRST ST	1557-19	1557-20	6	Vitrified Clay Pipe	469	11	B
63	653 E DOVEWOOD LN	1557-20	1557-21	8	Vitrified Clay Pipe	469	5	B
64	5521 N CALLISCH ST	1557-21	1557-16	8	Vitrified Clay Pipe	260	5	H
65	739 E BROWING AVE	1557-31	1557-30	6	Vitrified Clay Pipe	376	10	B
66	739 E BROWING AVE	1557-31	1557-30	6	Vitrified Clay Pipe	376	10	B
67	713 E ROBERTS AVE	1557-33	1557-35	8	Vitrified Clay Pipe	269	10	BVV
68	713 E ROBERTS AVE	1557-33	1557-35	8	Vitrified Clay Pipe	269	10	BVV
69	677 E ROBERTS AVE	1557-36	1557-29	10	Vitrified Clay Pipe	260	5	B
70	585 E ROBERTS AVE	1557-43	1557-38	8	Vitrified Clay Pipe	490	5	B
71	5671 N AUGUSTA ST	1557-57	1557-56	6	Vitrified Clay Pipe	260	5	BSV
72	1236 E BARSTOW AVE	1558-12	1558-13	6	Vitrified Clay Pipe	443	8	B
73	1295 E LOFTUS LN	1558-20	1558-19	8	Vitrified Clay Pipe	210	5	B
74	1255 E ALMENDRA DR	1558-27	1558-28	8	Vitrified Clay Pipe	316	15	BVV

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
75	5543 N BOND ST	1558-29	1558-30	12	Vitrified Clay Pipe	135	8	BVV
76	5411 N BOND ST	1558-31	1558-06	12	Vitrified Clay Pipe	500	8	B
77	5581 N BOND ST	1558-32	1558-29	12	Vitrified Clay Pipe	130	5	B
78	1267 E BULLARD AVE	1558-36	1558-37	6	Vitrified Clay Pipe	511	27	B
79	1267 E BULLARD AVE	1558-36	1558-37	6	Vitrified Clay Pipe	511	27	B
80	1267 E BULLARD AVE	1558-36	1558-37	6	Vitrified Clay Pipe	511	27	B
81	1267 E BULLARD AVE	1558-36	1558-37	6	Vitrified Clay Pipe	511	27	B
82	5616 N FOURTH ST	1558-39	1558-38	8	Vitrified Clay Pipe	165	9	BVV
83	5627 N BOND ST	1558-60	1558-34	8	Vitrified Clay Pipe	528	55	B
84	5627 N BOND ST	1558-60	1558-34	8	Vitrified Clay Pipe	528	55	CH3
85	5627 N BOND ST	1558-60	1558-34	8	Vitrified Clay Pipe	528	55	FH3
86	5420 N NINTH ST	1559-03	1559-44	10	Vitrified Clay Pipe	150	8	B
87	5494 N NINTH ST	1559-14	1559-04	10	Vitrified Clay Pipe	683	5	H
88	1535 E ALMENDRA DR	1559-15	1559-16	6	Vitrified Clay Pipe	590	5	B
89	1568 E LOFTUS LN	1559-16	1559-14	10	Vitrified Clay Pipe	590	15	B
90	1568 E LOFTUS LN	1559-16	1559-14	10	Vitrified Clay Pipe	590	15	B
91	1568 E LOFTUS LN	1559-16	1559-14	10	Vitrified Clay Pipe	590	15	B
92	6537 N TENTH ST	1559-23	1559-22	8	Vitrified Clay Pipe	387	103	CH3
93	5645 N TENTH ST	1559-24	1559-23	8	Vitrified Clay Pipe	687	135	B
94	5645 N TENTH ST	1559-24	1559-23	8	Vitrified Clay Pipe	687	135	B
95	5645 N TENTH ST	1559-24	1559-23	8	Vitrified Clay Pipe	687	135	CH3
96	5106 W SHAW AVE	1645-26	1645-28	6	Cast Iron	185	165	SRC
97	5106 W SHAW AVE	1645-26	1645-28	6	Cast Iron	185	165	SRC
98	5106 W SHAW AVE	1645-26	1645-28	6	Cast Iron	185	165	SRC
99	5123 W MISSION AVE	1645-28	1645-29	6	Cast Iron	212	165	SRC
100	5123 W MISSION AVE	1645-28	1645-29	6	Cast Iron	212	165	SRC
101	1529 W SAN MADELE AVE	1652-05	1652-06	8	Vitrified Clay Pipe	657	8	B
102	1621 W SAN BRUNO AVE	1652-16	1652-17	8	Vitrified Clay Pipe	319	5	B
103	W SAN MADELE AVE	1653-08	1653-09	8	Vitrified Clay Pipe	490	5	B
104	594 W SAN JOSE AVE	1654-14	1654-48	8	Vitrified Clay Pipe	312	5	BSV
105	5212 N MAROA AVE	1654-17	1655-16	12	Vitrified Clay Pipe	659	5	B
106	594 W SAN JOSE AVE	1654-48	1654-15	8	Vitrified Clay Pipe	207	5	B
107	5365 N SAN PABLO AVE	1655-33	1655-53	8	Vitrified Clay Pipe	327	5	B
108	5262 N BLACKSTONE AVE	1655-51	1655-41	6	Vitrified Clay Pipe	470	13	B
109	5262 N BLACKSTONE AVE	1655-51	1655-41	6	Vitrified Clay Pipe	470	13	BSV
110	5321 N FRESNO ST	1656-09	1556-03	10	Vitrified Clay Pipe	656	5	BSV
111	50 E SHAW AVE	1656-16	1656-17	8	Vitrified Clay Pipe	493	29	HVV

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
112	1255 E BARSTOW AVE	1658-15	1658-14	8	Vitrified Clay Pipe	494	20	BSV
113	1257 E BRUNO AVE	1658-18	1658-22	8	Vitrified Clay Pipe	280	17	B
114	1365 E BULLDOG LN	1658-29	1658-30	8	Vitrified Clay Pipe	705	32	B
115	5240 N SIXTH ST	1659-03	1659-04	8	Vitrified Clay Pipe	332	5	B
116	4915 N DALE AVE	1745-21	1745-23	8	Cast Iron	484	5	SRC
117	4915 N DALE AVE	1745-21	1745-23	8	Cast Iron	484	5	SRC
118	4915 N CRYSTAL AVE	1751-28	1751-29	8	Cast Iron	195	0	SRC
119	4707 N WARREN AVE	1751-43	1751-46	10	Vitrified Clay Pipe	190	5	B
120	4717 N WARREN AVE	1751-45	1751-46	8	Vitrified Clay Pipe	52	8	BSV
121	1221 W GETTYSBURG AVE	1752-26	1751-50	8	Vitrified Clay Pipe	623	14	BSV
122	4660 N DELNO AVE	1752-52	1752-54	6	Vitrified Clay Pipe	241	5	B
123	235 SANTA ANA AVE	1753-06	1753-07	8	Vitrified Clay Pipe	658	5	B
124	4710 N SAFFORD AVE	1753-35	1753-36	8	Vitrified Clay Pipe	654	8	B
125	4919 N MAROA AVE	1754-42	1754-43	8	Vitrified Clay Pipe	578	3	H
126	4589 N GLENN AVE	1755-28	1755-27	12	Vitrified Clay Pipe	655	5	BSV
127	4911 N GLENN AVE	1755-38	SN17550001	8	Vitrified Clay Pipe	368	10	B
128	4911 N GLENN AVE	1755-38	SN17550001	8	Vitrified Clay Pipe	368	10	B
129	4911 N GLENN AVE	1755-38	1755-43	8	Vitrified Clay Pipe	518	13	BSV
130	4911 N GLENN AVE	1755-38	1755-43	8	Vitrified Clay Pipe	518	13	CH4
131	4748 N SAN PABLO AVE	1755-56	1755-57	6	Cast Iron	398	380	SRC
132	4748 N SAN PABLO AVE	1755-56	1755-57	6	Cast Iron	398	380	SRC
133	2004 E PORTOLA AVE	1756-10	1756-08	6	Vitrified Clay Pipe	516	25	B
134	2004 E PORTOLA AVE	1756-10	1756-08	6	Vitrified Clay Pipe	516	25	BSV
135	4609 N CLARK ST	1756-11	1756-04	6	Vitrified Clay Pipe	327	9	B
136	4710 N VALERIA ST	1756-19	1756-18	8	Vitrified Clay Pipe	3297	5	BSV
137	2044 E ACACIA AVE	1756-38	1756-70	6	Vitrified Clay Pipe	220	10	B
138	2044 E ACACIA AVE	1756-38	1756-70	6	Vitrified Clay Pipe	220	10	B
139	4947 N THESTA ST	1756-46	1756-45	6	Vitrified Clay Pipe	525	116	B
140	4947 N THESTA ST	1756-46	1756-45	6	Vitrified Clay Pipe	525	116	BVV
141	4944 N DIANA ST	1756-54	1756-63	6	Vitrified Clay Pipe	490	21	B
142	4944 N DIANA ST	1756-54	1756-63	6	Vitrified Clay Pipe	490	21	B
143	4865 N DIANA ST	1756-56	1756-57	6	Vitrified Clay Pipe	232	14	B
144	4863 N DOON WAY	1756-58	1756-59	6	Vitrified Clay Pipe	105	5	BSV
145	4863 N DOON WAY	1756-58	1756-33	6	Vitrified Clay Pipe	480	17	B
146	1914 E SANTA ANA AVE	1756-60	1756-35	8	Vitrified Clay Pipe	500	96	B
147	1914 E SANTA ANA AVE	1756-60	1756-35	8	Vitrified Clay Pipe	500	96	B
148	1914 E SANTA ANA AVE	1756-60	1756-35	8	Vitrified Clay Pipe	500	96	BSV

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
149	4946 N EFFIE ST	1756-61	1756-60	8	Vitrified Clay Pipe	464	156	B
150	4946 N EFFIE ST	1756-61	1756-60	8	Vitrified Clay Pipe	464	156	B
151	4605 N MILLBROOK AVE	1758-04	1758-01	18	Reinforced Concrete Pipe	67	5	HSV
152	3602 E RIALTO AVE	1758-43	1758-44	6	Vitrified Clay Pipe	459	11	B
153	4715 N FIFTH ST	1758-44	1758-42	6	Vitrified Clay Pipe	450	5	B
154	4847 N SIXTH ST	1758-48	1758-46	8	Vitrified Clay Pipe	385	8	B
155	3305 E SIERRA MADRE AVE	1758-61	1758-60	8	Vitrified Clay Pipe	659	16	B
156	1110 E SHAW AVE	1758-67	1758-68	8	Cast Iron	393	5	SRC
157	1110 E SHAW AVE	1758-67	1758-68	8	Cast Iron	393	5	SRC
158	3889 E RIALTO AVE	1759-27	1759-28	8	Vitrified Clay Pipe	280	5	B
159	3633 E FAIRMONT AVE	1759-41	1759-42	6	Vitrified Clay Pipe	130	8	B
160	3542 E FAIRMONT AVE	1759-42	1758-53	8	Vitrified Clay Pipe	489	27	B
161	4450 E SANTA ANNA AVE	1760-32	1760-59	15	Vitrified Clay Pipe	655	5	B
162	2720 TULARE ST	2656-62	2657-35	6	Vitrified Clay Pipe	521	23	B
163	2720 TULARE ST	2656-62	2657-35	6	Vitrified Clay Pipe	521	23	B
164	2720 TULARE ST	2656-62	2657-35	6	Vitrified Clay Pipe	521	23	H
165	2720 TULARE ST	2656-62	2657-35	6	Vitrified Clay Pipe	521	23	H
166	4790 W ASHLAN AVE	1846-06	1846-07	12	Polyvinyl Chloride	660	5	HSV
167	4475 W ILA AVE	1851-57	1851-58	6	Vitrified Clay Pipe	83	3	H
168	1019 W SWIFT AVE	1852-11	1852-12	6	Vitrified Clay Pipe	360	5	B
169	4410 N TEILMAN AVE	1852-40	1852-28	6	Vitrified Clay Pipe	655	5	B
170	4546 N WEST AVE	1852-51	1851-67	6	Vitrified Clay Pipe	561	5	B
171	1046 W INDIANAPOLIS AVE	1852-52	1852-35	6	Vitrified Clay Pipe	498	5	HSV
172	131 W HOLLAND AVE	1853-11	1853-10	6	Vitrified Clay Pipe	480	5	B
173	12 E SWIFT AVE	1853-22	1853-18	6	Vitrified Clay Pipe	453	5	B
174	HOLLAND & PALM INTERSECTION	1853-29	1853-28	6	Vitrified Clay Pipe	510	5	BVV
175	530 E HOLLAND AVE	1854-11	1854-12	8	Vitrified Clay Pipe	666	5	B
176	4285 N BLACKSTONE AVE	1855-32	1855-31	8	Vitrified Clay Pipe	597	5	H
177	2033 E ASHCROFT AVE	1856-04	1856-06	6	Cast Iron	233	200	SRC
178	2033 E ASHCROFT AVE	1856-04	1856-06	6	Cast Iron	233	200	SRC
179	4429 N FRESNO ST	1856-40	1856-42	6	Vitrified Clay Pipe	341	5	B
180	2432 E RICHERT AVE	1856-45	1856-44	6	Vitrified Clay Pipe	527	28	B
181	470 N FRESNO ST	1857-11	1856-36	6	Vitrified Clay Pipe	364	29	B
182	470 N FRESNO ST	1857-11	1856-36	6	Vitrified Clay Pipe	364	29	CH4
183	4455 N AUGUSTA ST	1857-17	1857-26	6	Vitrified Clay Pipe	400	79	B
184	4455 N AUGUSTA ST	1857-17	1857-26	6	Vitrified Clay Pipe	400	79	B
185	3823 E DONNER AVE	1859-05	1859-04	6	Vitrified Clay Pipe	450	96	H

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
186	3823 E DONNER AVE	1859-05	1859-04	6	Vitrified Clay Pipe	450	96	HSV
187	3823 E DONNER AVE	1859-05	1859-04	6	Vitrified Clay Pipe	450	96	HSV
188	3823 E DONNER AVE	1859-05	1859-04	6	Vitrified Clay Pipe	450	96	HVV
189	3823 E DONNER AVE	1859-05	1859-04	6	Vitrified Clay Pipe	450	96	HVV
190	4410 N MERIDIAN AVE	1860-43	1860-51	8	Vitrified Clay Pipe	221	5	BSV
191	4133 W SAGINAW WAY	1947-04	1947-05	6	Polyvinyl Chloride	470	11	D
192	3884 N MANOR AVE	1951-49	1951-51	6	Vitrified Clay Pipe	500	43	B
193	3884 N MANOR AVE	1951-49	1951-51	6	Vitrified Clay Pipe	500	43	B
194	3884 N MANOR AVE	1951-49	1951-51	6	Vitrified Clay Pipe	500	43	B
195	3884 N MANOR AVE	1951-49	1951-51	6	Vitrified Clay Pipe	500	43	B
196	3884 N MANOR AVE	1951-49	1951-51	6	Vitrified Clay Pipe	500	43	B
197	934 W PONTIAC WAY	1952-11	1952-09	6	Vitrified Clay Pipe	633	17	H
198	934 W PONTIAC WAY	1952-11	1952-09	6	Vitrified Clay Pipe	633	17	H
199	934 W PONTIAC WAY	1952-11	1952-09	6	Vitrified Clay Pipe	633	17	H
200	934 W PONTIAC WAY	1952-11	1952-09	6	Vitrified Clay Pipe	633	17	H
201	934 W PONTIAC WAY	1952-11	1952-09	6	Vitrified Clay Pipe	633	17	HSV
202	36 E GRIFFITH WAY	1953-18	1953-17	8	Vitrified Clay Pipe	486	5	B
203	3862 N WILSON AVE	1954-50	1954-54	8	Vitrified Clay Pipe	330	15	B
204	3862 N WILSON AVE	1954-50	1954-54	8	Vitrified Clay Pipe	330	15	BVV
205	3862 N WILSON AVE	1954-50	1954-54	8	Vitrified Clay Pipe	330	15	BVV
206	3927 N BLACKSTONE AVE	1955-31	1955-38	8	Cast Iron	662	0	SRC
207	2516 E HAMPTON WAY	1956-41	1956-08	6	Vitrified Clay Pipe	119	5	B
208	1837 E SAGINAW WAY	1956-43	1956-42	6	Vitrified Clay Pipe	599	51	B
209	1837 E SAGINAW WAY	1956-43	1956-42	6	Vitrified Clay Pipe	599	51	B
210	1837 E SAGINAW WAY	1956-43	1956-42	6	Vitrified Clay Pipe	599	51	B
211	1837 E SAGINAW WAY	1956-43	1956-42	6	Vitrified Clay Pipe	599	51	BSV
212	3902 N MARIPOSA ST	1957-54	1957-66	8	Vitrified Clay Pipe	433	41	B
213	3822 N MARIPOSA ST	1957-66	2057-05	8	Vitrified Clay Pipe	440	16	B
214	4530 E ASHLAN AVE	1960-03	1960-02	15	Polyvinyl Chloride	640	5	B
215	3445 CLOVIS AVE	1966-61	1966-29	6	Vitrified Clay Pipe	250	5	HVV
216	3845 N SHIRLEY AVE	1967-04	1967-05	8	Vitrified Clay Pipe	281	10	B
217	3845 N SHIRLEY AVE	1967-04	1967-05	8	Vitrified Clay Pipe	281	10	BSV
218	5936 E LANSING WAY	1967-12	1967-13	8	Vitrified Clay Pipe	192	5	BSV
219	5971 E PONTIAC WAY	1967-43	1967-44	8	Vitrified Clay Pipe	151	5	B
220	4245 W. ANDREWS AVE	2047-40	2047-41	6	Polyvinyl Chloride	405	10	D
221	4245 W ANDREWS AVE	2047-40	2047-41	6	Polyvinyl Chloride	405	10	D
222	2244 W SHIELDS AVE	2050-38	2050-30	6	Vitrified Clay Pipe	260	5	B

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
223	3216 N WEST AVE	2052-01	2051-15	6	Vitrified Clay Pipe	682	5	XP
224	536 W SHIELDS AVE	2052-05	2052-06	8	Vitrified Clay Pipe	643	16	BSV
225	536 W SHIELDS AVE	2052-05	2052-06	8	Vitrified Clay Pipe	643	16	BSV
226	54 E DAKOTA AVE	2053-04	2053-03	8	Concrete Pipe	654	12	BVV
227	3758 N PALM AVE	2053-05	2053-04	6	Vitrified Clay Pipe	598	53	B
228	3758 N PALM AVE	2053-05	2053-04	6	Vitrified Clay Pipe	598	53	B
229	3758 N PALM AVE	2053-05	2053-04	6	Vitrified Clay Pipe	598	53	B
230	3758 N PALM AVE	2053-05	2053-04	6	Vitrified Clay Pipe	598	53	BSV
231	3717 N PALM AVE	2053-06	2053-28	6	Vitrified Clay Pipe	628	77	H
232	3621 N PALM AVE	2053-10	2053-36	8	Concrete Pipe	627	11	B
233	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	B
234	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	B
235	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	B
236	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	H
237	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	H
238	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	H
239	307 E FOUNTAIN	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	H
240	3219 N PALM AVE	2053-17	2053-51	6	Vitrified Clay Pipe	602	31	B
241	350 W SHIELDS AVE	2053-22	2053-23	6	Vitrified Clay Pipe	232	23	B
242	350 W SHIELDS AVE	2053-22	2053-23	6	Vitrified Clay Pipe	232	23	B
243	95 E GARLAND AVE	2053-28	2053-26	6	Vitrified Clay Pipe	675	34	H
244	93 E FEDORA AVE	2053-30	2053-31	6	Vitrified Clay Pipe	655	31	B
245	93 E FEDORA AVE	2053-30	2053-31	6	Vitrified Clay Pipe	655	31	BVV
246	305 W DAYTON AVE	2053-37	2053-38	8	Concrete Pipe	621	16	H
247	305 W DAYTON AVE	2053-37	2053-38	8	Concrete Pipe	621	16	H
248	43 E CORTLAND AVE	2053-41	2053-40	6	Vitrified Clay Pipe	655	51	B
249	135 E ANDREWS AVE	2053-45	2053-46	6	Vitrified Clay Pipe	454	22	H
250	3797 N EFFIE ST	2056-01	2056-58	6	Vitrified Clay Pipe	715	43	B
251	3797 N EFFIE ST	2056-01	2056-58	6	Vitrified Clay Pipe	715	43	B
252	3797 N EFFIE ST	2056-01	2056-58	6	Vitrified Clay Pipe	715	43	BVV
253	3605 N EFFIE ST	2056-47	2056-45	8	Vitrified Clay Pipe	90	8	XP
254	2704 E DAKOTA AVE	2057-04	2057-02	6	Vitrified Clay Pipe	598	20	XP
255	3686 N AGUSTA ST	2057-39	2057-38	6	Vitrified Clay Pipe	281	17	B
256	2840 E GARLAND	2057-44	2057-43	6	Vitrified Clay Pipe	496	8	B
257	3554 N MARIPOSA ST	2057-46	2057-47	6	Vitrified Clay Pipe	265	27	H
258	3334 N MARIPOSA ST	2057-48	2057-49	6	Vitrified Clay Pipe	437	24	B
259	3320 N ANGUS ST	2057-51	2057-50	6	Vitrified Clay Pipe	356	36	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
260	3536 N ANGUS ST	2057-52	2057-51	6	Vitrified Clay Pipe	561	53	B
261	2818 E FEDORA AVE	2057-55	2057-54	6	Vitrified Clay Pipe	148	15	B
262	2818 E FEDORA AVE	2057-55	2057-54	6	Vitrified Clay Pipe	148	15	B
263	2818 E FEDORA AVE	2057-55	2057-54	6	Vitrified Clay Pipe	148	15	B
264	2904 E FEDORA AVE	2057-56	2057-55	6	Vitrified Clay Pipe	353	8	B
265	3267 N ORCHARD ST	2057-58	2057-60	6	Vitrified Clay Pipe	383	17	B
266	3553 N ORCHARD ST	2057-60	2057-61	6	Vitrified Clay Pipe	455	41	B
267	3553 N ORCHARD ST	2057-60	2057-61	6	Vitrified Clay Pipe	455	41	B
268	3407 N ORCHARD ST	2057-61	2057-62	6	Vitrified Clay Pipe	443	45	B
269	3403 N ORCHARD ST	2057-62	2057-63	6	Vitrified Clay Pipe	329	33	B
270	3662 N ANGUS ST	2057-70	2057-55	6	Vitrified Clay Pipe	286	10	B
271	3662 N ANGUS ST	2057-70	2057-55	6	Vitrified Clay Pipe	286	10	B
272	3443 N MILLBROOK AVE	2058-16	2058-15	6	Vitrified Clay Pipe	308	11	B
273	3452 N THIRD ST	2058-26	2058-29	6	Vitrified Clay Pipe	357	5	B
274	3201 E SHIELDS AVE	2058-31	2058-23	8	Vitrified Clay Pipe	481	12	B
275	3614 N VIRGINIA AVE	2058-34	2058-35	6	Vitrified Clay Pipe	378	8	B
276	3427 E CORTLAND AVE	2058-43	2058-44	6	Vitrified Clay Pipe	552	5	BSV
277	3445 N BOND ST	2058-45	2058-44	6	Vitrified Clay Pipe	275	22	B
278	3445 N BOND ST	2058-45	2058-44	6	Vitrified Clay Pipe	275	22	B
279	3445 N BOND ST	2058-45	2058-44	6	Vitrified Clay Pipe	275	22	B
280	3442 N FOURTH ST	2058-51	2058-52	6	Vitrified Clay Pipe	292	11	B
281	3446 N FIFTH ST	2058-52	2058-54	6	Vitrified Clay Pipe	292	13	B
282	3446 N FIFTH ST	2058-52	2058-54	6	Vitrified Clay Pipe	292	13	B
283	3111 N SIXTH ST	2058-54	2058-15	6	Vitrified Clay Pipe	275	5	B
284	3442 E DAYTON AVE	2058-56	2058-57	6	Vitrified Clay Pipe	558	26	H
285	3524 E DAYTON AVE	2058-57	2058-14	6	Vitrified Clay Pipe	492	13	B
286	3524 E DAYTON AVE	2058-57	2058-14	6	Vitrified Clay Pipe	492	13	B
287	3542 E REDLANDS AVE	2058-59	2058-12	6	Vitrified Clay Pipe	492	18	B
288	3542 E REDLANDS AVE	2058-59	2058-12	6	Vitrified Clay Pipe	492	18	BVV
289	5348 E AIRWAYS BLVD	2064-05	2064-06	8	Polyvinyl Chloride	660	5	H
290	5884 E RAMONA WAY	2067-16	2067-64	8	Cast Iron	307	0	SRC
291	5849 E ANDREWS AVE	2067-44	2067-45	6	Vitrified Clay Pipe	473	5	H
292	2625 N ELLENDALE AVE	2145-05	2145-03	8	Polyvinyl Chloride	205	5	XP
293	2850 N CRYSTAL AVE	2151-16	2151-17	8	Vitrified Clay Pipe	663	70	B
294	1538 W MICHIGAN AVE	2151-34	2151-33	6	Vitrified Clay Pipe	575	49	B
295	3110 N HARRISON AVE	2153-02	2153-14	8	Vitrified Clay Pipe	656	57	B
296	2743 N FARRIS AVE	2153-44	2153-29	6	Vitrified Clay Pipe	600	20	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
297	2743 N FARRIS AVE	2153-44	2153-29	6	Vitrified Clay Pipe	600	20	H
298	2731 N HARRISON AVE	2153-46	2153-30	6	Vitrified Clay Pipe	646	5	B
299	305 E CLINTON AVE	2153-57	2154-83	6	Vitrified Clay Pipe	617	19	B
300	305 E CLINTON AVE	2153-57	2154-83	6	Vitrified Clay Pipe	617	19	D
301	304 E BROWN AVE	2153-62	2154-59	6	Vitrified Clay Pipe	635	11	BSV
302	3117 N WILSON AVE	2154-02	2154-03	6	Vitrified Clay Pipe	484	18	B
303	628 E SIMPSON AVE	2154-08	2154-17	6	Vitrified Clay Pipe	90	5	B
304	1036 E SIMPSON AVE	2154-104	2155-01	8	Vitrified Clay Pipe	638	56	B
305	1036 E SIMPSON AVE	2154-104	2155-01	8	Vitrified Clay Pipe	638	56	B
306	529 E TERRACE AVE	2154-107	2154-71	6	Vitrified Clay Pipe	661	46	BSV
307	2426 N VAN NESS BLVD	2154-108	2154-83	6	Vitrified Clay Pipe	663	14	BVV
308	629 E CORNELL AVE	2154-18	2154-24	6	Vitrified Clay Pipe	165	11	B
309	505 E BROWN AVE	2154-44	2154-59	10	Vitrified Clay Pipe	326	20	B
310	505 E BROWN AVE	2154-44	2154-59	10	Vitrified Clay Pipe	326	20	BSV
311	527 E BROWN AVE	2154-46	2154-44	6	Vitrified Clay Pipe	479	9	B
312	527 E BROWN AVE	2154-46	2154-44	6	Vitrified Clay Pipe	479	9	B
313	2640 N VAN NESS AVE	2154-50	2154-48	6	Vitrified Clay Pipe	177	5	B
314	625 E HARVARD AVE	2154-63	2154-62	6	Vitrified Clay Pipe	121	5	HSV
315	2611 N WISHON AVE	2154-64	2154-65	6	Vitrified Clay Pipe	121	19	BSV
316	2611 N WISHON AVE	2154-64	2154-65	6	Vitrified Clay Pipe	121	19	HVV
317	2611 N WISHON AVE	2154-64	2154-65	6	Vitrified Clay Pipe	121	19	XP
318	2644 N MAROA AVE	2154-69	2154-90	8	Vitrified Clay Pipe	166	16	B
319	745 E TERRACE AVE	2154-75	2154-73	6	Vitrified Clay Pipe	678	5	B
320	2426 N VAN NESS BLVD	2154-85	2154-108	6	Vitrified Clay Pipe	193	15	HSV
321	1044 E CORNELL AVE	2154-94	2155-14	8	Vitrified Clay Pipe	682	72	B
322	1044 E CORNELL AVE	2154-94	2155-14	8	Vitrified Clay Pipe	682	72	H
323	1044 E CORNELL AVE	2154-94	2155-14	8	Vitrified Clay Pipe	682	72	H
324	1323 E SIMPSON AVE	2155-04	2155-03	6	Vitrified Clay Pipe	661	76	BVV
325	1323 E SIMPSON AVE	2155-04	2155-03	6	Vitrified Clay Pipe	661	76	H
326	1545 E SIMPSON AVE	2155-05	2155-04	6	Vitrified Clay Pipe	489	79	B
327	1545 E SIMPSON AVE	2155-05	2155-04	6	Vitrified Clay Pipe	489	79	B
328	1405 E CORNELL AVE	2155-10	2155-09	6	Vitrified Clay Pipe	661	54	H
329	1405 E CORNELL AVE	2155-10	2155-09	6	Vitrified Clay Pipe	661	54	H
330	3006 N GLENN AVE	2155-11	2155-10	6	Vitrified Clay Pipe	488	33	B
331	3006 N GLENN AVE	2155-11	2155-10	6	Vitrified Clay Pipe	488	33	BSV
332	1624 E SIMPSON AVE	2155-12	2155-11	6	Vitrified Clay Pipe	125	12	BSV
333	3003 N BLACKSTONE AVE	2155-13	2155-11	6	Vitrified Clay Pipe	125	9	B

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
334	1243 E MICHIGAN AVE	2155-16	2155-15	8	Vitrified Clay Pipe	661	47	B
335	1337 E PRINCTON AVE	2155-24	2155-23	6	Vitrified Clay Pipe	661	44	B
336	2809 N BLACKSTONE AVE	2155-25	2155-24	8	Vitrified Clay Pipe	488	45	B
337	1620 N MICHIGAN AVE	2155-26	2155-25	6	Vitrified Clay Pipe	125	24	B
338	1145 E TERRACE AVE	2155-45	2155-46	6	Concrete Pipe	661	7	H
339	910 E TERRACE AVE	2155-50	2154-92	6	Vitrified Clay Pipe	588	16	BVV
340	3004 N MARIPOSA ST	2157-06	2157-05	8	Vitrified Clay Pipe	284	33	BVV
341	2514 N ANGUS ST	2157-42	2157-43	6	Concrete Pipe	638	170	H
342	2415 N FIRST ST	2157-47	2157-46	6	Concrete Pipe	617	20	H
343	3426 E SIMPSON AVE	2158-03	2158-04	6	Vitrified Clay Pipe	690	21	B
344	3426 E SIMPSON AVE	2158-03	2158-04	6	Vitrified Clay Pipe	690	21	B
345	3426 E SIMPSON AVE	2158-03	2158-04	6	Vitrified Clay Pipe	690	21	B
346	2836 N BOND AVE	2158-11	2158-10	6	Vitrified Clay Pipe	217	5	B
347	3401 E HARVARD AVE	2158-31	2158-38	8	Vitrified Clay Pipe	280	11	BVV
348	3012 N SEVENTH ST	2159-16	2159-01	6	Vitrified Clay Pipe	541	40	B
349	3012 N SEVENTH ST	2159-16	2159-01	6	Vitrified Clay Pipe	541	40	BVV
350	2030 N WEST AVE	2252-43	2251-25	6	Vitrified Clay Pipe	668	218	BVV
351	438 W WELDON AVE	2253-41	2253-51	8	Vitrified Clay Pipe	647	18	B
352	1749 N ARTHUR AVE	2253-81	2253-78	6	Vitrified Clay Pipe	632	78	B
353	1749 N ARTHUR AVE	2253-81	2253-78	6	Vitrified Clay Pipe	632	78	B
354	622 E CLINTON AVE	2254-06	2254-05	6	Vitrified Clay Pipe	441	12	BSV
355	740 E CLINTON AVE	2254-07	2254-06	6	Vitrified Clay Pipe	400	15	HVV
356	2325 N MAROA AVE	2254-08	2254-11	6	Vitrified Clay Pipe	409	24	HSV
357	2325 N MAROA AVE	2254-08	2254-11	6	Vitrified Clay Pipe	409	24	HVV
358	2325 N MAROA AVE	2254-08	2254-11	6	Vitrified Clay Pipe	409	24	HVV
359	904 E YALE AVE	2254-13	2254-23	8	Vitrified Clay Pipe	320	14	B
360	805 E YALE AVE	2254-14	2254-13	6	Vitrified Clay Pipe	455	36	B
361	805 E YALE AVE	2254-14	2254-13	6	Vitrified Clay Pipe	455	36	B
362	805 E YALE AVE	2254-14	2254-13	6	Vitrified Clay Pipe	455	36	B
363	2220 N VAN NESS BLVD	2254-15	2254-14	6	Vitrified Clay Pipe	815	35	B
364	2220 N VAN NESS BLVD	2254-15	2254-14	6	Vitrified Clay Pipe	815	35	B
365	2220 N VAN NESS BLVD	2254-15	2254-14	6	Vitrified Clay Pipe	815	35	B
366	2220 N VAN NESS BLVD	2254-15	2254-14	6	Vitrified Clay Pipe	815	35	HVV
367	2124 N VAN NESS BLVD	2254-21	2254-22	6	Vitrified Clay Pipe	838	40	B
368	901 E WELDON AVE	2254-26	2255-01	8	Vitrified Clay Pipe	158	11	BSV
369	850 E CAMBRIDGE AVE	2254-27	2254-25	6	Vitrified Clay Pipe	434	5	B
370	2019 N WILSON AVE	2254-33	2254-34	6	Vitrified Clay Pipe	165	12	H

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
371	2019 N WILSON AVE	2254-33	2254-34	6	Vitrified Clay Pipe	165	12	H
372	1922 N ECHO AVE	2254-38	2254-39	6	Vitrified Clay Pipe	859	24	B
373	N WISHON AVE	2254-42	2254-41	6	Vitrified Clay Pipe	454	5	H
374	1808 N WISHON AVE	2254-42	2254-41	6	Vitrified Clay Pipe	454	5	HVV
375	1814 N ECHO AVE	2254-44	2254-42	6	Vitrified Clay Pipe	851	33	B
376	1814 N ECHO AVE	2254-44	2254-42	6	Vitrified Clay Pipe	851	33	B
377	1814 N ECHO AVE	2254-44	2254-42	6	Vitrified Clay Pipe	851	33	HSV
378	1138 E VASSAR AVE	2255-21	2255-22	6	Vitrified Clay Pipe	344	9	D
379	1138 E YALE AVE	2255-25	2255-23	6	Vitrified Clay Pipe	465	5	BVV
380	1522 E YALE AVE	2255-28	2255-27	6	Concrete Pipe	364	215	B
381	1610 E YALE AVE	2255-29	2255-28	6	Concrete Pipe	417	320	HVV
382	2104 N COLLEGE AVE	2255-41	2255-59	6	Vitrified Clay Pipe	333	20	B
383	2104 N COLLEGE AVE	2255-41	2255-59	6	Vitrified Clay Pipe	333	20	B
384	2104 N COLLEGE AVE	2255-41	2255-59	6	Vitrified Clay Pipe	333	20	B
385	2104 N COLLEGE AVE	2255-41	2255-59	6	Vitrified Clay Pipe	333	20	B
386	2929 E NORMAL AVE	2257-27	2257-28	8	Cast Iron	395	5	SRC
387	4556 E UNIVERSITY AVE	2260-09	2260-25	6	Cast Iron	350	10	BSV
388	4556 E UNIVERSITY AVE	2260-09	2260-25	6	Cast Iron	350	10	BVV
389	4556 E UNIVERSITY AVE	2260-09	2260-25	6	Cast Iron	350	10	SRC
390	4207 E WELDON	2260-38	2259-32	8	Vitrified Clay Pipe	296	10	H
391	4207 E WELDON	2260-38	2259-32	8	Vitrified Clay Pipe	296	10	H
392	537 W HAMMOND AVE	2352-09	2352-08	6	Vitrified Clay Pipe	617	104	B
393	537 W HAMMOND AVE	2352-09	2352-08	6	Vitrified Clay Pipe	617	104	B
394	734 W HAMMOND AVE	2352-14	2352-71	8	Polyvinyl Chloride	266	19	B
395	734 W HAMMOND AVE	2352-14	2352-71	8	Polyvinyl Chloride	266	19	H
396	1225 N VAGEDES AVE	2352-17	2352-07	6	Vitrified Clay Pipe	460	9	HSV
397	1315 N FRUIT AVE	2352-20	2352-19	6	Vitrified Clay Pipe	667	58	B
398	1315 N FRUIT AVE	2352-20	2352-19	6	Vitrified Clay Pipe	667	58	BVV
399	1315 N FRUIT AVE	2352-20	2352-19	6	Vitrified Clay Pipe	667	58	D
400	1315 N FRUIT AVE	2352-20	2352-19	6	Vitrified Clay Pipe	667	58	D
401	43 W OLIVE AVE	2353-05	2353-04	8	Vitrified Clay Pipe	331	8	B
402	1228 N VAGEDES AVE	2353-09	2353-07	6	Vitrified Clay Pipe	120	5	BSV
403	1224 N FARRIS AVE	2353-23	2353-22	6	Vitrified Clay Pipe	137	15	BVV
404	1208 N HARRISON AVE	2353-26	2353-24	6	Vitrified Clay Pipe	230	5	B
405	244 E HEDGES AVE	2353-30	2353-28	14	Vitrified Clay Pipe	506	20	HSV
406	1284 N SAFFORD AVE	2353-31	2353-30	6	Vitrified Clay Pipe	331	8	BVV
407	1219 N SAFFORD AVE	2353-32	2353-02	6	Vitrified Clay Pipe	615	36	H

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
408	1295 N HARRISON AVE	2353-36	2353-34	6	Vitrified Clay Pipe	174	5	H
409	222 W OLIVE AVE	2353-41	2353-15	6	Vitrified Clay Pipe	501	32	B
410	222 W OLIVE AVE	2353-41	2353-15	6	Vitrified Clay Pipe	501	32	B
411	222 W OLIVE AVE	2353-41	2353-15	6	Vitrified Clay Pipe	501	32	B
412	222 W OLIVE AVE	2353-41	2353-15	6	Vitrified Clay Pipe	501	32	D
413	316 W OLIVE AVE	2353-42	2353-12	6	Vitrified Clay Pipe	460	8	B
414	144 E HOME AVE	2353-61	2353-49	6	Vitrified Clay Pipe	641	9	HVV
415	1407 N FARRIS AVE	2353-65	2353-52	6	Vitrified Clay Pipe	570	44	H
416	1407 N THORNE AVE	2353-67	2353-46	6	Vitrified Clay Pipe	704	28	B
417	1407 N THORNE AVE	2353-67	2353-46	6	Vitrified Clay Pipe	704	28	B
418	1405 N ARTHUR AVE	2353-69	2353-44	6	Vitrified Clay Pipe	704	65	B
419	1405 N VAGEDES AVE	2353-70	2353-43	6	Vitrified Clay Pipe	570	5	HVV
420	1507 N ARTHUR AVE	2353-73	2353-69	6	Vitrified Clay Pipe	604	70	B
421	1532 N SAFFORD AVE	2353-76	2353-60	6	Vitrified Clay Pipe	621	8	B
422	405 E OLIVE AVE	2354-11	2354-91	6	Vitrified Clay Pipe	115	13	B
423	405 E OLIVE AVE	2354-11	2354-91	6	Vitrified Clay Pipe	115	13	XP
424	1218 N FERGER AVE	2354-12	2354-10	6	Vitrified Clay Pipe	662	144	H
425	437 E OLIVE AVE	2354-14	2354-07	6	Vitrified Clay Pipe	395	14	BSV
426	645 E OLIVE AVE	2354-16	2354-04	6	Vitrified Clay Pipe	405	22	B
427	645 E OLIVE AVE	2354-16	2354-04	6	Vitrified Clay Pipe	405	22	B
428	858 E HEDGES AVE	2354-21	2354-96	12	Vitrified Clay Pipe	215	8	B
429	1320 N WISHON AVE	2354-22	2354-21	6	Vitrified Clay Pipe	360	31	B
430	1320 N WISHON AVE	2354-22	2354-21	6	Vitrified Clay Pipe	360	31	H
431	733 E FERN AVE	2354-23	2354-18	6	Vitrified Clay Pipe	414	26	H
432	1320 N ECHO AVE	2354-26	2354-15	6	Vitrified Clay Pipe	355	20	H
433	1319 N FERGER AVE	2354-29	2354-12	6	Vitrified Clay Pipe	150	14	BSV
434	1350 N ECHO AVE	2354-33	2354-26	6	Vitrified Clay Pipe	490	29	B
435	645 W HEDGES AVE	2354-35	2354-25	6	Vitrified Clay Pipe	475	23	BSV
436	1360 N LINDEN AVE	2354-36	2354-39	6	Vitrified Clay Pipe	390	33	B
437	1360 N LINDEN AVE	2354-36	2354-39	6	Vitrified Clay Pipe	390	33	H
438	1360 N LINDEN AVE	2354-36	2354-39	6	Vitrified Clay Pipe	390	33	H
439	1394 N LINDEN AVE	2354-37	2354-38	6	Vitrified Clay Pipe	150	16	B
440	1394 N LINDEN AVE	2354-37	2354-38	6	Vitrified Clay Pipe	150	16	B
441	1394 N LINDEN AVE	2354-38	2354-24	8	Vitrified Clay Pipe	509	15	B
442	748 E PINE AVE	2354-46	2354-47	6	Vitrified Clay Pipe	329	8	BSV
443	1460 N WILSON AVE	2354-53	2354-31	6	Vitrified Clay Pipe	400	17	B
444	655 E PINE AVE	2354-58	2354-60	6	Vitrified Clay Pipe	414	40	B

BCF-2 POINT REPAIRS
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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
445	655 E PINE AVE	2354-58	2354-60	6	Vitrified Clay Pipe	414	40	H
446	655 E PINE AVE	2354-58	2354-60	6	Vitrified Clay Pipe	414	40	H
447	655 E PINE AVE	2354-58	2354-60	6	Vitrified Clay Pipe	414	40	H
448	655 E PINE AVE	2354-58	2354-60	6	Vitrified Clay Pipe	414	40	H
449	655 E PINE AVE	2354-58	2354-60	6	Vitrified Clay Pipe	414	40	H
450	701 E PINE AVE	2354-59	2354-60	8	Vitrified Clay Pipe	20	8	BSV
451	742 E CARMEN AVE	2354-71	2354-70	6	Vitrified Clay Pipe	120	9	H
452	742 E CARMEN AVE	2354-72	2354-71	6	Vitrified Clay Pipe	40	15	H
453	1460 N WILSON AVE	2354-76	2354-52	6	Vitrified Clay Pipe	415	11	BSV
454	1550 N WILSON AVE	2354-79	2354-76	6	Vitrified Clay Pipe	415	51	H
455	1549 N ECHO AVE	2354-81	2354-92	6	Vitrified Clay Pipe	864	57	B
456	1549 N ECHO AVE	2354-81	2354-92	6	Vitrified Clay Pipe	864	57	B
457	1549 N ECHO AVE	2354-81	2354-92	6	Vitrified Clay Pipe	864	57	B
458	1549 N ECHO AVE	2354-81	2354-92	6	Vitrified Clay Pipe	864	57	H
459	641 E CARMEN AVE	2354-82	2354-84	6	Vitrified Clay Pipe	489	8	HVV
460	708 E CARMEN AVE	2354-84	2354-73	8	Vitrified Clay Pipe	300	13	B
461	708 E CARMEN AVE	2354-84	2354-73	8	Vitrified Clay Pipe	300	13	BSV
462	743 E CARMEN AVE	2354-85	2354-84	6	Vitrified Clay Pipe	328	5	H
463	855 E CARMEN AVE	2354-86	2354-88	6	Vitrified Clay Pipe	403	8	BVV
464	822 E CARMEN AVE	2354-90	2354-89	6	Vitrified Clay Pipe	378	24	B
465	405 E OLIVE AVE	2354-91	2354-09	6	Vitrified Clay Pipe	30	17	B
466	405 E OLIVE AVE	2354-91	2354-09	6	Vitrified Clay Pipe	30	17	XP
467	1002 E OLIVE AVE	2355-15	2354-01	12	Vitrified Clay Pipe	338	38	B
468	1229 N BLACKSTONE AVE	2355-24	2355-25	8	Cast Iron	166	5	SRC
469	1229 N BLACKSTONE AVE	2355-24	2355-25	8	Cast Iron	166	5	SRC
470	1649 E OLIVE AVE	2355-25	2355-01	8	Cast Iron	186	35	SRC
471	1649 E OLIVE AVE	2355-25	2355-01	8	Cast Iron	186	35	SRC
472	1302 N DEL MAR AVE	2355-67	2355-88	6	Vitrified Clay Pipe	479	62	B
473	1302 N DEL MAR AVE	2355-67	2355-88	6	Vitrified Clay Pipe	479	62	B
474	1302 N DEL MAR AVE	2355-67	2355-88	6	Vitrified Clay Pipe	479	62	B
475	1305 E OLIVE AVE	2355-88	2355-08	6	Vitrified Clay Pipe	471	155	B
476	1305 E OLIVE AVE	2355-88	2355-08	6	Vitrified Clay Pipe	471	155	B
477	1305 E OLIVE AVE	2355-88	2355-08	6	Vitrified Clay Pipe	471	155	HVV
478	1295 N THESTA ST	2356-20	2356-24	6	Vitrified Clay Pipe	570	9	B
479	3237 E PINE AVE	2358-62	2358-39	6	Vitrified Clay Pipe	199	9	BVV
480	1501 N CHESTNUT AVE	2361-29	2362-76	8	Cast Iron	635	510	SRC
481	1501 N CHESTNUT AVE	2361-29	2362-76	8	Cast Iron	635	510	SRC

BCF-2 POINT REPAIRS
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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
482	4734 E CARMEN AVE	2361-33	2361-32	8	Vitrified Clay Pipe	427	8	B
483	5096 E CARMEN AVE	2363-76	2363-77	8	Vitrified Clay Pipe	440	28	BSV
484	1444 W WHITE AVE	2451-23	2451-24	8	Vitrified Clay Pipe	220	10	HSV
485	1444 W WHITE AVE	2451-23	2451-24	8	Vitrified Clay Pipe	220	10	HSV
486	1005 N VAGEDES AVE	2452-16	2452-17	6	Vitrified Clay Pipe	505	50	B
487	1005 N VAGEDES AVE	2452-16	2452-17	6	Vitrified Clay Pipe	505	50	BVV
488	915 N VAGEDES AVE	2452-17	2453-56	6	Vitrified Clay Pipe	551	44	B
489	915 N VAGEDES AVE	2452-17	2453-56	6	Vitrified Clay Pipe	551	44	H
490	915 N VAGEDES AVE	2452-17	2453-56	6	Vitrified Clay Pipe	551	44	H
491	1105 N ARTHUR AVE	2453-01	2453-02	6	Vitrified Clay Pipe	505	53	B
492	1105 N ARTHUR AVE	2453-01	2453-02	6	Vitrified Clay Pipe	505	53	BVV
493	1105 N ARTHUR AVE	2453-01	2453-02	6	Vitrified Clay Pipe	505	53	BVV
494	1105 N ARTHUR AVE	2453-01	2453-02	6	Vitrified Clay Pipe	505	53	BVV
495	715 N WEBER AVE	2453-03	2453-04	6	Vitrified Clay Pipe	514	86	B
496	715 N WEBER AVE	2453-03	2453-04	6	Vitrified Clay Pipe	514	86	B
497	715 N WEBER AVE	2453-03	2453-04	6	Vitrified Clay Pipe	514	86	B
498	715 N WEBER AVE	2453-03	2453-04	6	Vitrified Clay Pipe	514	86	HVV
499	905 N ADOLINE AVE	2453-08	2453-07	6	Vitrified Clay Pipe	455	10	B
500	905 N ADOLINE AVE	2453-08	2453-07	6	Vitrified Clay Pipe	455	10	BVV
501	217 E THOMAS AVE	2453-43	2453-44	6	Vitrified Clay Pipe	585	48	BSV
502	217 E THOMAS AVE	2453-43	2453-44	6	Vitrified Clay Pipe	585	48	BVV
503	217 E THOMAS AVE	2453-43	2453-44	6	Vitrified Clay Pipe	585	48	BVV
504	517 N FARRIS AVE	2453-49	2453-50	6	Vitrified Clay Pipe	466	19	H
505	1003 N ECHO AVE	2454-11	2454-12	6	Vitrified Clay Pipe	320	28	B
506	1030 N FULTON	2455-02	2455-03	6	Cast Iron	474	0	SRC
507	733 N COLLEGE AVE	2455-09	2455-08	8	Vitrified Clay Pipe	437	52	B
508	733 N COLLEGE AVE	2455-09	2455-08	8	Vitrified Clay Pipe	437	52	H
509	545 PARK AVE	2455-20	2555-82	6	Cast Iron	732	32	H
510	545 PARK AVE	2455-20	2555-82	6	Cast Iron	732	32	H
511	545 PARK AVE	2455-20	2555-82	6	Cast Iron	732	32	H
512	545 PARK AVE	2455-20	2555-82	6	Cast Iron	732	32	H
513	545 PARK AVE	2455-20	2555-82	6	Cast Iron	732	32	H
514	545 PARK AVE	2455-20	2555-82	6	Cast Iron	732	32	H
515	914 N GLENN AVE	2455-53	2455-45	8	Vitrified Clay Pipe	336	23	B
516	1506 E LA SALLE AVE	2455-61	2455-53	8	Vitrified Clay Pipe	329	14	B
517	733 N COLLEGE	2455-89	2455-09	6	Vitrified Clay Pipe	156	5	HSV
518	2011 E TYLER AVE	2456-60	2456-59	6	Vitrified Clay Pipe	476	37	B

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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
519	2011 E TYLER AVE	2456-60	2456-59	6	Vitrified Clay Pipe	476	37	BSV
520	1004 N FRESNO ST	2456-65	2456-56	10	Concrete Pipe	92	15	B
521	1721 E HARVEY AVE	2456-70	2456-26	6	Vitrified Clay Pipe	210	13	BVV
522	1721 E HARVEY AVE	2456-70	2456-26	6	Vitrified Clay Pipe	210	13	HSV
523	2558 E LEWIS AVE	2457-02	2456-55	12	Concrete Pipe	449	290	B
524	2558 E LEWIS AVE	2457-02	2456-55	12	Concrete Pipe	449	290	B
525	3027 E WHITE AVE	2457-25	2457-19	6	Vitrified Clay Pipe	272	5	H
526	1100 N FRESNO ST	2457-35	2457-01	6	Vitrified Clay Pipe	409	62	BSV
527	1100 N FRESNO ST	2457-35	2457-01	6	Vitrified Clay Pipe	409	62	BSV
528	1011 N AUGUSTA ST	2457-36	2456-65	6	Vitrified Clay Pipe	409	55	B
529	1011 N AUGUSTA ST	2457-36	2456-65	6	Vitrified Clay Pipe	409	55	BSV
530	1011 N AUGUSTA ST	2457-36	2456-65	6	Vitrified Clay Pipe	409	55	BSV
531	918 N FRESNO ST	2457-38	2456-53	6	Vitrified Clay Pipe	409	13	B
532	3099 E BELMONT AVE	2457-48	2457-23	6	Vitrified Clay Pipe	618	5	BSV
533	3236 E HARVEY AVE	2458-52	2458-54	6	Vitrified Clay Pipe	425	24	BVV
534	3236 E HARVEY AVE	2458-52	2458-54	6	Vitrified Clay Pipe	425	24	H
535	3209 E THOMAS AVE	2458-54	2458-60	8	Vitrified Clay Pipe	180	21	B
536	3167 E BELMONT AVE	2458-56	2458-54	8	Vitrified Clay Pipe	730	66	B
537	3167 E BELMONT AVE	2458-56	2458-54	8	Vitrified Clay Pipe	730	66	BSV
538	3167 E BELMONT AVE	2458-56	2458-54	8	Vitrified Clay Pipe	730	66	BVV
539	3167 E BELMONT AVE	2458-56	2458-54	8	Vitrified Clay Pipe	730	66	BVV
540	667 N SECOND ST	2458-60	2458-59	8	Vitrified Clay Pipe	150	32	BVV
541	3123 E BELMONT AVE	2458-65	2458-59	6	Vitrified Clay Pipe	730	41	B
542	3117 E THOMAS AVE	2458-76	2458-59	6	Vitrified Clay Pipe	425	27	BVV
543	3778 E WHITE AVE	2459-60	2459-61	8	Vitrified Clay Pipe	400	5	B
544	4345 E WHITE AVE	2460-25	2460-27	8	Vitrified Clay Pipe	330	5	B
545	1144 W FRANKLIN AVE	2552-05	2552-04	8	Vitrified Clay Pipe	308	16	BSV
546	1144 W FRANKLIN AVE	2552-05	2552-04	8	Vitrified Clay Pipe	308	16	BSV
547	620 E BELMONT AVE	2554-25	2554-05	6	Vitrified Clay Pipe	626	13	B
548	512 E FRANKLIN AVE	2554-36	2554-27	8	Vitrified Clay Pipe	406	16	B
549	512 E FRANKLIN AVE	2554-36	2554-27	8	Vitrified Clay Pipe	406	16	B
550	202 N H ST	2554-41	2554-40	6	Vitrified Clay Pipe	24	13	B
551	202 N H ST	2554-41	2554-40	6	Vitrified Clay Pipe	24	13	BSV
552	279 N ECHO AVE	2554-43	2554-92	6	Vitrified Clay Pipe	140	20	H
553	164 N ROOSEVELT AVE	2554-45	2554-46	6	Vitrified Clay Pipe	211	8	B
554	108 N H ST	2554-49	2554-47	6	Polyvinyl Chloride	233	34	B
555	108 N H ST	2554-49	2554-47	6	Polyvinyl Chloride	233	34	BSV

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
556	108 N H ST	2554-49	2554-47	6	Polyvinyl Chloride	233	34	HSV
557	730 E FRANKLIN AVE	2554-53	2554-55	6	Vitrified Clay Pipe	223	31	B
558	730 E FRANKLIN AVE	2554-53	2554-55	6	Vitrified Clay Pipe	223	31	B
559	730 E FRANKLIN AVE	2554-53	2554-55	6	Vitrified Clay Pipe	223	31	BSV
560	730 E FRANKLIN AVE	2554-53	2554-55	6	Vitrified Clay Pipe	223	31	BVV
561	2121 H ST	2554-74	2554-73	10	Vitrified Clay Pipe	315	17	B
562	2121 H ST	2554-74	2554-73	10	Vitrified Clay Pipe	315	17	B
563	607 E DIVISADERO ST	2554-78	2554-75	6	Vitrified Clay Pipe	340	46	BSV
564	607 E DIVISADERO ST	2554-78	2554-75	6	Vitrified Clay Pipe	340	46	BVV
565	742 E VOORMAN AVE	2554-79	2554-78	6	Vitrified Clay Pipe	405	59	B
566	742 E VOORMAN AVE	2554-79	2554-78	6	Vitrified Clay Pipe	405	59	B
567	742 E VOORMAN AVE	2554-79	2554-78	6	Vitrified Clay Pipe	405	59	BVV
568	607 E DIVISADERO ST	2554-88	2554-75	12	Vitrified Clay Pipe	178	9	BSV
569	205 N H ST	2554-90	2553-49	8	Vitrified Clay Pipe	671	18	BSV
570	1330 E BELMONT AVE	2555-11	2555-28	6	Vitrified Clay Pipe	635	5	B
571	1224 E FRANKLIN AVE	2555-21	2555-26	8	Cast Iron	750	0	SRC
572	252 N POPLAR AVE	2555-37	2555-48	6	Vitrified Clay Pipe	435	29	H
573	158 N POPLAR AVE	2555-48	2555-54	6	Vitrified Clay Pipe	490	12	H
574	214 N SAN PABLO	2555-57	2555-56	6	Vitrified Clay Pipe	435	19	B
575	214 N SAN PABLO	2555-57	2555-56	6	Vitrified Clay Pipe	435	19	B
576	214 N SAN PABLO	2555-57	2555-56	6	Vitrified Clay Pipe	435	19	BVV
577	1537 E VOORMAN AVE	2555-66	2555-59	6	Vitrified Clay Pipe	180	14	B
578	16 N SAN PABLO AVE	2555-70	2555-67	8	Vitrified Clay Pipe	424	18	B
579	297 N BLACKSTONE AVE	2556-01	2555-40	15	Vitrified Clay Pipe	375	5	B
580	215 N EFFIE ST	2556-11	2556-09	8	Vitrified Clay Pipe	630	8	B
581	385 N CLARK ST	2556-19	2556-20	8	Vitrified Clay Pipe	653	8	XP
582	275 N DIANA ST	2556-20	2556-15	15	Vitrified Clay Pipe	330	10	B
583	2329 E GRANT AVE	2556-45	2556-46	6	Vitrified Clay Pipe	266	41	B
584	2329 E GRANT AVE	2556-45	2556-46	6	Vitrified Clay Pipe	266	41	BSV
585	2329 E GRANT AVE	2556-45	2556-46	6	Vitrified Clay Pipe	266	41	BSV
586	2329 E GRANT AVE	2556-45	2556-46	6	Vitrified Clay Pipe	266	41	HSV
587	2329 E GRANT AVE	2556-45	2556-46	6	Vitrified Clay Pipe	266	41	HSV
588	451 N HOWARD ST	2556-46	2556-47	6	Vitrified Clay Pipe	156	30	BVV
589	384 N THESTA ST	2556-99	2556-44	8	Vitrified Clay Pipe	630	15	B
590	384 N THESTA ST	2556-99	2556-44	8	Vitrified Clay Pipe	630	15	B
591	384 N THESTA ST	2556-99	2556-44	8	Vitrified Clay Pipe	630	15	B
592	2734 N MCKENZIE AVE	2557-16	2557-15	10	Vitrified Clay Pipe	331	5	B

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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
593	270 N MARIPOSA ST	2557-20	2557-15	8	Vitrified Clay Pipe	320	19	B
594	270 N MARIPOSA ST	2557-20	2557-15	8	Vitrified Clay Pipe	320	19	BSV
595	2988 E BELMONT AVE	2557-26	2557-27	6	Vitrified Clay Pipe	273	33	B
596	2988 E BELMONT AVE	2557-26	2557-27	6	Vitrified Clay Pipe	273	33	B
597	2988 E BELMONT AVE	2557-26	2557-27	6	Vitrified Clay Pipe	273	33	H
598	450 N ORCHARD ST	2557-30	2557-31	8	Vitrified Clay Pipe	330	5	B
599	3017 E MADISON AVE	2557-33	2557-30	6	Vitrified Clay Pipe	615	26	B
600	3017 E MADISON AVE	2557-33	2557-30	6	Vitrified Clay Pipe	615	26	B
601	3017 E MADISON AVE	2557-33	2557-30	6	Vitrified Clay Pipe	615	26	B
602	3017 E MADISON AVE	2557-33	2557-30	6	Vitrified Clay Pipe	615	26	H
603	3037 E GRANT AVE	2557-34	2557-31	6	Vitrified Clay Pipe	614	40	B
604	3037 E GRANT AVE	2557-34	2557-31	6	Vitrified Clay Pipe	614	40	B
605	3037 E GRANT AVE	2557-34	2557-31	6	Vitrified Clay Pipe	614	40	B
606	3037 E GRANT AVE	2557-34	2557-31	6	Vitrified Clay Pipe	614	40	B
607	3037 E GRANT AVE	2557-34	2557-31	6	Vitrified Clay Pipe	614	40	BSV
608	221 N ORCHARD ST	2557-49	2557-50	6	Vitrified Clay Pipe	302	13	B
609	221 N ORCHARD ST	2557-49	2557-50	6	Vitrified Clay Pipe	302	13	B
610	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
611	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
612	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
613	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
614	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
615	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
616	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
617	137 N ORCHARD ST	2557-52	2557-51	6	Vitrified Clay Pipe	368	43	H
618	3402 E MADISON AVE	2558-10	2558-16	8	Vitrified Clay Pipe	329	5	H
619	364 N FIFTH ST	2558-24	2558-23	6	Vitrified Clay Pipe	441	87	BSV
620	364 N FIFTH ST	2558-24	2558-23	6	Vitrified Clay Pipe	441	87	BVV
621	364 N FIFTH ST	2558-24	2558-23	6	Vitrified Clay Pipe	441	87	H
622	364 N FIFTH ST	2558-24	2558-23	6	Vitrified Clay Pipe	441	87	H
623	310 N SECOND ST	2558-26	2558-27	6	Vitrified Clay Pipe	479	5	HSV
624	258 N FIRST ST	2558-31	2558-32	6	Vitrified Clay Pipe	417	18	H
625	258 N FIRST ST	2558-31	2558-32	6	Vitrified Clay Pipe	417	18	HSV
626	258 N FIRST ST	2558-31	2558-32	6	Vitrified Clay Pipe	417	18	HSV
627	258 N FIRST ST	2558-31	2558-32	6	Vitrified Clay Pipe	417	18	HSV
628	3666 E NEVADA AVE	2559-14	2559-18	8	Vitrified Clay Pipe	330	20	B
629	3666 E NEVADA AVE	2559-14	2559-18	8	Vitrified Clay Pipe	330	20	BVV

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
630	5965 E SHIELDS AVE	2559-15	2559-16	6	Vitrified Clay Pipe	590	8	B
631	3746 E BELMONT AVE	2559-52	2559-54	30	Concrete Pipe	322	152	SRV
632	3746 E BELMONT AVE	2559-52	2559-54	30	Concrete Pipe	322	152	SRV
633	3770 E BELMONT AVE	2559-54	2559-90	30	Concrete Pipe	127	184	SRV
634	3770 E BELMONT AVE	2559-54	2559-90	30	Concrete Pipe	127	184	SRV
635	3770 E BELMONT AVE	2559-54	2559-90	30	Concrete Pipe	127	184	SRV
636	4128 E BELMONT AVE	2559-62	2559-64	8	Vitrified Clay Pipe	560	52	B
637	4128 E BELMONT AVE	2559-62	2559-64	8	Vitrified Clay Pipe	560	52	HVV
638	411 N NINTH ST	2559-67	2559-05	6	Vitrified Clay Pipe	491	20	BSV
639	160 N ELEVENTH ST	2559-85	2559-86	12	Vitrified Clay Pipe	664	21	B
640	4321 E ILLINOIS AVE	2560-39	2560-40	6	Vitrified Clay Pipe	497	90	B
641	4321 E ILLINOIS AVE	2560-39	2560-40	6	Vitrified Clay Pipe	497	90	B
642	4321 E ILLINOIS AVE	2560-39	2560-40	6	Vitrified Clay Pipe	497	90	B
643	4321 E ILLINOIS AVE	2560-39	2560-40	6	Vitrified Clay Pipe	497	90	B
644	370 N MAPLE AVE	2561-25	2560-17	6	Vitrified Clay Pipe	660	13	H
645	370 N MAPLE AVE	2561-25	2560-17	6	Vitrified Clay Pipe	660	13	HSV
646	370 N MAPLE AVE	2561-25	2560-17	6	Vitrified Clay Pipe	660	13	HVV
647	530 S TRINITY ST	2653-111	2653-87	6	Vitrified Clay Pipe	91	14	B
648	530 S TRINITY ST	2653-111	2653-87	6	Vitrified Clay Pipe	91	14	H
649	624 S PLUMAS ST	2653-73	2653-90	6	Vitrified Clay Pipe	391	52	B
650	624 S PLUMAS ST	2653-73	2653-90	6	Vitrified Clay Pipe	391	52	BSV
651	127 E ONEIL AVE	2653-94	2653-95	6	Vitrified Clay Pipe	110	5	BSV
652	127 E ONEIL AVE	2653-95	2653-74	6	Vitrified Clay Pipe	159	8	B
653	127 E ONEIL AVE	2653-96	SN26530004	6	Vitrified Clay Pipe	90	5	BVV
654	1762 G ST	2654-30	2654-29	10	Vitrified Clay Pipe	580	5	B
655	1332 N ST	2655-02	2655-01	6	Vitrified Clay Pipe	440	24	BSV
656	1630 VAN NESS AVE	2655-10	2655-16	6	Vitrified Clay Pipe	479	32	B
657	1630 VAN NESS AVE	2655-10	2655-16	6	Vitrified Clay Pipe	479	32	BVV
658	1630 VAN NESS AVE	2655-10	2655-16	6	Vitrified Clay Pipe	479	32	H
659	1630 VAN NESS AVE	2655-10	2655-16	6	Vitrified Clay Pipe	479	32	SRCZ
660	1650 L ST	2655-11	2655-15	6	Vitrified Clay Pipe	388	9	HVV
661	1402 BROADWAY	2655-40	2655-21	6	Vitrified Clay Pipe	375	18	B
662	1402 BROADWAY	2655-40	2655-21	6	Vitrified Clay Pipe	375	18	B
663	1402 BROADWAY	2655-40	2655-21	6	Vitrified Clay Pipe	375	18	BSV
664	1315 VAN NESS AVE	2655-41	2655-57	27	Concrete Pipe	481	5	H
665	2305 STANISLAUS ST	2655-49	2655-13	6	Vitrified Clay Pipe	429	40	HVV
666	2310 STANISLAUS ST	2655-50	2655-72	6	Vitrified Clay Pipe	423	24	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
667	2310 STANISLAUS ST	2655-50	2655-72	6	Vitrified Clay Pipe	423	24	BVV
668	2222 STANISLAUS ST	2655-51	2655-27	6	Vitrified Clay Pipe	425	9	B
669	1428 H ST	2655-56	2655-71	8	Vitrified Clay Pipe	433	23	H
670	1428 H ST	2655-56	2655-71	8	Vitrified Clay Pipe	433	23	H
671	1428 H ST	2655-56	2655-71	8	Vitrified Clay Pipe	433	23	H
672	1428 H ST	2655-56	2655-71	8	Vitrified Clay Pipe	433	23	H
673	1911 MERCED ST	2655-64	2655-63	8	Vitrified Clay Pipe	411	19	B
674	1432 E DIVISADERO ST	2655-66	2655-13	6	Vitrified Clay Pipe	385	37	BSV
675	1432 E DIVISADERO ST	2655-66	2655-13	6	Vitrified Clay Pipe	385	37	HVV
676	946 E DIVISADERO ST	2655-73	2554-81	6	Vitrified Clay Pipe	153	5	B
677	2619 MERCED ST	2656-06	2656-04	6	Vitrified Clay Pipe	430	12	BSV
678	2505 MERCED ST	2656-07	2656-03	6	Vitrified Clay Pipe	432	39	B
679	2505 MERCED ST	2656-07	2656-03	6	Vitrified Clay Pipe	432	39	B
680	2505 MERCED ST	2656-07	2656-03	6	Vitrified Clay Pipe	432	39	BVV
681	2520 MERCED ST	2656-08	2656-09	6	Vitrified Clay Pipe	421	12	BVV
682	1230 M ST	2656-14	2656-63	6	Vitrified Clay Pipe	409	5	H
683	2314 MARIPOSA MALL	2656-18	2656-17	6	Vitrified Clay Pipe	200	5	H
684	908 M ST	2656-19	2756-47	6	Vitrified Clay Pipe	524	9	B
685	908 M ST	2656-19	2756-47	6	Vitrified Clay Pipe	524	10	B
686	908 M ST	2656-19	2756-47	6	Vitrified Clay Pipe	524	10	B
687	2606 KERN ST	2656-41	2656-40	6	Vitrified Clay Pipe	376	44	BVV
688	2950 MARIPOSA ST	2656-47	2657-06	6	Vitrified Clay Pipe	438	12	H
689	2727 TULARE ST	2656-49	2656-62	6	Vitrified Clay Pipe	485	9	D
690	2727 TULARE ST	2656-49	2656-62	6	Vitrified Clay Pipe	485	9	H
691	2621 FRESNO ST	2656-54	2656-55	6	Vitrified Clay Pipe	424	16	H
692	2621 FRESNO ST	2656-54	2656-55	6	Vitrified Clay Pipe	424	16	H
693	2006 E DIVISADERO	2656-57	2656-04	8	Vitrified Clay Pipe	232	10	H
694	2006 E DIVISADERO	2656-57	2656-04	8	Vitrified Clay Pipe	232	10	HVV
695	2448 STANISLAUS ST	2656-64	2656-01	6	Vitrified Clay Pipe	428	18	B
696	2448 STANISLAUS ST	2656-64	2656-01	6	Vitrified Clay Pipe	428	18	B
697	2448 STANISLAUS ST	2656-64	2656-01	6	Vitrified Clay Pipe	428	18	B
698	2920 E HUNTINGTON BLVD	2657-20	2657-67	12	Vitrified Clay Pipe	325	11	H
699	3103 KERCKHOFF AVE	2657-31	2657-32	14	Vitrified Clay Pipe	420	10	D
700	430 S FIRST ST	2657-33	2657-34	14	Vitrified Clay Pipe	414	5	B
701	2730 TULARE ST	2657-64	2657-35	6	Vitrified Clay Pipe	250	8	B
702	900 SANTA FE AVE	2657-65	2757-01	8	Vitrified Clay Pipe	384	30	BVV
703	900 SANTA FE AVE	2657-65	2757-01	8	Vitrified Clay Pipe	384	30	BVV

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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
704	900 SANTA FE AVE	2657-65	2757-01	8	Vitrified Clay Pipe	384	30	H
705	900 SANTA FE AVE	2657-65	2757-01	8	Vitrified Clay Pipe	384	30	H
706	710 R ST	2657-68	2657-65	8	Vitrified Clay Pipe	191	5	B
707	3303 E PLATT AVE	2658-02	2658-12	12	Vitrified Clay Pipe	368	28	H
708	3025 E KERCKHOFF AVE	2658-13	2658-50	6	Vitrified Clay Pipe	479	18	B
709	3025 E KERCKHOFF AVE	2658-13	2658-50	6	Vitrified Clay Pipe	479	18	D
710	3327 KERCKHOFF AVE	2658-14	2658-13	6	Vitrified Clay Pipe	479	32	B
711	3403 E KERCKHOFF AVE	2658-15	2658-14	6	Vitrified Clay Pipe	428	13	B
712	3561 E KERCKHOFF AVE	2658-16	2658-15	6	Vitrified Clay Pipe	530	5	BSV
713	3362 E KERCKHOFF AVE	2658-19	2658-53	10	Vitrified Clay Pipe	479	28	B
714	3555 E HUNTINGTON BLVD	2658-21	2658-20	10	Vitrified Clay Pipe	479	30	H
715	3363 E BALCH AVE	2658-24	2658-23	6	Vitrified Clay Pipe	479	11	D
716	3463 E BALCH AVE	2658-25	2658-24	6	Vitrified Clay Pipe	428	20	B
717	3463 E BALCH AVE	2658-25	2658-24	6	Vitrified Clay Pipe	428	20	B
718	3561 E BALCH AVE	2658-26	2658-70	6	Vitrified Clay Pipe	428	22	B
719	3561 E BALCH AVE	2658-26	2658-70	6	Vitrified Clay Pipe	428	22	BSV
720	3561 E BALCH AVE	2658-26	2658-70	6	Vitrified Clay Pipe	428	22	H
721	528 S FIFTH ST	2658-27	2658-29	6	Vitrified Clay Pipe	428	8	H
722	3302 BALCH AVE	2658-30	2658-31	6	Vitrified Clay Pipe	368	28	B
723	3302 BALCH AVE	2658-30	2658-31	6	Vitrified Clay Pipe	368	28	BVV
724	532 S SECOND ST	2658-32	2658-73	6	Vitrified Clay Pipe	474	14	B
725	623 S FOURTH ST	2658-40	2658-41	6	Vitrified Clay Pipe	530	24	B
726	623 S FOURTH ST	2658-40	2658-41	6	Vitrified Clay Pipe	530	24	B
727	3360 E MONO ST	2658-41	2658-42	6	Vitrified Clay Pipe	363	46	BVV
728	3360 E MONO ST	2658-41	2658-42	6	Vitrified Clay Pipe	363	46	BVV
729	3130 E HUNTINGTON BLVD	2658-51	2657-34	6	Vitrified Clay Pipe	420	43	B
730	3130 E HUNTINGTON BLVD	2658-51	2657-34	6	Vitrified Clay Pipe	420	43	B
731	3653 E BALCH AVE	2658-70	2659-22	6	Vitrified Clay Pipe	479	5	B
732	543 S FIRST ST	2658-73	2657-36	6	Vitrified Clay Pipe	489	41	D
733	3911 E PLATT AVE	2659-06	2659-05	6	Vitrified Clay Pipe	459	5	HSV
734	3669 E KERCKHOFF AVE	2659-09	2658-16	6	Vitrified Clay Pipe	428	13	B
735	3669 E KERCKHOFF AVE	2659-09	2658-16	6	Vitrified Clay Pipe	428	13	BSV
736	3655 E HUNTINGTON BLVD	2659-15	2658-21	10	Vitrified Clay Pipe	479	25	B
737	3655 E HUNTINGTON BLVD	2659-15	2658-21	10	Vitrified Clay Pipe	479	25	B
738	3655 E HUNTINGTON BLVD	2659-15	2658-21	10	Vitrified Clay Pipe	479	25	H
739	3753 E BALCH AVE	2659-23	2659-22	6	Vitrified Clay Pipe	430	5	B
740	4055 E BALCH AVE	2659-26	2659-25	6	Vitrified Clay Pipe	459	54	B

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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
741	4055 E BALCH AVE	2659-26	2659-25	6	Vitrified Clay Pipe	459	54	BSV
742	4167 BALCH AVE	2659-27	2659-26	6	Vitrified Clay Pipe	479	41	B
743	4167 BALCH AVE	2659-27	2659-26	6	Vitrified Clay Pipe	479	41	B
744	4167 BALCH AVE	2659-27	2659-26	6	Vitrified Clay Pipe	479	41	BSV
745	3659 E MONO ST	2659-33	2658-28	8	Vitrified Clay Pipe	480	28	B
746	522 EIGHTH ST	2659-34	2659-33	8	Vitrified Clay Pipe	480	27	H
747	521 EIGHTH ST	2659-35	2659-34	8	Vitrified Clay Pipe	480	21	H
748	3751 E VENTURA ST	2659-43	2659-45	8	Vitrified Clay Pipe	480	35	B
749	3751 E VENTURA ST	2659-43	2659-45	8	Vitrified Clay Pipe	480	35	BVV
750	3751 E VENTURA ST	2659-43	2659-45	8	Vitrified Clay Pipe	480	35	BVV
751	3751 E VENTURA ST	2659-43	2659-45	8	Vitrified Clay Pipe	480	35	BVV
752	3660 E KERCKHOFF AVE	2659-83	2659-15	8	Vitrified Clay Pipe	210	8	H
753	205 S BARTON AVE	2660-01	2560-58	6	Vitrified Clay Pipe	485	29	B
754	205 S BARTON AVE	2660-01	2560-58	6	Vitrified Clay Pipe	485	29	BVV
755	4608 E MONO ST	2661-28	2660-24	6	Vitrified Clay Pipe	279	5	B
756	47 E AMADOR ST	2753-11	2753-12	6	Vitrified Clay Pipe	380	55	BSV
757	47 E AMADOR ST	2753-11	2753-12	6	Vitrified Clay Pipe	380	55	BSV
758	217 E AMADOR ST	2753-14	2753-15	6	Vitrified Clay Pipe	380	28	BVV
759	823 S MODOC ST	2753-16	2753-55	6	Vitrified Clay Pipe	430	5	B
760	129 E SAN JOAQUIN ST	2753-21	2753-20	6	Vitrified Clay Pipe	380	73	B
761	129 E SAN JOAQUIN ST	2753-21	2753-20	6	Vitrified Clay Pipe	380	73	BSV
762	129 E SAN JOAQUIN ST	2753-21	2753-20	6	Vitrified Clay Pipe	380	73	BSV
763	129 E SAN JOAQUIN ST	2753-21	2753-20	6	Vitrified Clay Pipe	380	73	BVV
764	223 E SAN JOAQUIN ST	2753-22	2753-23	6	Vitrified Clay Pipe	375	56	B
765	53 E STANISLAUS ST	2753-27	2753-28	6	Vitrified Clay Pipe	380	21	FH3
766	219 E STANISLAUS ST	2753-30	2753-32	6	Vitrified Clay Pipe	368	14	BSV
767	219 E STANISLAUS ST	2753-30	2753-32	6	Vitrified Clay Pipe	368	14	BVV
768	51 E TUOLUMNE ST	2753-38	2753-37	6	Vitrified Clay Pipe	380	74	B
769	51 E TUOLUMNE ST	2753-38	2753-37	6	Vitrified Clay Pipe	380	74	B
770	51 E TUOLUMNE ST	2753-38	2753-37	6	Vitrified Clay Pipe	380	74	BSV
771	51 E TUOLUMNE ST	2753-38	2753-37	6	Vitrified Clay Pipe	380	74	BSV
772	51 E TUOLUMNE ST	2753-38	2753-37	6	Vitrified Clay Pipe	380	74	BSV
773	101 E OLEANDER AVE	2753-41	2753-40	6	Vitrified Clay Pipe	380	47	BSV
774	231 E OLEANDER AVE	2753-42	2753-41	6	Vitrified Clay Pipe	430	49	BSV
775	231 E OLEANDER AVE	2753-42	2753-41	6	Vitrified Clay Pipe	430	49	BSV
776	1244 S TRINITY ST	2753-43	2753-44	16	Vitrified Clay Pipe	379	11	HSV
777	304 E KEARNEY BLVD	2753-44	2853-78	16	Vitrified Clay Pipe	443	5	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
778	1622 C ST	2754-02	2754-09	6	Vitrified Clay Pipe	484	56	B
779	1622 C ST	2754-02	2754-09	6	Vitrified Clay Pipe	484	56	BSV
780	1622 C ST	2754-02	2754-09	6	Vitrified Clay Pipe	484	56	BVV
781	1107 CALAVERAS ST	2754-04	2754-08	6	Vitrified Clay Pipe	484	22	FH4
782	1211 STANISLAUS ST	2754-10	2754-09	6	Vitrified Clay Pipe	428	46	B
783	1211 STANISLAUS ST	2754-10	2754-09	6	Vitrified Clay Pipe	428	46	BSV
784	1211 STANISLAUS ST	2754-10	2754-09	6	Vitrified Clay Pipe	428	46	BVV
785	1444 STANISLAUS ST	2754-26	2754-20	10	Vitrified Clay Pipe	434	11	BVV
786	1018 TUOLUMNE ST	2754-49	2754-50	6	Vitrified Clay Pipe	423	31	B
787	1018 TUOLUMNE ST	2754-49	2754-50	6	Vitrified Clay Pipe	423	31	B
788	1215 S SNOW AVE	2754-52	2754-55	6	Vitrified Clay Pipe	375	36	B
789	1215 S SNOW AVE	2754-52	2754-55	6	Vitrified Clay Pipe	375	36	B
790	1215 S SNOW AVE	2754-52	2754-55	6	Vitrified Clay Pipe	375	36	B
791	1215 S SNOW AVE	2754-52	2754-55	6	Vitrified Clay Pipe	375	36	BSV
792	457 E KEARNEY BLVD	2754-53	2754-54	6	Vitrified Clay Pipe	380	11	B
793	505 E KEARNEY BLVD	2754-54	2754-55	6	Vitrified Clay Pipe	425	14	B
794	1116 B ST	2754-65	2754-64	6	Vitrified Clay Pipe	440	17	BVV
795	552 E TUOLUMNE ST	2754-72	2754-71	12	Vitrified Clay Pipe	724	5	H
796	543 E OLEANDER AVE	2754-75	2754-52	6	Vitrified Clay Pipe	380	29	B
797	543 E OLEANDER AVE	2754-75	2754-52	6	Vitrified Clay Pipe	380	29	BSV
798	543 E OLEANDER AVE	2754-75	2754-52	6	Vitrified Clay Pipe	380	29	BVV
799	1344 TULARE ST	2755-09	2755-11	6	Vitrified Clay Pipe	528	16	B
800	1344 TULARE ST	2755-09	2755-11	6	Vitrified Clay Pipe	528	16	BVV
801	1023 E ST	2755-12	2755-11	6	Vitrified Clay Pipe	454	33	B
802	1023 E ST	2755-12	2755-11	6	Vitrified Clay Pipe	454	33	B
803	1023 E ST	2755-12	2755-11	6	Vitrified Clay Pipe	454	33	HSV
804	1417 KERN ST	2755-20	2755-21	12	Vitrified Clay Pipe	480	8	H
805	1420 FRESNO ST	2755-23	2755-24	6	Vitrified Clay Pipe	388	16	B
806	1420 FRESNO ST	2755-23	2755-24	6	Vitrified Clay Pipe	388	16	BSV
807	1441 FRESNO ST	2755-25	2755-02	6	Vitrified Clay Pipe	496	5	HVV
808	1445 FRESNO ST	2755-30	2755-27	18	Vitrified Clay Pipe	200	10	SMWZ
809	1445 FRESNO ST	2755-30	2755-27	18	Vitrified Clay Pipe	200	10	SMWZ
810	1136 F ST	2755-33	2755-32	8	Vitrified Clay Pipe	477	23	B
811	1136 F ST	2755-33	2755-32	8	Vitrified Clay Pipe	477	23	B
812	1136 F ST	2755-33	2755-32	8	Vitrified Clay Pipe	477	23	B
813	1136 F ST	2755-33	2755-32	8	Vitrified Clay Pipe	477	23	BVV
814	1136 F ST	2755-33	2755-32	8	Vitrified Clay Pipe	477	12	B

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
815	1136 F ST	2755-33	2755-32	8	Vitrified Clay Pipe	477	12	D
816	921 CHINA ALLEY	2755-38	2755-36	8	Vitrified Clay Pipe	430	9	BVV
817	1257 G ST	2755-47	2755-30	18	Vitrified Clay Pipe	190	15	SMWZ
818	1257 G ST	2755-47	2755-30	18	Vitrified Clay Pipe	190	15	SMWZ
819	1257 G ST	2755-47	2755-30	18	Vitrified Clay Pipe	190	15	SMWZ
820	1266 G ST	2755-68	2755-47	18	Vitrified Clay Pipe	690	21	SMW
821	1266 G ST	2755-68	2755-47	18	Vitrified Clay Pipe	690	21	SMW
822	1266 G ST	2755-68	2755-47	18	Vitrified Clay Pipe	690	21	SMW
823	1920 TULARE ST	2755-73	2756-05	10	Vitrified Clay Pipe	425	5	H
824	1821 FRESNO ST	2755-79	2755-80	6	Vitrified Clay Pipe	241	5	B
825	1821 FRESNO ST	2755-80	2755-67	8	Vitrified Clay Pipe	10	5	BSV
826	1901 MARIPOSA ST	2755-81	2755-59	6	Vitrified Clay Pipe	430	34	B
827	1901 MARIPOSA ST	2755-81	2755-59	6	Vitrified Clay Pipe	430	34	BSV
828	1901 MARIPOSA ST	2755-81	2755-59	6	Vitrified Clay Pipe	430	34	BVV
829	1901 MARIPOSA ST	2755-81	2755-59	6	Vitrified Clay Pipe	430	34	BVV
830	1010 FULTON MALL	2756-01	2755-74	10	Vitrified Clay Pipe	414	16	B
831	740 H ST	2756-08	2756-13	6	Vitrified Clay Pipe	439	23	BSV
832	740 H ST	2756-08	2756-13	6	Vitrified Clay Pipe	439	23	H
833	740 H ST	2756-08	2756-13	6	Vitrified Clay Pipe	439	23	H
834	648 N BROADWAY	2756-12	2756-13	12	Polyvinyl Chloride	400	15	H
835	735 H ST	2756-14	2756-84	10	Vitrified Clay Pipe	371	9	BSV
836	635 BROADWAY	2756-15	2756-13	6	Vitrified Clay Pipe	432	8	B
837	626 N BROADWAY	2756-16	2756-12	6	Vitrified Clay Pipe	429	5	BSV
838	458 FULTON ST	2756-19	2756-20	6	Vitrified Clay Pipe	277	8	BVV
839	2033 VENTURA ST	2756-22	2756-11	8	Vitrified Clay Pipe	429	10	H
840	2033 VENTURA ST	2756-22	2756-11	8	Vitrified Clay Pipe	429	10	H
841	2126 VENTURA ST	2756-27	2756-26	6	Vitrified Clay Pipe	399	5	H
842	2126 VENTURA ST	2756-27	2756-26	6	Vitrified Clay Pipe	399	8	H
843	2126 INYO ST	2756-29	2756-28	6	Vitrified Clay Pipe	427	39	B
844	2126 INYO ST	2756-29	2756-28	6	Vitrified Clay Pipe	427	39	H
845	2126 INYO ST	2756-29	2756-28	6	Vitrified Clay Pipe	427	39	H
846	2126 INYO ST	2756-29	2756-28	6	Vitrified Clay Pipe	427	39	H
847	2126 INYO ST	2756-29	2756-28	6	Vitrified Clay Pipe	427	39	H
848	2134 KERN ST	2756-30	2756-98	6	Vitrified Clay Pipe	50	19	B
849	2134 KERN ST	2756-30	2756-98	6	Vitrified Clay Pipe	50	19	B
850	2228 SANTA CLARA ST	2756-38	2756-39	6	Vitrified Clay Pipe	110	5	B
851	2130 VENTURA ST	2756-41	2756-73	16	Vitrified Clay Pipe	382	5	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
852	654 VAN NESS AVE	2756-48	2756-28	6	Vitrified Clay Pipe	430	23	BSV
853	654 VAN NESS AVE	2756-48	2756-28	6	Vitrified Clay Pipe	430	23	H
854	2027 KERN ST	2756-71	2756-03	8	Vitrified Clay Pipe	110	32	B
855	2027 KERN ST	2756-71	2756-02	8	Vitrified Clay Pipe	110	8	B
856	2134 KERN ST	2756-98	2756-31	6	Vitrified Clay Pipe	371	5	BSV
857	900 SANTA FE AVE	2757-01	2757-02	8	Vitrified Clay Pipe	20	11	BSV
858	900 SANTA FE AVE	2757-02	2757-97	8	Vitrified Clay Pipe	201	34	B
859	900 SANTA FE AVE	2757-02	2757-97	8	Vitrified Clay Pipe	201	34	B
860	900 SANTA FE AVE	2757-02	2757-97	8	Vitrified Clay Pipe	201	34	BVV
861	900 SANTA FE AVE	2757-02	2757-97	8	Vitrified Clay Pipe	201	34	BVV
862	900 SANTA FE AVE	2757-02	2757-97	8	Vitrified Clay Pipe	201	34	H
863	825 S TOPEKA AVE	2757-04	2757-10	8	Vitrified Clay Pipe	375	26	BSV
864	825 S TOPEKA AVE	2757-04	2757-10	8	Vitrified Clay Pipe	375	26	H
865	305 O ST	2757-21	2757-31	8	Vitrified Clay Pipe	311	10	H
866	305 O ST	2757-21	2757-31	8	Vitrified Clay Pipe	311	10	H
867	235 SANTE FE AVE	2757-44	2757-45	10	Vitrified Clay Pipe	266	10	B
868	235 SANTE FE AVE	2757-44	2757-45	10	Vitrified Clay Pipe	266	10	BVV
869	3095 E BUTLER	2757-47	2757-48	10	Vitrified Clay Pipe	350	19	BVV
870	3095 E BUTLER	2757-47	2757-48	10	Vitrified Clay Pipe	350	19	BVV
871	3095 E BUTLER	2757-47	2757-48	10	Vitrified Clay Pipe	350	19	BVV
872	3259 E BUTLER AVE	2757-52	2758-11	6	Vitrified Clay Pipe	431	36	B
873	3259 E BUTLER AVE	2757-52	2758-11	6	Vitrified Clay Pipe	431	36	B
874	3259 E BUTLER AVE	2757-52	2758-11	6	Vitrified Clay Pipe	431	36	BVV
875	3203 E BUTLER AVE	2757-54	2757-52	6	Vitrified Clay Pipe	305	40	B
876	3203 E BUTLER AVE	2757-54	2757-52	6	Vitrified Clay Pipe	305	40	BVV
877	1236 S PARALLEL AVE	2757-55	2757-51	12	Concrete Pipe	341	8	BSV
878	3114 E VENTURA ST	2757-70	2757-71	6	Vitrified Clay Pipe	492	37	H
879	724 S ORANGE AVE	2757-71	2757-72	6	Vitrified Clay Pipe	355	61	B
880	2970 E VENTURA ST	2757-73	2757-63	10	Vitrified Clay Pipe	242	17	B
881	778 S HAZELWOOD BLVD	2757-75	2757-74	8	Vitrified Clay Pipe	158	8	H
882	3135 E MONTECITO AVE	2757-78	2757-77	6	Vitrified Clay Pipe	492	15	BVV
883	925 S FIRST ST	2757-80	2757-79	6	Vitrified Clay Pipe	430	11	B
884	935 TOPEKA AVE	2757-92	2757-90	8	Vitrified Clay Pipe	326	24	B
885	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	B
886	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	B
887	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	H
888	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	H

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
889	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	HSV
890	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	HVV
891	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	HVV
892	728 S HAZELWOOD BLVD	2757-95	2757-103	6	Vitrified Clay Pipe	326	50	SMWZ
893	1259 S HAZELWOOD BLVD	2758-09	2758-10	6	Vitrified Clay Pipe	105	5	BVV
894	1309 S THIRD ST	2758-14	2758-11	6	Vitrified Clay Pipe	486	18	B
895	1034 S FOURTH ST	2758-17	2758-06	6	Vitrified Clay Pipe	485	30	B
896	1034 S FOURTH ST	2758-17	2758-06	6	Vitrified Clay Pipe	485	30	B
897	1034 S FOURTH ST	2758-17	2758-06	6	Vitrified Clay Pipe	485	30	B
898	1034 S FOURTH ST	2758-17	2758-06	6	Vitrified Clay Pipe	485	30	BVV
899	833 S FOURTH ST	2758-23	2758-31	6	Vitrified Clay Pipe	297	22	B
900	833 S FOURTH ST	2758-23	2758-31	6	Vitrified Clay Pipe	297	22	B
901	833 S FOURTH ST	2758-23	2758-31	6	Vitrified Clay Pipe	297	22	BSV
902	833 S FOURTH ST	2758-23	2758-31	6	Vitrified Clay Pipe	297	22	D
903	3445 E EL MONTE WAY	2758-29	2758-31	6	Vitrified Clay Pipe	373	5	B
904	3438 E MONTECITO AVE	2758-33	2758-32	6	Vitrified Clay Pipe	187	10	B
905	3438 E MONTECITO AVE	2758-33	2758-32	6	Vitrified Clay Pipe	187	10	B
906	3445 E ALTA AVE	2758-34	2758-33	6	Vitrified Clay Pipe	100	5	BSV
907	3522 E EL MONTE WAY	2758-41	2758-40	6	Vitrified Clay Pipe	242	28	BVV
908	1134 S FIFTH ST	2758-51	2758-16	6	Vitrified Clay Pipe	519	9	H
909	3588 E ALTA AVE	2758-53	2758-47	6	Vitrified Clay Pipe	522	33	B
910	3588 E ALTA AVE	2758-53	2758-47	6	Vitrified Clay Pipe	522	33	B
911	3585 E LYELL AVE	2758-55	2758-56	6	Vitrified Clay Pipe	606	43	H
912	3585 E LYELL AVE	2758-55	2758-56	6	Vitrified Clay Pipe	606	43	H
913	1354 S ORANGE AVE	2758-60	2758-62	6	Vitrified Clay Pipe	604	20	B
914	3701 E ALTA AVE	2759-02	2759-03	6	Vitrified Clay Pipe	531	34	B
915	3701 E ALTA AVE	2759-02	2759-03	6	Vitrified Clay Pipe	531	34	B
916	3701 E ALTA AVE	2759-02	2759-03	6	Vitrified Clay Pipe	531	34	H
917	3750 E EL MONTE WAY	2759-10	2759-12	6	Vitrified Clay Pipe	531	97	B
918	3750 E EL MONTE WAY	2759-10	2759-12	6	Vitrified Clay Pipe	531	97	B
919	3750 E EL MONTE WAY	2759-10	2759-12	6	Vitrified Clay Pipe	531	97	B
920	3750 E EL MONTE WAY	2759-10	2759-12	6	Vitrified Clay Pipe	531	97	B
921	3750 E EL MONTE WAY	2759-10	2759-12	6	Vitrified Clay Pipe	531	97	BSV
922	3750 E EL MONTE WAY	2759-10	2759-12	6	Vitrified Clay Pipe	531	97	BVV
923	3733 E ALTA AVE	2759-11	2759-03	6	Vitrified Clay Pipe	380	21	BSV
924	1104 S EIGHTH ST	2759-15	2759-16	6	Vitrified Clay Pipe	377	18	B
925	1104 S EIGHTH ST	2759-15	2759-16	6	Vitrified Clay Pipe	377	18	B

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
926	1104 S EIGHTH ST	2759-15	2759-16	6	Vitrified Clay Pipe	377	18	BVV
927	1133 S ORANGE AVE	2759-16	2758-53	6	Vitrified Clay Pipe	378	21	D
928	1040 S CHANCE AVE	2760-13	2760-14	12	Vitrified Clay Pipe	244	5	XP
929	1034 S PEACH AVE	2763-14	2763-20	8	Vitrified Clay Pipe	679	36	BSV
930	1034 S PEACH AVE	2763-14	2763-20	8	Vitrified Clay Pipe	679	36	BVV
931	154 E EDEN AVE	2853-33	2853-35	30	Concrete Pipe	24	5	B
932	661 E CALIFORNIA AVE	2854-02	2854-18	6	Vitrified Clay Pipe	388	18	B
933	661 E CALIFORNIA AVE	2854-02	2854-18	6	Vitrified Clay Pipe	388	18	B
934	941 KLETTE AVE	2854-07	2854-08	6	Vitrified Clay Pipe	425	17	B
935	941 KLETTE AVE	2854-07	2854-08	6	Vitrified Clay Pipe	425	17	BVV
936	527 FRESNO ST	2854-13	2854-14	6	Vitrified Clay Pipe	202	17	B
937	527 FRESNO ST	2854-13	2854-14	6	Vitrified Clay Pipe	202	17	BVV
938	1138 KLETTE AVE	2854-16	2854-15	6	Vitrified Clay Pipe	350	30	BSV
939	1052 KLETTE AVE	2854-17	2854-16	6	Vitrified Clay Pipe	600	36	B
940	1052 KLETTE AVE	2854-17	2854-16	6	Vitrified Clay Pipe	600	36	B
941	928 KLETTE AVE	2854-18	2854-17	6	Vitrified Clay Pipe	354	13	B
942	617 KERN ST	2854-19	2854-20	6	Vitrified Clay Pipe	609	8	BSV
943	1060 WATERMAN AVE	2854-20	2854-21	6	Vitrified Clay Pipe	578	60	B
944	1060 WATERMAN AVE	2854-20	2854-21	6	Vitrified Clay Pipe	578	60	B
945	1060 WATERMAN AVE	2854-20	2854-21	6	Vitrified Clay Pipe	578	60	B
946	1060 WATERMAN AVE	2854-20	2854-21	6	Vitrified Clay Pipe	578	60	B
947	1060 WATERMAN AVE	2854-20	2854-21	6	Vitrified Clay Pipe	578	60	B
948	1060 WATERMAN AVE	2854-20	2854-21	6	Vitrified Clay Pipe	578	60	B
949	1140 WATERMAN AVE	2854-21	2854-22	6	Vitrified Clay Pipe	350	42	BSV
950	1140 WATERMAN AVE	2854-22	2854-23	6	Vitrified Clay Pipe	188	20	B
951	1240 WATERMAN AVE	2854-25	2854-24	6	Vitrified Clay Pipe	250	20	B
952	1240 WATERMAN AVE	2854-25	2854-24	6	Vitrified Clay Pipe	250	20	H
953	1234 POTTLE AVE	2854-30	2854-29	6	Vitrified Clay Pipe	295	17	B
954	1234 POTTLE AVE	2854-30	2854-29	6	Vitrified Clay Pipe	295	17	H
955	800 POTTLE AVE	2854-36	2854-35	6	Vitrified Clay Pipe	480	5	BVV
956	1053 MAYOR AVE	2854-40	2854-41	6	Vitrified Clay Pipe	535	21	BVV
957	1138 COLLINS AVE	2854-41	2854-42	6	Vitrified Clay Pipe	428	16	B
958	1210 COLLINS AVE	2854-43	2854-42	6	Vitrified Clay Pipe	347	11	B
959	917 A ST	2854-48	2854-47	10	Vitrified Clay Pipe	480	5	B
960	1032 TULARE ST	2854-54	2854-49	6	Vitrified Clay Pipe	435	23	B
961	1032 TULARE ST	2854-54	2854-49	6	Vitrified Clay Pipe	435	23	B
962	1032 TULARE ST	2854-54	2854-49	6	Vitrified Clay Pipe	435	23	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
963	1032 TULARE ST	2854-54	2854-49	6	Vitrified Clay Pipe	435	23	BVV
964	1136 A ST	2854-55	2754-67	6	Vitrified Clay Pipe	440	5	B
965	371 B ST	2855-02	2955-52	8	Vitrified Clay Pipe	402	9	BVV
966	320 B ST	2855-03	2955-52	8	Vitrified Clay Pipe	392	5	BSV
967	2103 S TUPMAN ST	2855-07	2855-86	10	Vitrified Clay Pipe	166	5	B
968	664 MAYOR AVE	2855-36	2855-30	8	Vitrified Clay Pipe	429	37	H
969	915 INYO ST	2855-39	2854-48	6	Vitrified Clay Pipe	430	35	B
970	915 INYO ST	2855-39	2854-48	6	Vitrified Clay Pipe	430	35	BVV
971	764 A ST	2855-40	2855-41	6	Vitrified Clay Pipe	483	9	B
972	554 B ST	2855-42	2855-28	6	Vitrified Clay Pipe	431	17	B
973	1124 KERN ST	2855-45	2855-90	6	Vitrified Clay Pipe	433	62	B
974	1124 KERN ST	2855-45	2855-90	6	Vitrified Clay Pipe	433	62	B
975	1124 KERN ST	2855-45	2855-90	6	Vitrified Clay Pipe	433	62	BVV
976	1124 KERN ST	2855-45	2855-90	6	Vitrified Clay Pipe	433	62	BVV
977	1124 KERN ST	2855-45	2855-90	6	Vitrified Clay Pipe	433	62	BVV
978	912 B ST	2855-45	2855-90	6	Vitrified Clay Pipe	480	15	B
979	811 B ST	2855-46	2855-47	6	Vitrified Clay Pipe	434	12	B
980	920 A ST	2855-47	2854-49	6	Vitrified Clay Pipe	479	18	BSV
981	1257 KERN ST	2855-50	2755-08	6	Vitrified Clay Pipe	420	9	B
982	1224 KERN ST	2855-51	2855-50	6	Vitrified Clay Pipe	487	5	B
983	1320 KERN ST	2855-56	2755-09	6	Vitrified Clay Pipe	380	8	B
984	761 E ST	2855-57	2855-58	6	Vitrified Clay Pipe	375	11	B
985	506 E ST	2855-64	2855-63	8	Vitrified Clay Pipe	538	5	B
986	1424 KERN ST	2855-67	2755-19	6	Vitrified Clay Pipe	423	19	B
987	1424 KERN ST	2855-67	2755-19	6	Vitrified Clay Pipe	423	19	BSV
988	750 MONO ST	2855-82	2855-33	6	Vitrified Clay Pipe	450	5	B
989	1424 KERN ST	2855-84	2855-85	10	Vitrified Clay Pipe	430	5	B
990	2539 E WOODWARD AVE	2856-04	2857-16	14	Vitrified Clay Pipe	407	9	H
991	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
992	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
993	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
994	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
995	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
996	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
997	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
998	1320 MONTEREY ST	2856-08	2856-62	6	Vitrified Clay Pipe	391	44	H
999	214 BROADWAY	2856-19	2856-20	6	Vitrified Clay Pipe	325	22	BVV

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1000	214 BROADWAY	2856-19	2856-20	6	Vitrified Clay Pipe	325	22	H
1001	1820 MONTERY ST	2856-21	2856-71	6	Vitrified Clay Pipe	372	13	B
1002	253 FULTON ST	2856-28	2856-25	8	Vitrified Clay Pipe	401	33	B
1003	1820 SAN BENITO ST	2856-39	2856-23	6	Vitrified Clay Pipe	402	11	BSV
1004	564 F ST	2856-50	2855-69	18	Vitrified Clay Pipe	392	5	BVV
1005	401 H ST	2856-53	2856-42	10	Vitrified Clay Pipe	478	5	BSV
1006	1804 VENTURA ST	2856-55	2756-15	6	Vitrified Clay Pipe	536	39	B
1007	1804 VENTURA ST	2856-55	2756-15	6	Vitrified Clay Pipe	536	39	BSV
1008	1804 VENTURA ST	2856-55	2756-15	6	Vitrified Clay Pipe	536	39	BSV
1009	1804 VENTURA ST	2856-55	2756-15	6	Vitrified Clay Pipe	536	39	HSV
1010	241 H ST	2856-79	2856-80	10	Vitrified Clay Pipe	481	10	BVV
1011	241 H ST	2856-79	2856-80	10	Vitrified Clay Pipe	481	10	BVV
1012	310 G ST	2856-80	2856-67	10	Vitrified Clay Pipe	476	19	B
1013	310 G ST	2856-80	2856-67	10	Vitrified Clay Pipe	476	19	BSV
1014	2105 S VAN NESS AVE	2857-03	2857-05	8	Vitrified Clay Pipe	460	23	B
1015	1923 S MARY ST	2857-20	2857-11	6	Vitrified Clay Pipe	439	14	B
1016	2933 E HAMILTON	2857-27	2857-28	8	Vitrified Clay Pipe	75	21	H
1017	2748 E HAMILTON	2857-28	2857-30	8	Vitrified Clay Pipe	400	38	B
1018	2748 E HAMILTON	2857-28	2857-30	8	Vitrified Clay Pipe	400	38	B
1019	2748 E HAMILTON	2857-28	2857-30	8	Vitrified Clay Pipe	400	38	B
1020	2748 E HAMILTON	2857-28	2857-30	8	Vitrified Clay Pipe	400	38	B
1021	2748 E HAMILTON	2857-28	2857-30	8	Vitrified Clay Pipe	400	38	B
1022	2748 E HAMILTON	2857-28	2857-30	8	Vitrified Clay Pipe	400	38	HSV
1023	120 FULTON ST	2857-37	2857-48	6	Vitrified Clay Pipe	418	13	H
1024	2250 LOS ANGELES ST	2857-38	2857-40	6	Vitrified Clay Pipe	469	10	B
1025	2250 LOS ANGELES ST	2857-38	2857-40	6	Vitrified Clay Pipe	469	10	H
1026	210 VAN NESS AVE	2857-39	2856-31	6	Vitrified Clay Pipe	418	5	H
1027	2202 MONTEREY ST	2857-40	2757-26	6	Vitrified Clay Pipe	418	5	H
1028	2910 E HEATON AVE	2857-41	2857-27	8	Vitrified Clay Pipe	640	33	B
1029	100 M ST	2857-42	2857-41	8	Vitrified Clay Pipe	487	21	B
1030	100 M ST	2857-42	2857-41	8	Vitrified Clay Pipe	487	21	B
1031	100 M ST	2857-42	2857-41	8	Vitrified Clay Pipe	487	21	B
1032	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	B
1033	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1034	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1035	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1036	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1037	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1038	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1039	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1040	1780 S PEARL ST	2857-43	2857-24	6	Vitrified Clay Pipe	197	60	H
1041	2730 E WOODWARD AVE	2857-46	2857-14	8	Vitrified Clay Pipe	380	5	B
1042	202 FULTON ST	2857-48	2856-29	6	Vitrified Clay Pipe	483	15	B
1043	202 FULTON ST	2857-48	2856-29	6	Vitrified Clay Pipe	483	15	B
1044	202 FULTON ST	2857-48	2856-29	6	Vitrified Clay Pipe	483	15	H
1045	2060 S GEARHART ST	2858-02	2858-04	8	Vitrified Clay Pipe	496	58	B
1046	2008 ORANGE AVE	2858-03	2858-19	8	Vitrified Clay Pipe	420	8	B
1047	1919 S THIRD ST	2858-26	2858-14	6	Cast Iron	433	0	SRC
1048	3321 E BRALY AVE	2858-31	2858-27	6	Cast Iron	355	90	SRC
1049	3321 E BRALY AVE	2858-31	2858-27	6	Cast Iron	355	90	SRC
1050	1808 S FIFTH ST	2858-37	2858-34	8	Vitrified Clay Pipe	146	17	B
1051	3230 E ORLEANS AVE	2858-49	2858-43	6	Cast Iron	335	5	SRC
1052	3230 E ORLEANS AVE	2858-49	2858-43	6	Cast Iron	335	5	SRC
1053	1736 S HAZELWOOD BLVD	2858-52	2858-39	6	Vitrified Clay Pipe	335	26	B
1054	1728 S FOURTH ST	2858-53	2858-38	6	Vitrified Clay Pipe	335	8	BSV
1055	1742 S FIFTH ST	2858-54	2858-37	6	Vitrified Clay Pipe	335	21	D
1056	1725 S FIFTH ST	2858-55	2858-36	6	Vitrified Clay Pipe	363	21	B
1057	1429 S ORANGE AVE	2858-59	2858-58	6	Vitrified Clay Pipe	329	16	BVV
1058	1627 S FIFTH ST	2858-62	2858-55	6	Vitrified Clay Pipe	521	48	B
1059	1627 S FIFTH ST	2858-62	2858-55	6	Vitrified Clay Pipe	521	48	B
1060	1627 S FIFTH ST	2858-62	2858-55	6	Vitrified Clay Pipe	521	48	BVV
1061	1627 S FIFTH ST	2858-62	2858-55	6	Vitrified Clay Pipe	521	48	H
1062	1640 S FIFTH ST	2858-63	2858-54	6	Vitrified Clay Pipe	520	5	B
1063	1435 S FOURTH ST	2858-65	2858-68	6	Vitrified Clay Pipe	387	12	H
1064	3356 E BUTLER AVE	2858-68	2858-72	6	Vitrified Clay Pipe	465	12	B
1065	3241 E TOWNSEND AVE	2858-74	2858-72	6	Vitrified Clay Pipe	320	29	B
1066	3241 E TOWNSEND AVE	2858-74	2858-72	6	Vitrified Clay Pipe	320	29	BVV
1067	3125 E TOWNSEND AVE	2858-83	2858-80	6	Vitrified Clay Pipe	280	37	B
1068	3125 E TOWNSEND AVE	2858-83	2858-80	6	Vitrified Clay Pipe	280	37	B
1069	3125 E TOWNSEND AVE	2858-83	2858-80	6	Vitrified Clay Pipe	280	37	BVV
1070	3633 E BRALY AVE	2859-27	2859-17	8	Vitrified Clay Pipe	324	8	B
1071	1727 S ORANGE AVE	2859-30	2858-87	6	Vitrified Clay Pipe	615	17	BVV
1072	3747 E HEATON AVE	2859-40	2858-58	6	Vitrified Clay Pipe	640	16	B
1073	3747 E HEATON AVE	2859-40	2858-58	6	Vitrified Clay Pipe	640	16	B

BCF-2 POINT REPAIRS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH PRIORITY POINT REPAIRS

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1074	54 E CALIFORNIA AVE	2953-12	2953-11	6	Vitrified Clay Pipe	362	30	B
1075	54 E CALIFORNIA AVE	2953-12	2953-11	6	Vitrified Clay Pipe	362	30	B
1076	54 E CALIFORNIA AVE	2953-12	2953-11	6	Vitrified Clay Pipe	362	30	BSV
1077	216 W ATCHISON ST	2953-13	2953-14	8	Vitrified Clay Pipe	628	34	BSV
1078	216 W ATCHISON ST	2953-13	2953-14	8	Vitrified Clay Pipe	628	34	BVV
1079	9 W ATCHISON ST	2953-14	2953-15	8	Vitrified Clay Pipe	97	8	B
1080	9 W ATCHISON ST	2953-20	2953-15	8	Concrete Pipe	257	8	B
1081	241 W ATCHISON ST	2953-23	2953-18	8	Vitrified Clay Pipe	330	5	B
1082	56 E LORENA ST	2953-26	2953-25	6	Vitrified Clay Pipe	582	51	B
1083	56 E LORENA ST	2953-26	2953-25	6	Vitrified Clay Pipe	582	51	B
1084	2220 S WALNUT AVE	2953-28	2953-30	8	Vitrified Clay Pipe	330	8	BVV
1085	2220 S WALNUT AVE	2953-29	2953-30	6	Vitrified Clay Pipe	658	8	BVV
1086	2220 S WALNUT AVE	2953-30	2953-42	8	Vitrified Clay Pipe	332	11	B
1087	2887 S THORNE AVE	2953-39	2953-33	8	Vitrified Clay Pipe	256	19	B
1088	2887 S THORNE AVE	2953-39	2953-33	8	Vitrified Clay Pipe	256	19	B
1089	2280 S WALNUT AVE	2953-41	2953-42	6	Vitrified Clay Pipe	659	18	B
1090	2280 S WALNUT AVE	2953-41	2953-42	6	Vitrified Clay Pipe	659	18	B
1091	2280 S WALNUT AVE	2953-41	2953-42	6	Vitrified Clay Pipe	659	18	BVV
1092	2131 S FAIVIEW AVE	2954-04	2954-05	6	Vitrified Clay Pipe	410	11	B
1093	2166 S LEE AVE	2954-05	2954-06	6	Vitrified Clay Pipe	437	18	BVV
1094	2139 S LEE AVE	2954-06	2954-14	8	Vitrified Clay Pipe	329	13	B
1095	2139 S LEE AVE	2954-06	2954-14	8	Vitrified Clay Pipe	329	13	B
1096	855 E LORENA AVE	2954-14	2954-24	8	Vitrified Clay Pipe	327	9	B
1097	2163 S MAUD AVE	2954-16	2954-14	6	Vitrified Clay Pipe	423	24	B
1098	608 E GEARY ST	2954-32	2954-33	6	Vitrified Clay Pipe	166	10	B
1099	608 E GEARY ST	2954-32	2954-33	6	Vitrified Clay Pipe	166	10	SMW
1100	2218 S MARTIN LUTHER	2954-36	2954-38	10	Vitrified Clay Pipe	521	25	B
1101	2385 S FAIRVIEW AVE	2954-61	2954-45	8	Vitrified Clay Pipe	241	16	BVV
1102	2390 S WALNUT AVE	2954-63	2953-09	10	Vitrified Clay Pipe	330	5	B
1103	2338 S WALNUT AVE	2954-64	2954-47	10	Vitrified Clay Pipe	331	14	BSV
1104	2374 S BARDELL ST	2955-18	2955-19	6	Vitrified Clay Pipe	320	8	B
1105	2372 S TUPMAN ST	2955-25	2955-26	8	Concrete Pipe	320	11	B
1106	2105 S MARTIN LUTHER	2955-28	2955-29	6	Vitrified Clay Pipe	619	37	B
1107	2105 S MARTIN LUTHER	2955-28	2955-29	6	Vitrified Clay Pipe	619	37	B
1108	1311 E FLORENCE AVE	2955-44	2955-47	10	Vitrified Clay Pipe	325	21	B
1109	1311 E FLORENCE AVE	2955-44	2955-47	10	Vitrified Clay Pipe	325	21	B
1110	2225 S EUNICE AVE	2955-46	2955-47	6	Vitrified Clay Pipe	523	38	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1111	2225 S EUNICE AVE	2955-46	2955-47	6	Vitrified Clay Pipe	523	38	H
1112	2206 S IVY AVE	2955-49	2955-50	6	Vitrified Clay Pipe	622	21	B
1113	1551 E FLORENCE AVE	2955-50	2955-55	10	Vitrified Clay Pipe	331	14	BVV
1114	2324 S IVY AVE	2955-51	2955-70	6	Vitrified Clay Pipe	681	33	B
1115	2292 S GENEVA AVE	2955-54	2955-55	6	Vitrified Clay Pipe	621	45	BSV
1116	2292 S GENEVA AVE	2955-54	2955-55	6	Vitrified Clay Pipe	621	45	H
1117	1636 E FLORENCE AVE	2955-55	2955-56	10	Vitrified Clay Pipe	307	27	B
1118	1636 E FLORENCE AVE	2955-55	2955-56	10	Vitrified Clay Pipe	307	27	B
1119	1636 E FLORENCE AVE	2955-55	2955-56	10	Vitrified Clay Pipe	307	27	H
1120	2290 S ELM AVE	2955-56	2955-57	10	Vitrified Clay Pipe	30	5	B
1121	1329 E FLORENCE AVE	2955-75	2955-44	8	Vitrified Clay Pipe	657	13	B
1122	2370 S KIRK ST	2956-21	2956-22	6	Vitrified Clay Pipe	305	8	B
1123	2385 S HOLLY AVE	2956-27	2956-28	6	Vitrified Clay Pipe	132	10	B
1124	2385 S HOLLY AVE	2956-27	2956-28	6	Vitrified Clay Pipe	132	10	B
1125	235 S ELM AVE	2956-32	2956-72	6	Vitrified Clay Pipe	165	13	B
1126	235 S ELM AVE	2956-32	2956-72	6	Vitrified Clay Pipe	165	13	BSV
1127	2365 S ELM AVE	2956-33	2956-32	6	Vitrified Clay Pipe	318	16	H
1128	1824 E CALIFORNIA AVE	2956-35	2956-46	6	Vitrified Clay Pipe	586	29	B
1129	1824 E CALIFORNIA AVE	2956-35	2956-46	6	Vitrified Clay Pipe	586	29	B
1130	2195 S ELM AVE	2956-36	2955-58	8	Vitrified Clay Pipe	168	9	B
1131	2233 S HOLLY AVE	2956-43	2956-40	6	Vitrified Clay Pipe	320	20	B
1132	2229 S POPPY AVE	2956-46	2956-37	6	Vitrified Clay Pipe	627	16	B
1133	2285 S HOLLY AVE	2956-47	2956-46	6	Vitrified Clay Pipe	305	32	BSV
1134	2285 S HOLLY AVE	2956-47	2956-46	6	Vitrified Clay Pipe	305	32	HVV
1135	2316 S KIRK ST	2956-54	2956-21	6	Vitrified Clay Pipe	664	33	B
1136	2316 S KIRK ST	2956-54	2956-21	6	Vitrified Clay Pipe	664	33	H
1137	2250 E CALIFORNIA AVE	2956-56	2956-57	6	Vitrified Clay Pipe	167	5	BVV
1138	2590 E CHURCH AVE	2956-62	2957-01	36	Reinforced Concrete Pipe	374	10	B
1139	2590 E CHURCH AVE	2956-62	2957-01	36	Reinforced Concrete Pipe	374	10	SRV
1140	2301 E FLORENCE AVE	2956-64	2956-63	6	Vitrified Clay Pipe	663	8	B
1141	2224 S CHERRY AVE	2956-66	2956-67	6	Vitrified Clay Pipe	545	28	B
1142	2224 S CHERRY AVE	2956-66	2956-67	6	Vitrified Clay Pipe	545	28	H
1143	2328 S CHERRY AVE	2956-67	2956-61	6	Vitrified Clay Pipe	615	21	H
1144	2167 S G ST	2956-79	2956-78	6	Vitrified Clay Pipe	165	9	B
1145	2167 S G ST	2956-79	2956-78	6	Vitrified Clay Pipe	165	9	H
1146	2111 S LOTUS AVE	2956-80	2956-82	6	Vitrified Clay Pipe	325	24	BVV
1147	2111 S LOTUS AVE	2956-80	2956-82	6	Vitrified Clay Pipe	325	24	H

BCF-2 POINT REPAIRS
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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1148	2161 S LILY AVE	2956-81	2956-84	6	Vitrified Clay Pipe	600	20	B
1149	2256 S RAILROAD	2957-07	2957-06	8	Cast Iron	658	384	B
1150	2256 S RAILROAD	2957-07	2957-06	8	Cast Iron	658	384	B
1151	2384 SARAH ST	2957-12	2957-53	8	Vitrified Clay Pipe	265	16	B
1152	2384 SARAH ST	2957-12	2957-53	8	Vitrified Clay Pipe	265	16	H
1153	2336 S RAILROAD AVE	2957-15	2957-14	6	Vitrified Clay Pipe	393	27	B
1154	2336 S RAILROAD AVE	2957-15	2957-14	6	Vitrified Clay Pipe	393	27	BVV
1155	2336 S RAILROAD AVE	2957-15	2957-14	6	Vitrified Clay Pipe	393	27	BVV
1156	2356 S RAILROAD AVE	2957-16	2957-15	6	Vitrified Clay Pipe	771	22	H
1157	2356 S RAILROAD AVE	2957-16	2957-102	6	Vitrified Clay Pipe	383	15	B
1158	2356 S RAILROAD AVE	2957-16	2957-102	6	Vitrified Clay Pipe	383	15	B
1159	2356 S RAILROAD AVE	2957-16	2957-102	6	Vitrified Clay Pipe	383	15	H
1160	2643 E CHURCH AVE	2957-18	2957-19	6	Vitrified Clay Pipe	660	21	B
1161	2643 E CHURCH AVE	2957-18	2957-19	6	Vitrified Clay Pipe	660	21	B
1162	2643 E CHURCH AVE	2957-20	2957-21	8	Vitrified Clay Pipe	53	5	BSV
1163	2811 E CHURCH AVE	2957-28	2957-27	6	Vitrified Clay Pipe	329	29	BSV
1164	2811 E CHURCH AVE	2957-28	2957-27	6	Vitrified Clay Pipe	329	29	BVV
1165	2811 E CHURCH AVE	2957-28	2957-27	6	Vitrified Clay Pipe	329	29	BVV
1166	2303 S ORINDA ST	2957-38	2957-36	10	Vitrified Clay Pipe	672	34	B
1167	2500 E CALIFORNIA AVE	2957-40	2957-41	8	Vitrified Clay Pipe	250	36	B
1168	2500 E CALIFORNIA AVE	2957-40	2957-41	8	Vitrified Clay Pipe	250	36	B
1169	2384 SARAH ST	2957-53	2957-23	6	Vitrified Clay Pipe	397	16	BSV
1170	2384 SARAH ST	2957-53	2957-23	6	Vitrified Clay Pipe	397	16	H
1171	89 E GARRETT AVE	3053-19	3053-18	6	Vitrified Clay Pipe	388	5	B
1172	2581 S WALNUT AVE	3053-28	3153-05	12	Vitrified Clay Pipe	360	8	B
1173	1222 E KAVILAND AVE	3055-11	3055-12	8	Concrete Pipe	551	5	B
1174	2498 S ELM AVE	3055-18	3055-17	8	Vitrified Clay Pipe	660	5	B
1175	2424 E GROVE AVE	3056-10	3056-11	6	Vitrified Clay Pipe	444	21	B
1176	2424 E GROVE AVE	3056-10	3056-11	6	Vitrified Clay Pipe	444	21	B
1177	2424 E GROVE AVE	3056-10	3056-11	6	Vitrified Clay Pipe	444	21	B
1178	2495 S LILY AVE	3056-13	3056-12	8	Vitrified Clay Pipe	663	9	B
1179	2953 S ELM AVE	3056-28	3056-01	8	Concrete Pipe	676	13	BVV
1180	2953 S ELM AVE	3056-28	3056-01	8	Concrete Pipe	676	13	BVV
1181	2592 S CEDAR AVE	3059-10	3159-24	8	Vitrified Clay Pipe	207	5	B
1182	2536 S MAPLE AVE	3061-10	3061-11	6	Polyvinyl Chloride	388	4	D
1183	2594 S HABITAT AVE	3153-01	3153-08	48	Concrete Pipe	87	8	SRC
1184	2658 S LEE AVE	3154-07	3154-06	8	Vitrified Clay Pipe	555	10	B

No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1185	2658 S LEE AVE	3154-07	3154-06	8	Vitrified Clay Pipe	555	10	B
1186	2750 S BARDELL ST	3155-12	3155-13	8	Vitrified Clay Pipe	209	5	B
1187	2734 S TUPMAN ST	3155-17	3155-30	8	Vitrified Clay Pipe	420	38	B
1188	2734 S TUPMAN ST	3155-17	3155-30	8	Vitrified Clay Pipe	420	38	B
1189	2734 S TUPMAN ST	3155-17	3155-30	8	Vitrified Clay Pipe	420	38	B
1190	2734 S TUPMAN ST	3155-17	3155-30	8	Vitrified Clay Pipe	420	38	BSV
1191	2727 S BARDELL ST	3155-19	3155-21	8	Vitrified Clay Pipe	260	56	B
1192	2727 S BARDELL ST	3155-19	3155-21	8	Vitrified Clay Pipe	260	56	B
1193	2727 S BARDELL ST	3155-19	3155-21	8	Vitrified Clay Pipe	260	56	B
1194	2727 S BARDELL ST	3155-19	3155-21	8	Vitrified Clay Pipe	260	56	B
1195	2697 S BARDELL ST	3155-21	3155-23	8	Vitrified Clay Pipe	260	19	B
1196	2677 S BARDELL ST	3155-23	3155-26	8	Vitrified Clay Pipe	270	22	B
1197	2677 S BARDELL ST	3155-23	3155-26	8	Vitrified Clay Pipe	270	22	B
1198	2677 S BARDELL ST	3155-23	3155-26	8	Vitrified Clay Pipe	270	22	B
1199	2672 S TUPMAN ST	3155-30	3155-29	8	Vitrified Clay Pipe	390	39	B
1200	2672 S TUPMAN ST	3155-30	3155-29	8	Vitrified Clay Pipe	390	39	B
1201	2672 S TUPMAN ST	3155-30	3155-29	8	Vitrified Clay Pipe	390	39	B
1202	2672 S TUPMAN ST	3155-30	3155-29	8	Vitrified Clay Pipe	390	39	BVV
1203	1307 E DOROTHY AVE	3155-32	3155-36	8	Vitrified Clay Pipe	165	16	BVV
1204	1004 E DRUMMOND AVE	3155-39	3154-20	8	Vitrified Clay Pipe	664	371	HVV
1205	1046 E CALWA AVE	3155-60	3154-10	8	Vitrified Clay Pipe	664	326	B
1206	2627 S EAST AVE	3157-08	3157-09	10	Vitrified Clay Pipe	222	5	BVV
1207	2734 S TUPMAN ST	3157-17	3157-23	8	Vitrified Clay Pipe	420	20	B
1208	2734 S TUPMAN ST	3157-17	3157-23	8	Vitrified Clay Pipe	420	20	B
1209	2696 S MAPLE AVE	3160-17	3160-10	12	Vitrified Clay Pipe	350	5	BSV
1210	4771 E DATE AVE	3161-01	3161-08	8	Vitrified Clay Pipe	535	5	B
1211	2991 LEE AVE	3254-09	3254-12	6	Vitrified Clay Pipe	316	5	B
1212	3052 S MARTIN LUTHER	3254-11	3254-13	15	Reinforced Concrete Pipe	331	75	BSV
1213	3052 S MARTIN LUTHER	3254-11	3254-13	15	Reinforced Concrete Pipe	331	75	BVV
1214	3052 S MARTIN LUTHER	3254-11	3254-13	15	Reinforced Concrete Pipe	331	75	SRVC
1215	1664 E CHESTER AVE	3255-15	3255-14	8	Vitrified Clay Pipe	458	5	BSV
1216	3187 E COMMERCE AVE	3258-03	3258-08	8	Vitrified Clay Pipe	625	5	H
1217	2907 S MAPLE AVE	3260-04	3260-14	10	Vitrified Clay Pipe	570	35	B
1218	2907 S MAPLE AVE	3260-04	3260-14	10	Vitrified Clay Pipe	570	35	B
1219	2907 S MAPLE AVE	3260-04	3260-14	10	Vitrified Clay Pipe	570	35	BSV
1220	4525 E COMMERCE AVE	3260-09	3260-10	8	Vitrified Clay Pipe	500	8	B
1221	2907 S MAPLE AVE	3260-14	3260-13	10	Vitrified Clay Pipe	660	54	B

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No.	Street	Upstream MH	Downstream MH	Diameter (in)	Material	Total Length (ft)	MOSR	Priority Code
1222	2907 S MAPLE AVE	3260-14	3260-13	10	Vitrified Clay Pipe	660	54	B
1223	2907 S MAPLE AVE	3260-14	3260-13	10	Vitrified Clay Pipe	660	54	B
1224	2907 S MAPLE AVE	3260-14	3260-13	10	Vitrified Clay Pipe	660	54	B
1225	2907 S MAPLE AVE	3260-14	3260-13	10	Vitrified Clay Pipe	660	54	B
1226	313 W ROY AVE	3355-08	3355-02	8	Vitrified Clay Pipe	640	5	B
1227	207 W ROY AVE	3355-10	3355-08	8	Vitrified Clay Pipe	660	5	BSV
1228	10882 N. WOODROW AVE	561-44	561-43	8	Polyvinyl Chloride	184	5	D
1229	2303 E. WARICK	961-26	961-27	6	Polyvinyl Chloride	413	4	D
1230	419 W ESCALON AVE	SN14540003	1454-11	8	Vitrified Clay Pipe	75	5	B
1231	4909 N GLENN AVE	SN17550001	1755-43	8	Vitrified Clay Pipe	200	5	BSV
1232	1303 W CAMBRIDGE AVE	SN22510002	2251-26	8	Cast Iron	71	65	SRC
1233	1303 W CAMBRIDGE AVE	SN22510002	2251-26	8	Cast Iron	71	65	SRC
1234	1426 N ECHO AVE	SN23540004	2354-47	6	Vitrified Clay Pipe	400	13	BVV
1235	1426 N ECHO AVE	SN23540004	2354-47	6	Vitrified Clay Pipe	400	13	H
1236	1840 BROADWAY	SN26540003	2654-32	6	Vitrified Clay Pipe	428	22	H
1237	1840 BROADWAY	SN26540003	2654-32	6	Vitrified Clay Pipe	428	22	H
1238	1840 BROADWAY	SN26540003	2654-32	6	Vitrified Clay Pipe	428	22	H
1239	1840 BROADWAY	SN26540003	2654-32	6	Vitrified Clay Pipe	428	22	H
1240	1861 AMADOR ST	SN26540004	2654-11	6	Vitrified Clay Pipe	428	26	B
1241	1861 AMADOR ST	SN26540004	2654-11	6	Vitrified Clay Pipe	428	26	D
1242	1254 FULTON MALL	SN26550002	SN26550003	30	Vitrified Clay Pipe	400	5	B
1243	517 FRESNO ST	SN28540006	2854-13	6	Vitrified Clay Pipe	150	10	B
1244	517 FRESNO ST	SN28540006	2854-13	6	Vitrified Clay Pipe	150	10	BVV
1245	517 FRESNO ST	SN28540007	2854-13	6	Vitrified Clay Pipe	150	5	BVV
1246	1232 WATERMAN AVE	SN28540010	2854-24	6	Vitrified Clay Pipe	150	5	B
1247	1226 POTTLE AVE	SN28540012	2854-30	6	Vitrified Clay Pipe	150	5	H
1248	1137 COLLINS AVE	SN28540014	2854-32	6	Vitrified Clay Pipe	150	10	BSV
1249	1137 COLLINS AVE	SN28540014	2854-32	6	Vitrified Clay Pipe	150	10	BSV

APPENDIX I – BCF-MOSR SEWER SEGMENTS

BCF-3 MOSR SEWER SEGMENTS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH MOSR REHABILITATION SECTIONS

DRAFT

CIPP Liner Rehabilitation Phase A										
No.	Street	Plat Number	Upstream MH	Downstream MH	Pipe Diameter (in)	Material	Total Length (ft)	MOSR	$/ft	Price
1	810 E BELGRAVIA AVE	2954	2954-59	2954-52	30	Concrete Segments	1038	600	260	$431,000
2	871 E CHURCH AVE	2954	2954-56	2954-59	30	Concrete Segments	294	138	260	$143,000
3	505 F ST	2856	2855-70	2856-64	18	Vitrified Clay Pipe	475	288	180	$155,000
4	506 E ST	2856	2855-63	2855-62	18	Vitrified Clay Pipe	230	129	180	$ 94,000
5	1430 SANTA CLARA ST	2856	2856-64	2855-63	18	Vitrified Clay Pipe	218	123	180	$ 91,000
6	3370 E MONO ST	2658	2658-35	2658-33	15	Reinforced Concrete Pipe	479	376	160	$143,000
7	3408 E MONO ST	2658	2658-36	2658-35	15	Reinforced Concrete Pipe	479	116	160	$143,000
8	860 N AUGUSTA AVE	2457	2457-08	2457-02	12	Standard Concrete Pipe	435	352	140	$121,000
9	2841 E SHIELDS AVE	2057	2057-26	2057-27	12	Vitrified Clay Pipe	473	272	140	$128,000
10	2997 E SHIELDS AVE	2057	2057-24	2057-25	12	Standard Concrete Pipe	473	267	140	$128,000
11	3074 E SAGINAW WAY	1957	1957-69	2057-08	12	Vitrified Clay Pipe	812	477	140	$212,000
12	3995 N FIRST ST	1957	1957-51	1957-50	8	Vitrified Clay Pipe	272	141	113	$ 79,000
13	1501 N CHESTNUT AVE	2361	2361-29	2362-76	8	Cast Iron	635	510	113	$153,000
14	1004 E DRUMMOND AVE	3155	3155-39	3154-20	8	Vitrified Clay Pipe	664	371	113	$158,000
15	1002 E JENSEN AVE	3155	3155-48	3154-21	8	Standard Concrete Pipe	619	348	113	$151,000
16	1046 E CALWA AVE	3155	3155-60	3154-10	8	Vitrified Clay Pipe	664	326	113	$158,000

Phase A Total = $ 2,488,000

BCF-3 MOSR SEWER SEGMENTS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH MOSR REHABILITATION SECTIONS

DRAFT

CIPP Liner Rehabilitation Phase B										
No.	Street	Plat Number	Upstream MH	Downstream MH	Pipe Diameter (in)	Material	Total Length (ft)	MOSR	$/ft	Price
17	1206 E GROVE AVE	3055	3055-07	3055-08	8	Standard Concrete Pipe	660	351	113	$157,000
18	945 E KAVILAND AVE	3055	3055-10	3054-07	8	Standard Concrete Pipe	664	333	113	$158,000
19	1047 E BYRD AVE	3055	3055-08	3054-06	8	Concrete Segments	664	259	113	$158,000
20	952 E KAVILAND AVE	3055	3055-12	3054-08	8	Standard Concrete Pipe	664	144	113	$158,000
21	2256 S RAILROAD	2957	2957-07	2957-06	8	Cast Iron	658	384	113	$157,000
22	2943 N MARIPOSA ST	2157	2157-16	2157-05	8	Concrete Segments	659	380	113	$157,000
23	2602 N FRESNO ST	2157	2157-04	2156-57	8	Standard Concrete Pipe	659	363	113	$157,000
24	3013 E CORNELL AVE	2157	2157-29	2157-30	8	Standard Concrete Pipe	628	222	113	$152,000
25	2707 E BROWN AVE	2157	2157-35	2157-03	8	Standard Concrete Pipe	658	126	113	$157,000
26	4946 N EFFIE ST	1756	1756-61	1756-60	8	Vitrified Clay Pipe	464	156	113	$109,000
27	2515 N FIRST ST	2157	2157-44	2157-43	6	Standard Concrete Pipe	620	366	100	$140,000
28	2619 N FIRST ST	2157	2157-41	2157-40	6	Standard Concrete Pipe	617	337	100	$139,000
29	2907 E HARVARD AVE	2157	2157-39	2157-40	6	Vitrified Clay Pipe	659	318	100	$145,000
30	2514 N ANGUS ST	2157	2157-42	2157-43	6	Standard Concrete Pipe	638	170	100	$142,000
31	1540 N GERALDINE WAY	2352	2352-47	2352-44	6	Concrete Segments	665	436	100	$146,000
32	537 W HAMMOND AVE	2352	2352-09	2352-08	6	Vitrified Clay Pipe	617	104	100	$139,000
33	4947 N THESTA ST	1756	1756-46	1756-45	6	Vitrified Clay Pipe	525	116	100	$109,000
34	4748 N SAN PABLO AVE	1755	1755-56	1755-57	6	Cast Iron	398	380	100	$ 91,000

Phase B Total = $ 2,571,000

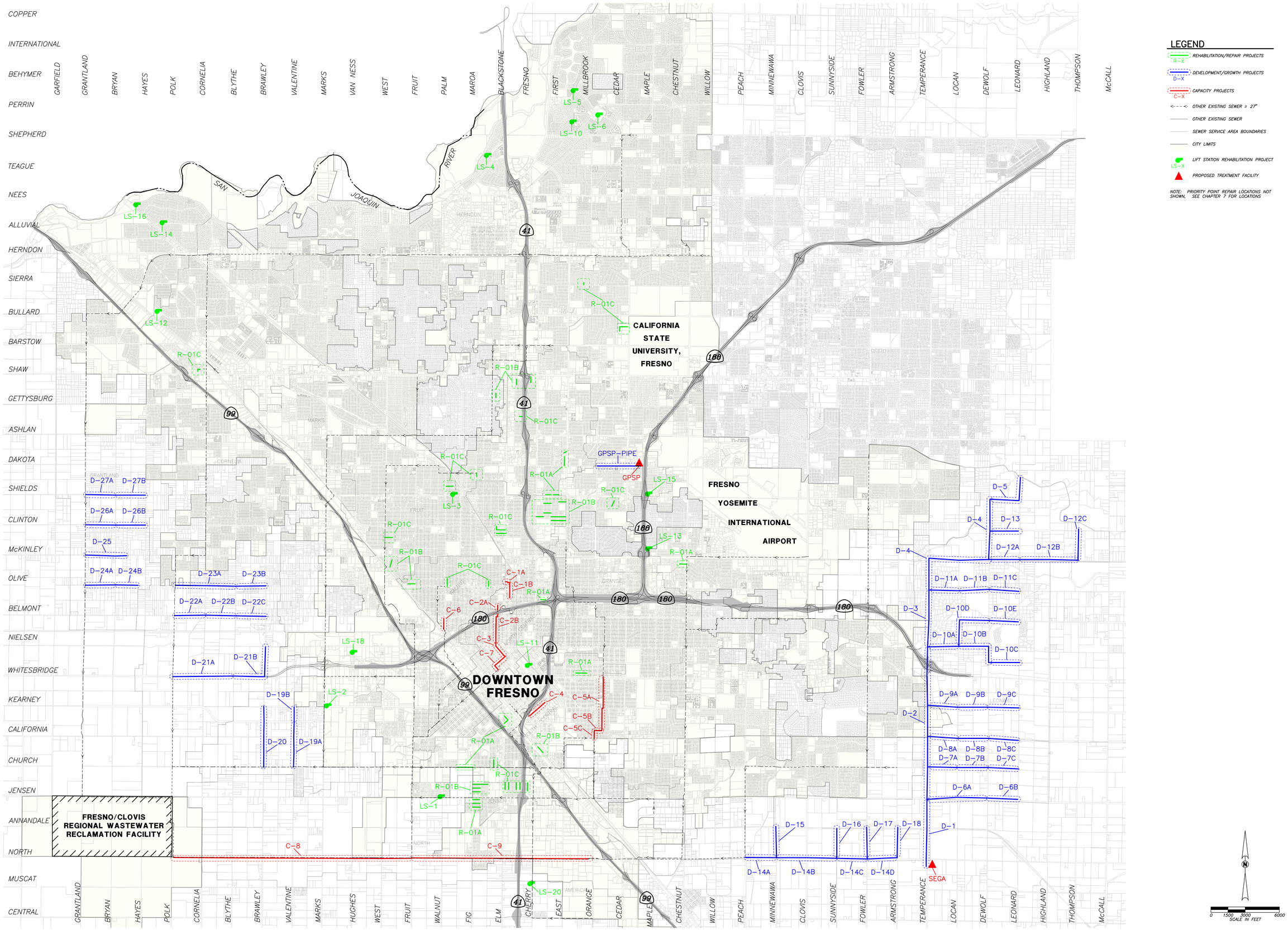
BCF-3 MOSR SEWER SEGMENTS
CITY OF FRESNO WASTEWATER MASTER PLAN
HIGH MOSR REHABILITATION SECTIONS

DRAFT

CIPP Liner Rehabilitation Phase C										
No.	Street	Plat Number	Upstream MH	Downstream MH	Pipe Diameter (in)	Material	Total Length (ft)	MOSR	$/ft	Price
35	1782 E GROVE AVE	3056	3056-29	3056-28	8	Standard Concrete Pipe	659	346	113	$157,000
36	2504 S KIRK ST	3056	3056-13	3056-14	8	Standard Concrete Pipe	624	315	113	$152,000
37	2504 S HOLLY AVE	3056	3056-26	3056-27	8	Standard Concrete Pipe	630	261	113	$153,000
38	2504 S NICHOLAS AVE	3056	3056-11	3056-32	8	Concrete Segments	678	201	113	$160,000
39	2582 S LILY AVE	3056	3056-18	3056-19	8	Vitrified Clay Pipe	630	114	113	$153,000
40	1421 E CHURCH AVE	2955	2955-69	2955-07	8	Concrete Segments	664	162	113	$158,000
41	1503 E VASSAR AVE	2255	2255-14	2255-15	8	Standard Concrete Pipe	402	231	113	$ 99,000
42	2242 N GLENN AVE	2255	2255-15	2255-16	8	Standard Concrete Pipe	372	225	113	$ 94,000
43	3672 N MAROA AVE	2055	2055-05	2054-52	8	Concrete Segments	336	189	113	$ 89,000
44	6537 N TENTH ST	1559	1559-23	1559-22	8	Vitrified Clay Pipe	387	103	113	$ 97,000
45	5645 N TENTH ST	1559	1559-24	1559-23	8	Vitrified Clay Pipe	687	135	113	$162,000
46	1305 E OLIVE AVE	2355	2355-88	2355-08	6	Vitrified Clay Pipe	471	155	100	$101,000
47	1218 N FERGER AVE	2354	2354-12	2354-10	6	Vitrified Clay Pipe	662	144	100	$146,000
48	1610 E YALE AVE	2255	2255-29	2255-28	6	Standard Concrete Pipe	417	320	100	$ 94,000
49	1522 E YALE AVE	2255	2255-28	2255-27	6	Standard Concrete Pipe	364	215	100	$ 86,000
50	1508 E CLINTON AVE	2255	2255-08	2255-16	6	Standard Concrete Pipe	290	176	100	$ 76,000
51	2030 N WEST AVE	2252	2252-43	2251-25	6	Vitrified Clay Pipe	668	218	100	$147,000
52	3104 N NINTH ST	2159	2159-27	2159-28	6	Vitrified Clay Pipe	542	203	100	$111,000
53	307 E FOUNTAIN	2054	2053-15	2054-13	6	Vitrified Clay Pipe	612	134	100	$139,000
54	2033 E ASHCROFT AVE	1856	1856-04	1856-06	6	Cast Iron	233	200	100	$ 68,000
55	5123 W MISSION AVE	1645	1645-28	1645-29	6	Cast Iron	212	165	100	$ 65,000
56	5106 W SHAW AVE	1645	1645-26	1645-28	6	Cast Iron	185	165	100	$ 61,000
57	6414 N FOURTH ST	1358	1358-23	1358-22	6	Vitrified Clay Pipe	200	104	100	$ 63,000

Phase C Total = $ 2,631,000

APPENDIX J – BCF-CIP PROJECT MAP



PRELIMINARY

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REF. & REV.

CITY OF FRESNO

WASTEWATER COLLECTION SYSTEM MASTER PLAN
FIGURE 1
CAPITAL IMPROVEMENT PROJECTS

DR. BY: DGM
CH. BY: LMG
DATE: 7-11-2014
SCALE AS NOTED

SHEET NO. 1
OF 1 SHEETS

Drawing: P:\277-50\CAD\Sht\277-50_Master_Plan.dwg, 30x42 — BCF.ctb

Southeast Development Area (SEDA)
Specific Plan
Storm Drain Technical Study

DRAFT

June 10th, 2022

Prepared for:

City of FRESNO

Prepared by:

Blair, Church & Flynn
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CHAPTER 1
INTRODUCTION

1.1 Project Description and Background

The City of Fresno (City) is preparing a Specific Plan and Program Environmental Impact Report (PEIR) for the Southeast Development Area (SEDA). The SEDA Specific Plan Area (Plan Area), previously known as the Southeast Growth Area (SEGA), is an approximately 9,000-acre area in the southeast portion of the City of Fresno that was formally designated as a growth area in the 2025 Fresno General Plan. The Plan Area is generally bound by the Gould Canal to the north, McCall and Highland Avenues to the east, Jenson and North Avenues to the south, and Locan, Temperance, and Minnewawa Avenues to the west; see Figure 1.1 for the Plan Area's location.

SEDA was approved for incorporation into the City by the Local Agency Formation Commission (LAFCo) in 2006, with a number of qualifying provisions, of which included the preparation of a Specific Plan and associated environmental documents before the land could be annexed to the City. Located in Growth Area II, SEDA was planned for development after other infill initiatives from the City's other planning efforts, and would be developed in phases. The General Plan established two levels of development – the General Plan Horizon and the General Plan Buildout. The General Plan Horizon is the level of development predicted to occur by the "Horizon Year," which was established as 2035, in accordance with the General Plan. General Plan Buildout is the level of development characterized by full occupancy of all developable sites in accordance with the General Plan; this is estimated to occur beyond 2035 (defined as past 2050).

As such, the General Plan defined development of SEDA under General Plan Horizon as a portion of the full buildout conditions – specifically, it assumes a residential development capacity of approximately 15,000 dwelling units. Accordingly, the residential development capacity of SEDA under General Plan Buildout is approximately 45,000 dwelling units, and the General Plan assumed that the additional 30,000 dwelling units would not be developed until after 2035. However, though the General Plan was analyzed under the General Plan Horizon level, the associated MEIR (Master Environmental Impact Report) analyzed the environmental impacts of the General Plan under the buildout level of the Sphere of Influence (SOI), which encompasses other growth areas, including SEDA.

The Specific Plan for SEDA provides implementation mechanisms for development in the Plan Area that accommodate for increased density and accelerate housing production. As part of the City's General Plan, SEDA was designated with land use classifications as defined in the General Plan. The Specific Plan presents alternative land use classifications for SEDA, and seeks to propose how the Plan Area will develop over time to complete buildout conditions with these newly-defined land use categories.

As part of the Specific Plan process, a PEIR needs to be developed to evaluate the impacts associated with the proposed improvements to the Plan Area, and what, if any, mitigation measures are necessary to account for such impacts. This technical report will focus on the impacts of the SEDA Specific Plan on storm drain facilities and the drainage capacity of the Plan Area.

1.2 Summary of Analysis

The City's General Plan assigned land use classifications to areas located within the SEDA Specific Plan Area. Each land use classification has a set of characteristics assigned to it with respect to a specific utility demand that have been determined and/or calculated by various

contributing parties. The SEDA Specific Plan proposes new land use classifications for the Plan Area that are different than the General Plan classifications that may change the area's characteristics as it relates to utilities, e.g., water demand, wastewater generation, or storm water runoff, when compared to the General Plan. Additionally, some land uses may change in area, further altering those characteristics.

In the case of storm drain utilities, each land use classification as defined in both the General Plan and the SEDA Specific Plan possesses varying degrees of drainage. An area's runoff rate and volume are heavily affected by the amount of impervious surfaces within the area. Imperviousness is directly related to the type of land use, and can either positively or negatively affect an areas drainage capabilities with a change in impervious surfaces. A common characteristic that can define an area's imperviousness, i.e. its ability to handle drainage during storm events, is its Equivalent Area, also known as the CA value. An area's CA value is the product of a unique runoff coefficient (C) and its area (A). Runoff coefficients vary based on land use depending on a perceived level of imperviousness, i.e., areas with higher levels of impervious surfaces (e.g. shopping centers) will have higher runoff coefficients than those with less impervious surfaces (e.g. rural residential areas).

Changes in land use can affect the runoff rate and volume of areas depending on whether the change increases or decreases equivalent areas; these changes will impact drainage collection and disposal facilities. Typical drainage collection facilities include inlets, manholes, pipelines, and outfall structures, and disposal facilities are usually recharge or retention/detention basins, pump stations, and canals. Land use changes that increase runoff rates and volumes will have a negative impact on collection and disposal facilities. Increased equivalent areas result in increased peak runoff rates, which can increase head loss in collection system piping and reduce the system's ability to convey peak runoff rates from inlets to basins, leading to possible flooding at the inlet and manhole locations. Basins are also impacted by increased runoff rates and volumes because basins are typically designed to withhold a specific volume of runoff, and any increase could lead to flooding. Conversely, land use changes that decrease runoff rates and volumes will have positive impacts on the collection and disposal system by reducing the peak runoff rate and the volume of runoff collected by inlets and basins.

The City's storm drain system is managed, owned, and operated by the Fresno Metropolitan Flood Control District (FMFCD). The FMFCD has developed a Storm Drainage Master Plan (SDMP) that divides the City into various drainage areas. Each area facilitates the drainage of all parcels within the area via a system of collection and disposal facilities. The Plan Area includes six (6) proposed drainage areas, and two (2) existing drainage areas designed by FMFCD; each area has a designated basin for disposal, and a system of proposed collection facilities.

The Specific Plan is proposing a change in land use classifications within SEDA from those originally defined within the City's 2025 General Plan. Land use classifications and areas are changing for several parcels, which is going to impact the equivalent area of each drainage area within the Plan Area. This technical study is limited to analyzing change in equivalent area of each drainage area between the General Plan land use case and the SEDA Specific Plan land use case, and determining if the proposed improvements will be sufficient to accommodate the revised runoff flows and volumes. The equivalent areas for each land use within the proposed drainage areas were calculated using the General Plan land use classifications, and subsequently compared to equivalent areas obtained using the Specific Plan land use classifications to evaluate the impact caused from a change in runoff characteristics.

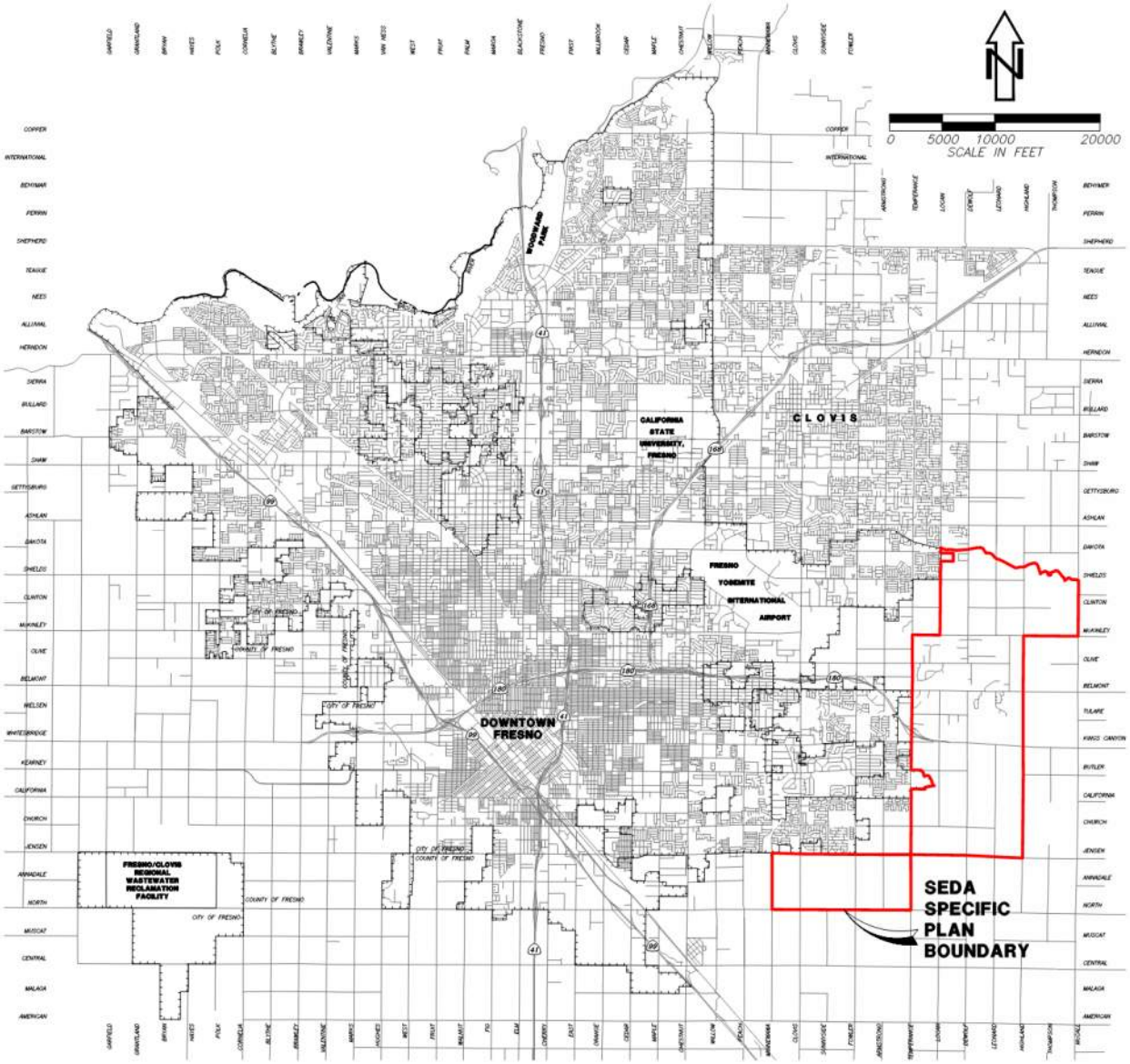


Figure 1.1 SEDA Specific Plan Location

CHAPTER 2
REGULATORY FRAMEWORK

2.1 General

The FMFCD manages stormwater runoff collection and disposal within the Plan Area and the Fresno/Clovis metropolitan area in general. The FMFCD provides flood control within an approximately 400 square mile watershed in Fresno County, generally located between the Kings River and San Joaquin River, and extending up into the Sierra Nevada foothills. FMFCD also provides urban storm drainage, groundwater recharge, and recreation spaced in the Fresno/Clovis metropolitan area, as well as Clean Water Act pollution prevention compliance assistance.

The District's flood control program consists of a system of major facilities and operations that control flows from a number of low-elevation streams that drain a portion of the west slope of the Sierra Nevada between the San Joaquin and Kings Rivers. The system is comprised of numerous flood control facilities including various dams and reservoirs, as well as many related streams and channels. The FMFCD is responsible for flood control and stormwater planning and management; the District Services Plan (DSP) provides comprehensive policies and implementation actions for flood control, rural streams management, local storm water drainage, stormwater quality management, water conservation, recreation, and related wildlife management.[1] The FMFCD coordinates with cities and the County of Fresno via a framework provided in the Storm Drainage and Flood Control Master Plan, which is prepared by the District as a specific element within the general plan of each agency. The Master Plan identifies urban and rural drainage area boundaries, computes runoff flows based on planned land use, identifies facility size and location, establishes street grades necessary to accomplish drainage of the runoff from the point of origin to the nearest collector facility, and identifies natural channels requiring preservation.

The FMFCD is responsible for reviewing all land use proposals for drainage and flood control needs and impacts, including evaluation of the proximity of development to floodplains, the need for the application of floodplain management requirements, the acceptability of proposed floodplain modifications' compliance with and implementation of the Master Plan, and the identification of stormwater quality best management practices.

In addition to the standards and requirements set forth by the FMFCD, a number of other federal, state, and local regulations must be adhered to when planning storm drain facilities. The management of surface water quality is regulated by a number of policies, which are also discussed in the following sections.

2.2 Federal Regulations

Clean Water Act[2]

The Federal Water Pollution Control Act of 1972, commonly referred to as the Clean Water Act (CWA), regulates the discharge of pollutants into watersheds throughout the United States. It is the primary federal law regulating and governing water pollution, with the objective of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. The CWA establishes the basic structure for regulating discharges if pollutants in waters of the United States and regulating quality standards for surface waters. Under the CWA., the EPA has implemented

[1] Fresno Metropolitan flood Control District, "2016 District Services Plan," 2016.
[2] Clean Water Act, 33 U.S.C. §1251 et seq. (1972).

pollution control programs, such as setting wastewater standards for industry, and developed national water quality criteria recommendations for pollutants in surface waters. The CWA makes it unlawful to discharge any pollutant from a point source into navigable waters, unless a permit was obtained via the National Pollutant Discharge Elimination System (NPDES).

National Pollutant Discharge Elimination System[3]

The National Pollutant Discharge Elimination System (NPDES) was established in the CWA to regulate point sources that discharge pollutants into waters of the United States; this includes stormwater runoff from a Municipal Separate Storm Sewer System (MS4) to surface waters. Stormwater runoff often carries pollutants, such as oil, pesticides, herbicides, trash, bacteria and heavy metals, which are some of the leading causes of water quality impairments. Storm water discharge is regulated under the NPDES permit for direct discharge into receiving waters and by the National Pretreatment Program for indirect discharge into sewage treatment plants. The NPDES permitting program delegates authority to state governments for implementation through State Water Boards. NPDES permits generally identify effluent and receiving water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge. Also included are prohibitions on discharges not specifically allowed under the permit, and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, and self-monitoring. All counties that have storm drain systems that service a population of 100,000 or more, as well as construction sites one (1) acre or larger, must file for and obtain an NPDES permit. Additionally, the EPA's Storm Water Phase I Final Rule requires an operator or a regulated municipal separate storm sewer system to develop, implement, and enforce a program to reduce pollutants in post-construction runoff to the City's storm drain system from new developments and redevelopment projects that result in land disturbance of (one) 1 or more acres, such as Best Management Practices (BMPs), ordinances, or other regulatory mechanisms.

National Flood Insurance Program

The Federal Emergency Management Agency (FEMA) is mandated to evaluate flood hazards as a result of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. FEMA provides Flood Insurance Rate Maps (FIRMs) for local and regional planners to promote efficient land and floodplain development and to identify potential flood areas based on current conditions. The National Flood Insurance Program provides flood insurance to homeowners, renters, and businesses, and works with communities to adopt and enforce floodplain management regulations that help mitigate flooding effects. FEMA completes Flood Insurance Studies to delineate a FIRMs.

2.3 State Regulations

California Porter-Cologne Water Quality Control Act[4]

The Porter-Cologne Water Quality Control Act is the principal law governing water quality in California, for both above- and below-ground supplies. This act designated the SWRCB as the statewide water quality planning agency, and gave authority to nine (9) Regional Water Quality Control Boards (RWQCB) to oversee water quality on a day-to-day basis at both the local and regional levels. RWQCBs develop Regional Water Quality Plans (Basin Plans), regulate all pollutant or nuisance discharges that may affect either surface or groundwater, and implementing said water quality plans. The Central Valley RWQCB oversees the Fresno area.

[3] Environmental Protection Agency (EPA), National Pollutant Discharge Elimination System (NPDES), 1972.
[4] California Porter-Cologne Water Quality Act, California Water Code Div. 7 §13000 et seq. (1969)

The Central Valley RWQCB issues and enforces NPDES permits in Fresno, which allows the RWQCB to regulate where and how waste is disposed, including the discharge volume and effluent limits of the waste and the monitoring and reporting responsibilities of the discharger. The RWQCB also conducts inspections of permitted discharges and monitors permit compliance.

Statewide General Construction Permit[5]

The SWRCB issued the General Construction Permit (GCP), Order No. 2012-0006-DWQ, which requires construction projects of one (1) acre or larger to file specific Permit Registration Documents with the SWRCB prior to beginning construction. The documents include a Notice of Intent, risk assessment, site map, Storm Water Pollution Prevention Plan (SWPPP), annual fee, and a signed certification statement. The SWPPP must include applicable Best Management Practices (BMP) to be enacted during construction to prevent soil erosion and discharge of other construction-related pollutants that could contaminate nearby water resources. The SWPPP must also include a visual monitoring plan, a chemical monitoring program for nonvisible pollutants, and a sediment monitoring plan. The GCP also includes post-construction runoff reduction requirements.

2.4 Local Regulations

Storm water management is mainly regulated by the Central Valley RWQCB and the FMFCD. There are other local regulations and planning documents that assist the City in overseeing storm water management and infrastructure.

Fresno General Plan[6]

The City's General Plan contains the following goals, policies, and objectives relevant to the provision of wastewater service and facilities (Table 2.1):

Table 2.1 City of Fresno General Plan Objectives and Policies Relevant to Recycled Water Supply

Objective/Policy Number	Objective/Policy Text
Policy NS-2-b	**Soil Analysis Requirement.** Identify areas with potential geologic and/or soils hazards, and require development in these areas to conduct a soil analysis and mitigation plan by a registered civil engineer (or engineering geologist specializing in soil geology) prior to allowing on-site drainage or disposal for wastewater, stormwater runoff, or swimming pool/spa water.
Objective NS-3	Minimize the risks to property, life, and the environment due to flooding and stormwater runoff hazards.
Policy NS-3-a	**Stormwater Drainage and Flood Control Master Plan.** Support the full implementation of the FMFCD Storm Drainage and Flood Control Master Plan, the completion of planned flood control and drainage system facilities, and the continued maintenance of stormwater and flood water retention and conveyance facilities and capacities. Work with the FMFCD to make sure that

[5] California State Water Resources Control Board(SWRCB), Order No. 2012-0006-DWQ, "National Pollutant Discharge Elimination System (NPDES) General Permit for Storm Water Discharges Associated with Construction and Land Disturbance Activities," 2012.

[6] City of Fresno, "Fresno General Plan," December 18, 2014.

Objective/Policy Number	Objective/Policy Text
	its Storm Drainage and Flood Control Master Plan is consistent with the General Plan.
Policy NS-3-b	**Curb and Gutter Installation.** Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to install curbing, gutters, and other drainage facilities with priority to existing neighborhoods with the greatest deficiencies and consistent with the Storm Drainage and Flood Control Master Plan.
Policy NS-3-c	**Dual Use Facilities.** Support multiple uses of flood control and drainage facilities as follows: • Use, wherever practical, FMFCD facilities for groundwater management and recharge; and • Promote recreational development of ponding basin facilities located within or near residential areas, compatible with the stormwater and groundwater recharge functions.
Policy NS-3-e	**Pollutants.** Work with FMFCD to prevent and reduce the existence of urban stormwater pollutants pursuant to the requirements of the National Pollution Discharge Elimination Systems Act.
Policy NS-3-f	**Flooding Emergency Response Plans.** Work with responsible agencies to update emergency dam failure inundation plans, evacuation plans and other emergency response plans for designated flood-prone areas, including the San Joaquin riverbottom.
Policy NS-3-g	**Essential Facilities Siting Outside of Floodplains.** Avoid siting emergency response and essential public facilities, such as fire and police stations, within a 100-year floodplain, unless it can be demonstrated that the facility can be safely operated and accessed during flood events.
Policy NS-3-h	**Runoff Controls.** Implement grading regulations and related development policies that protect area residents from flooding caused by urban runoff produced from events that exceed capacity of the Storm Drainage and Flood Control Master Plan system of facilities. Place all structures and/or flood-proofing in a manner that does not cause floodwaters to be diverted onto adjacent property, increase flood hazards to other property, or otherwise adversely affect other property.
Policy NS-3-i	**New Development Must Mitigate Impact.** Require new development to not significantly impact the existing storm drainage and flood control system by imposing conditions of approval as project mitigation, as authorized by law. As part of this process, closely coordinate and consult with the FMFCD to identify appropriate conditions that will result in mitigation acceptable and preferred by FMFCD for each project.
Policy NS-3-k	**100-Year Floodplain Policy.** Require developers of residential subdivisions to preserve those portions of development sites as open space that may be subject to 100-year flood events, unless the flood hazard can be substantially mitigated by development project design.
Policy NS-3-l	**200-Year Floodplain Protection.** Promote flood control measures that maintain natural conditions within the 200-year floodplain of rivers and streams and, to the extent possible, combine flood control, recreation, water quality, and open space functions. Discourage construction of permanent improvements that would be adversely affected by periodic floods within the 200-year floodplain, particularly in the San Joaquin riverbottom.

Objective/Policy Number	Objective/Policy Text
Policy NS-3-m	**Flood Risk Public Awareness.** Continue public awareness programs to inform the general public and potentially affected property owners of flood hazards and potential dam failure inundation. Remind households and businesses located in flood-prone areas of opportunities to purchase flood insurance.
Policy RC-6-f	**Regulate Sewage Disposal Facilities.** Oppose development of new sewage disposal facilities either within the Planning Area or upgradient (north and east) of the Planning Area, unless the treatment facilities produce effluent that: • Will not degrade the aquifer in the long term; • Will not introduce contaminants into surface water that would negatively affect its potential economic use for drinking water. • Will not deleteriously affect downstream agricultural and urban uses; and • Will not degrade sensitive riparian habitat.

City of Fresno Municipal Code[7]

Article 7, "Urban Storm Water Quality Management and Discharge Control," of Chapter 6, "Municipal Services and Utilities," of the City of Fresno Municipal Code includes provisions regarding storm water discharge for the City. The purpose of the Storm Water Quality Management and Discharge Control Ordinance is to ensure the health, safety, and general welfare of citizens, and protect the water quality of water courses and water bodies in accordance with the Clean Water Act (CWA) by reducing pollutants in urban storm water discharges to the maximum practicable extent and by prohibiting non-stormwater discharges to the storm drain system.

FMFCD Post-Development Standards Technical Manual[8]

The FMFCD published a Post-Development Standards Technical Manual in 2014 to provide development and redevelopment standards to address stormwater quality requirements for projects in areas that do not drain to the Regional Stormwater Management Basin System. Per the manual, five (5) drainage areas in the FMFCD service area do not drain into a stormwater management basin, and two (2) areas outside the service area do not drain into a regional stormwater management basin. These post-development requirements were developed to comply with the MS4 Permit maintained for stormwater and non-stormwater discharges from MS4 to waters of the United States. The manual provides guidance and recommendations for implementing stormwater quality BMPs with the intention of improving water quality and mitigating potential water quality impacts from stormwater and non-stormwater discharges.

FMFCD Standard Plans and Specifications

The FMFCD maintains a set of standard Specifications and Plans intended to serve as requirements for FMFCD improvements and projects. The specifications and plans are maintained and published by FMFCD for use by designers and Contractors.

[7] City of Fresno Municipal Code, Chapter 6, "Municipal Services and Utilities, Article 7, "Urban Storm Water Quality Management and Discharge Control."
[8] Fresno Metropolitan Flood Control District, "Post-Development Standards Technical Manual," prepared by Larry Walker Associates, June 2014.

CHAPTER 3
EXISTING CONDITIONS

3.1 Storm Drainage Infrastructure

3.1.1 General

The Plan Area is located in the Upper Dry Subbasin of the Tulare-Buena Vista Lakes Watershed. The Tulare-Buena Vista Lakes Watershed generally consists of the drainage area of the San Joaquin Valley south of the San Joaquin River; this includes major population centers as Fresno, Bakersfield, Porterville, Hanford, Tulare, and Visalia. Encompassing approximately 10.5 million acres, water primarily flows through the watershed from the northeast to the southwest, from the Sierra Nevada to the San Joaquin Valley. Rivers in the basin typically end at the Tulare Lake and Buena Vista Lake in the western San Joaquin Valley, but some surface water can drain north to the San Joaquin River during years of extreme rainfall. The main rivers that produce surface waters within the basin include the Kings, Kaweah, Tule, and Kern Rivers. Additional suppliers of surface water in the basin area include the San Luis Canal/California Aqueduct System, Friant-Kern Canal, and the Delta-Mendota Canal, which contribute imported surface waters to the basin.9

The Upper Dry Subbasin is approximately 2,126 square miles in area, and encompasses much of western Fresno County and small portions of Kings and San Benito Counties. There are several streams that run throughout both the basin and subbasin, of which the major ones include Dry Creek, Dog Creek, and Fancher Creek. Drainage in much of the subbasin area has been utilized as agricultural irrigation supply through the engineering and construction of numerous canal and conveyance systems.

There are a number of flood control reservoirs that work to control flows and provide irrigation supplies; these include the Friant Dam, Mendota Dam, Pine Flat Dam, Redbank Dam, Big Dry Creek Dam, Fancher Creek Dam, Redbank Creek , Pup Creek, and the Alluvial Drain Detention Basins. These facilities, along with the numerous canals, convey discharges throughout the City of Fresno.

3.1.2 Fresno Metropolitan Flood Control District (FMFCD)

Stormwater collection in the City of Fresno is typically completed via FMFCD facilities. It begins with street gutters that collect and convey stormwater runoff to storm drain inlets. The runoff is collected in these inlets and delivered to FMFCD's pipe networks, pump stations, and infiltration basins for groundwater recharge. Most runoff is discharged into recharge basins, but during heavy rainfall events, excess runoff overflows into a system of relief channels and canals that discharge to the San Joaquin River, its tributary streams, local agricultural canals, and FID facilities.

FMFCD's Storm Drain Master Plan divides the District into many local drainage areas of one to two square miles throughout Fresno. All inlets, pipes, and pump stations within each drainage area are maintained by the District. The gutters, along with public streets and sidewalks, are maintained by the City of Fresno Street Maintenance Division. It is assumed that this maintenance agreement will remain in place for the foreseeable future. The District's Storm Drainage and Flood Control Master Plan includes 164 adopted or proposed drainage areas, with all but five (5) areas

[9] California Regional Water Quality Control Board Central Valley Region, "Water Quality Control Plan for the Tulare Lake Basin," Third Edition, May 2018.

served by a retention or detention facility.[10] FMFCD basins have been sized for capacities of two-year storms and for at least 60% of average rainfall [9]; FMFCD allows a 20% change in volume before basins need to be resized or relocated.[11]

Some portions of the Plan Area have been annexed by the FMFCD and are part of existing FMFCD drainage areas serving the Plan Area. These include:

- North SEDA (area bound between McKinley Avenue and the Gould Canal)
    - Drainage Area BS
        - Basin BS
        - Redbank Basin
    - Drainage Area DS
        - Drainage DS
- Central SEDA (area bound between Jensen and McKinley Avenues)
    - Drainage Area DV
        - Basin DV
    - Drainage Area BM
        - Basin BM
    - Drainage Area BL
        - Basin BL
- Southern SEDA (area bound between North and McKinley Avenues)
    - Drainage Area BG
        - Basin BG
    - Drainage Area CS
        - Basin CS

Drainage Areas DS and DV have existing basins that have been constructed, but the area has not been built out to master-planned conditions; these areas have been considered as proposed for analysis purposes.

The rest of the Plan Area is outside the District's service area and currently relies on other means of storm water drainage to control flooding. The District is developing drainage areas for the Plan Area, and these area will be discussed further in Chapter 4. See Figure 3.1 for the existing FMFCD drainage areas/facilities in the Plan Area.

3.1.3 Fresno Irrigation District (FID)

The FMFCD maintains groundwater recharge contracts with the Cities of Fresno and Clovis, as well as the FID to provide for dry season delivery of imported surface water into the District's local basins for detention/retention of water for groundwater recharge purposes. The District, along with several other entities, also maintains a Master Discharge Agreement with the FID to discharge stormwater into designated FID canals to prevent flooding. FMFCD may do so as long as they do not overtax canal capacities, cause damage, endanger personal property, deposit poor quality water, or interfere with the primary use of the FID system to transport and distribute irrigation water.

There are a number of existing FID facilities that cross the Plan Area, including canals and pipelines; these include, from northeast to southwest: Redbank Creek, the Gould Canal, the Gray Colony Canal, Dog Creek, the Mill Canal, the Temperance Canal, the Fancher Creek Canal, the Briggs Canal, the East Branch West Branch Canal, the Hansen Canal, and the Armstrong Canal.

[10] Fresno Metropolitan Flood Control District, "2016 District Services Plan," 2016.
[11] City of Fresno, Section 4.9, "Hydrology and Water Quality," "Southwest Fresno Specific Plan Draft EIR," August 2017.

These facilities currently serve portions of the Plan Area with irrigation water and stormwater runoff collection. There are a number of FID and private pipelines that help convey the irrigation water to users in the area. See Figure 3.2 for the existing FID facilities in the Plan Area.

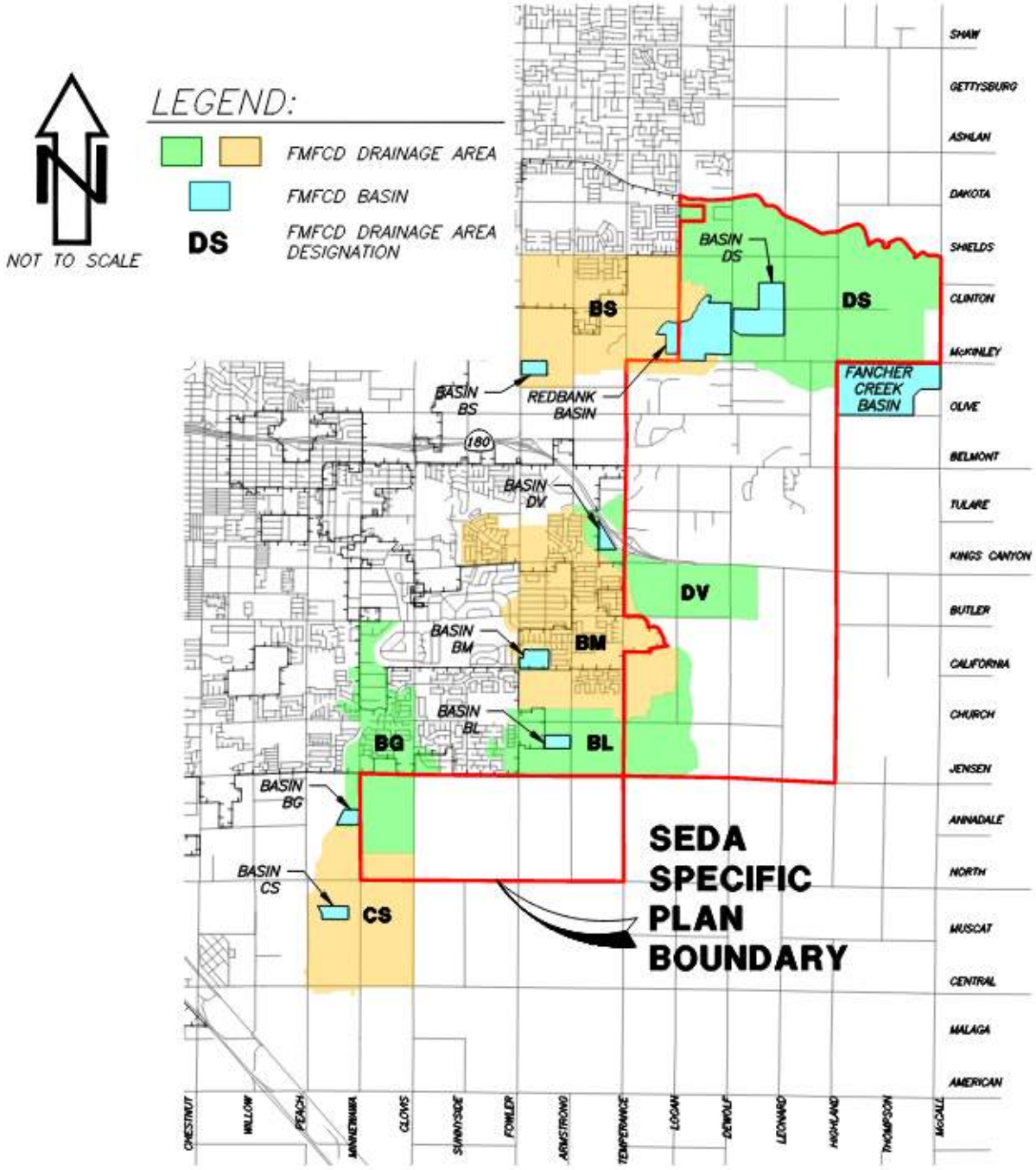


Figure 3.1 Existing FMFCD Drainage Areas and Basins within SEDA

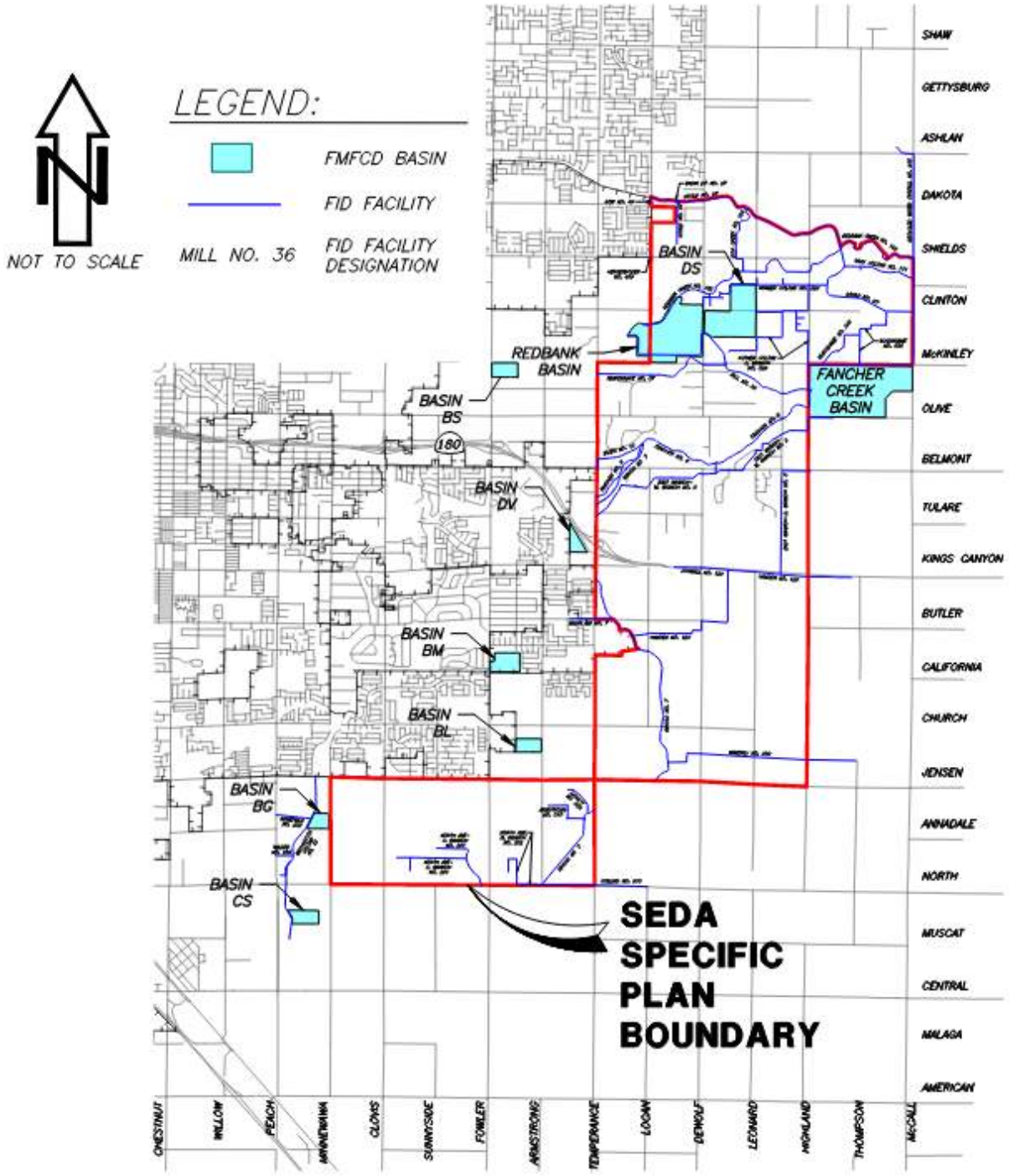


Figure 3.2: Existing FID Facilities within SEDA

CHAPTER 4
FUTURE STORM DRAIN INFRASTRUCTURE

4.1 General

The FMFCD's Storm Drainage and Flood Control Master Plan designates proposed improvements to the Plan Area to provide storm drain and flood control facilities for stormwater runoff. The FMFCD is currently developing proposed drainage areas and basins, along with facilities including inlets and pipelines, for the Plan Area, and all proposed improvements discussed in this chapter are preliminary and have not been officially approved and/or finalized.[12]

4.2 General Plan Policies

The General Plan discusses aspects of the storm drain and flood control systems as they pertain to development in Fresno. New storm drainage facilities are funded and constructed by owners/developers of properties pursuant to the City's drainage fee requirements in fresno Municipal Code §12-1901 et. Seq., or constructed by FMFCD themselves under publicly awarded contracts. The City requires all drainage to be directed toward public streets to allow stormwater to travel along paved surfaces and into FMFCD inlets. The FMFCD pipeline network is designed with a peak flow capacity to accommodate a two-year storm; the basin capacities are determined from a percentage of this two-year storm runoff, but with a volume of 6 inches of rainfall. All basins are also designed with relief systems so that dewatering can occur between rain events and additional capacity can be created.

Any infill project that increases the amount of impervious surfaces, changes existing drainage patterns, and/or generates storm flows faster/greater than the existing condition could result in overburdening of the existing stormwater collection system. New developments are required to mitigate any increase in runoff by either increasing the capacity of the system (e.g., build more infrastructure), or maintain all runoff onsite to ensure offsite runoff does not increase.

The City also utilizes drainage basins for groundwater recharge, as well as for passive and active recreational uses in residential areas. Several basins throughout Fresno have received improvements that encourage recreational use, such as baseball and playground areas. Basins also provide critical areas for open space and urban wildlife habitats.

Per Section 9.4, "Storm Drainage and Flood Control," of the General Plan, a portion of the SEDA Plan Area has not yet been annexed by the FMFCD, and therefore storm drain improvements were not designed at the time the General Plan was adopted. Storm Water Master Plans for the Plan Area were to be developed and adopted based on the General Plan requirements once all of SEDA was annexed by the District.

The General Plan includes two (2) locations of proposed storm drain basins within the Plan Area, of which both have been annexed and constructed. These include the Redbank Basin and Basin DS, both of which are located in the northern portion of the Plan Area (north of McKinley Avenue). See Figure 4.1 for the General Plan Land Use Map with the proposed basins shown.

[12] Wade, Denise, FMFCD Master Plan Special Projects Manager, Email to Blair, Church & Flynn, February 22, 2022.

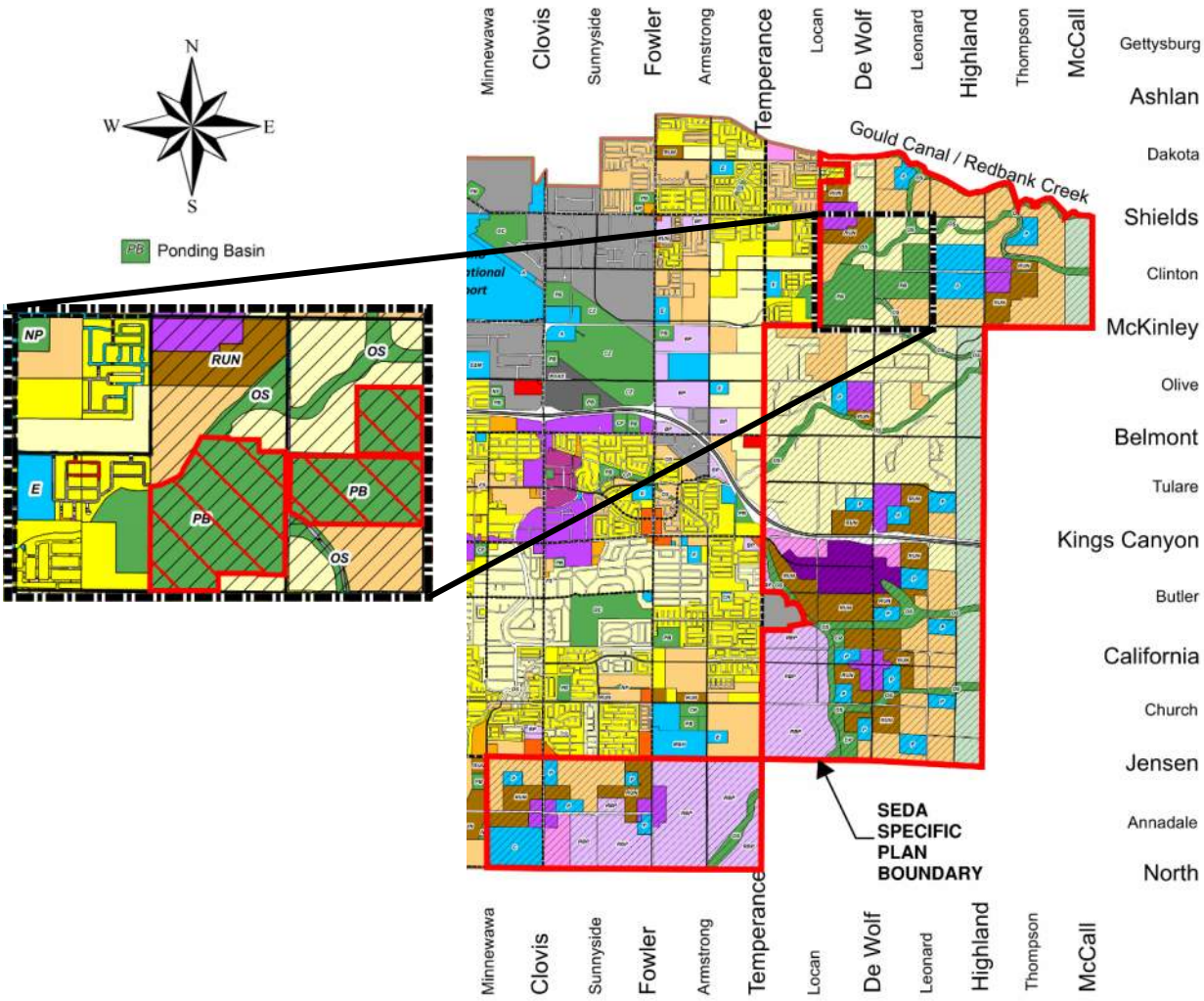


Figure 4.1 General Plan Land Use within SEDA

Source: City of Fresno, "Fresno General Plan," December 18, 2014.

4.3 Master Plan Improvements

In accordance with the Storm Drain and Flood Control Master Plan and other planning documents provided, the FMFCD is developing improvements for the Plan Area for storm drain facilities. As mentioned, the Plan Area encompasses all or part of the following existing drainage areas: BG, BL, BM, BS, CS, DS and, DV. Proposed drainage areas for SEDA include DT, DU, DW, DX, DY, and DZ. Most of the existing drainage areas include existing storm drain collection facilities, while the proposed drainage areas generally have no existing storm drain facilities. Areas DS and DV are the exceptions in that they are existing drainage areas with basins but have not yet been built out to master plan conditions. See Figure 4.2 for a map of existing and proposed drainage areas and basins.

FMFCD improvements include storm drain inlets and piping, which are being analyzed and developed in conjunction with the proposed land uses within the Plan Area. Those portions of the Plan Area encompassed in existing drainage areas include master planned utilities designed by FMFCD.

There are seven (7) existing basins contributing to storm water collection for the Plan Area, and six (6) proposed basins within the Plan Area. There are also two (2) existing basins outside of the Plan Area that are not part of existing drainage areas, including the Redbank Basin and the Fancher Creek Basin, that may contribute to additional drainage capacity; however, these two basins were not considered in this study. Drainage area acreages and basin capacities are listed in Table 4.1. FMFCD basins are designed for a capacity of a two-year storm and for at least 60 percent of average rainfall. Per the FMFCD, the proposed drainage areas for SEDA have not been adopted yet, and the basin locations have not been finalized; those presented here have been placed by FMFCD staff. The Specific Plan must be analyzed and evaluated for impacts on the aggregate area and each planned basin area; this analysis will be discussed in Chapter 5.

Table 4.1 Drainage Areas and Basin Capacities

Drainage Area Designation	Drainage Area Size [A] (Acres)	Basin Volume [B] (Acre-Ft)
Existing Drainage Areas/Basins		
BG	755	232.1
BL	782	301.1
BM	1,519	390.4
BS	1,341	396.7
CS	854	346.5
DS [C]	1,960	1,383.3
DV [C]	505	230.0
Proposed Drainage Areas/Basins		
DT	983	232.4
DU	1,307	323.8
DW	756	233.9
DX	879	304.5
DY	749	295.2
DZ	698	263.6

[A] Drainage areas obtained from GIS Shape files provided by FMFCD
[B] Basin volumes obtained from H&H calculation sheets provided by FMFCD
[C] Existing Drainage Area and basin but not yet built out

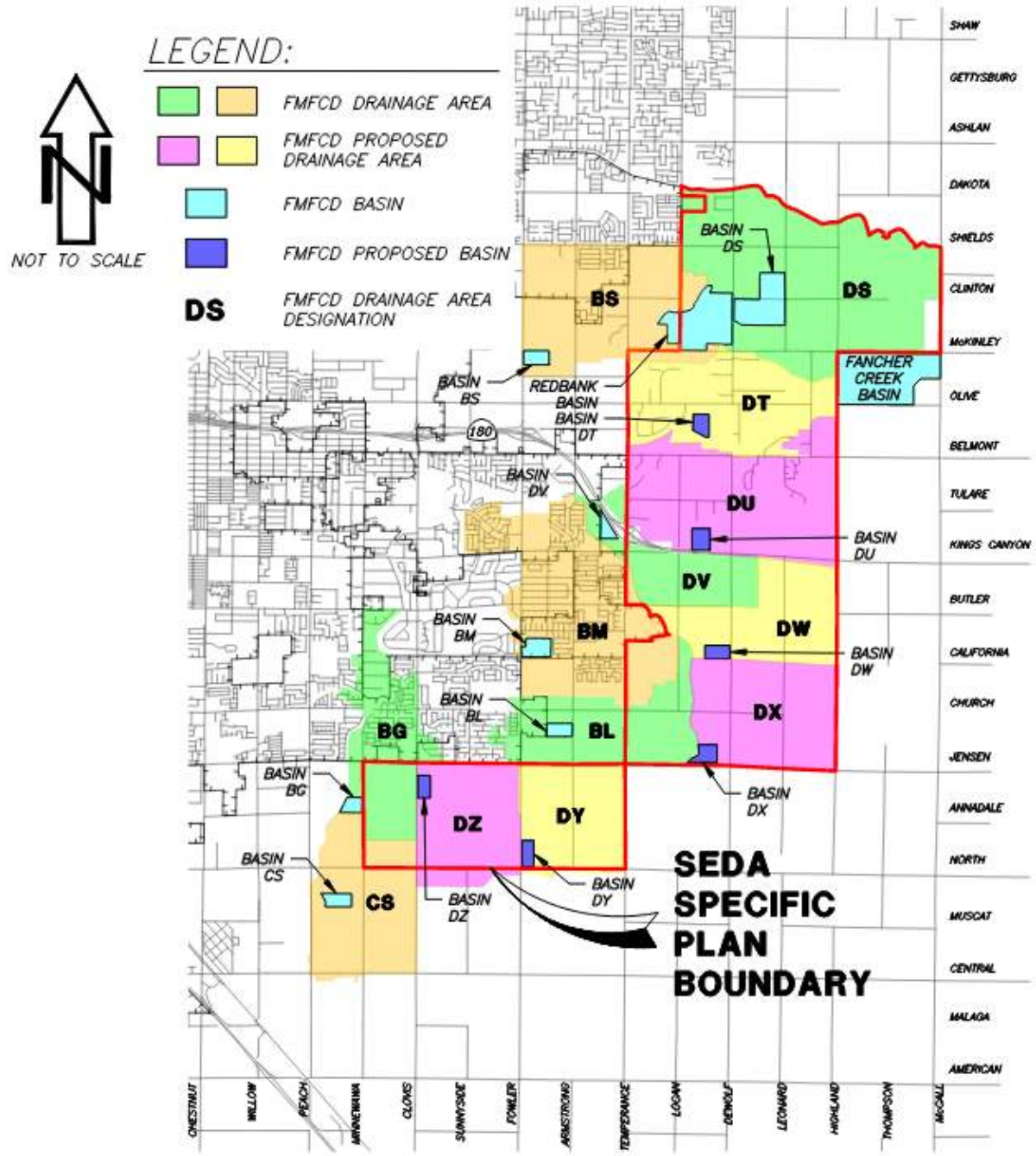


Figure 4.2 Proposed FMFCD Drainage Areas and Basins in SEDA

CHAPTER 5
SPECIFIC PLAN STORM DRAIN RUNOFF ANALYSIS

5.1 General

The SEDA Specific Plan revised the General Plan buildout land use classifications in the Plan Area to new SEDA-specific land use classifications – see Figure 5.1 for the General Plan Land Use Map of the Plan Area, and Figure 5.2 for the SEDA Specific Plan Land Use Map for the chosen alternative for the Plan Area. With changes in land use classifications, the Plan Area will need to be evaluated for impacts to the existing and proposed stormwater collection system due to changes in stormwater runoff.

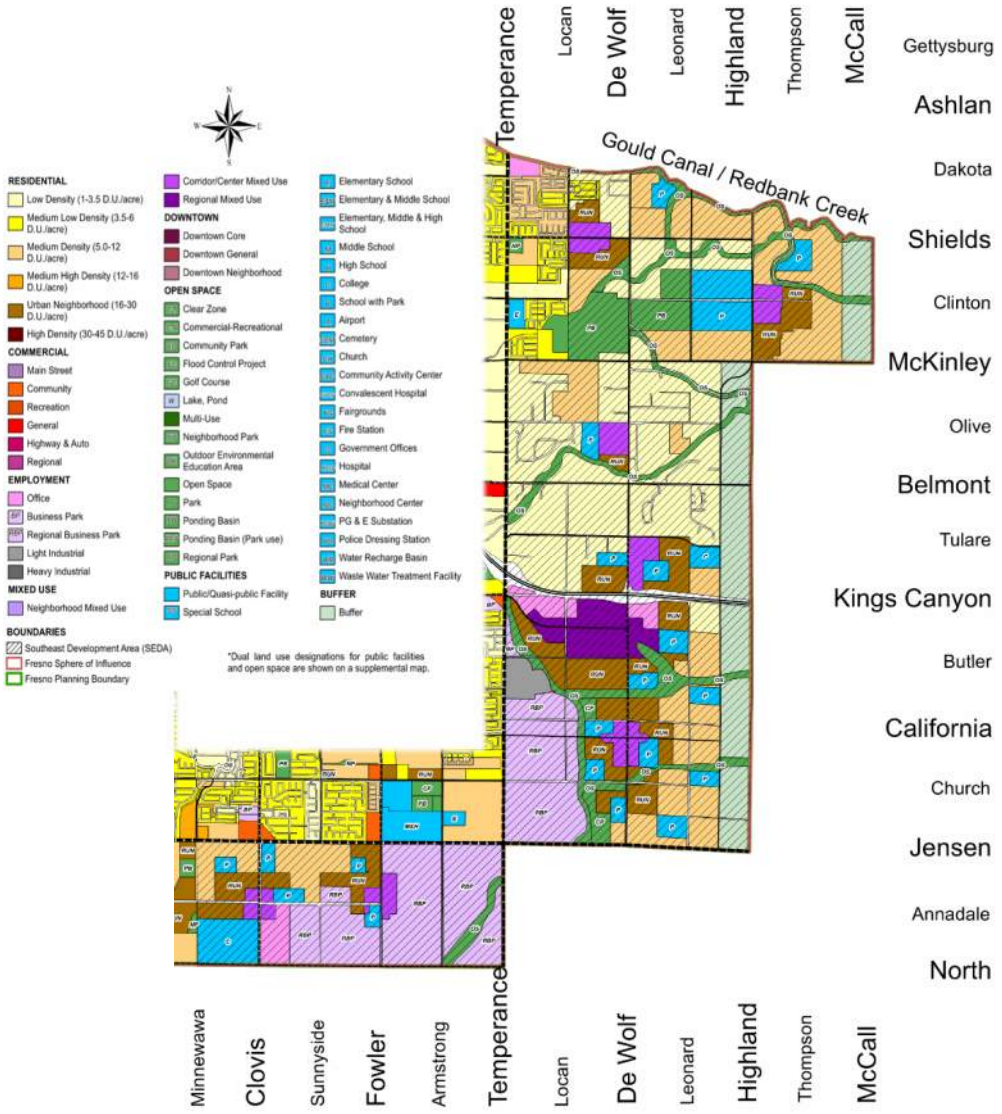
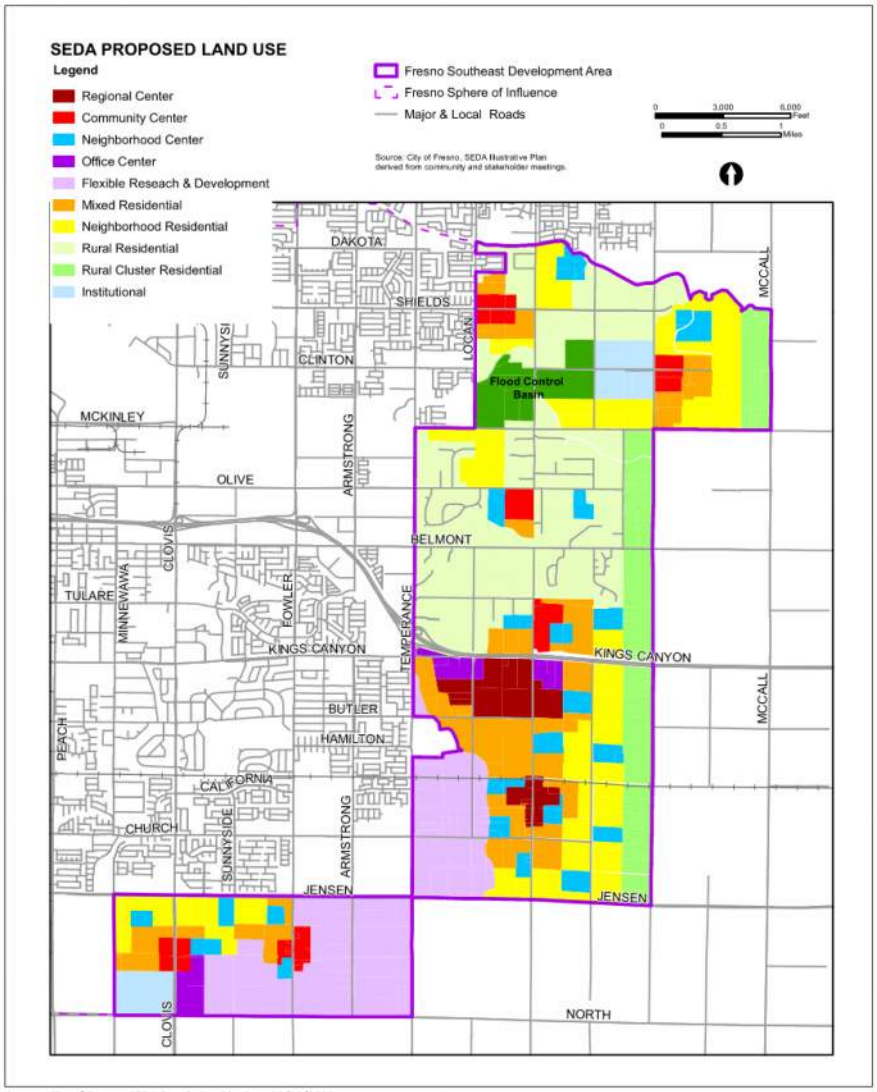


Figure 5.1 General Plan Land Use Map for SEDA Plan Area
Source: City of Fresno General Plan, Figure LU-1, December 2014, Figure Updated 3/2/2021



Source: City of Fresno, SEDA Regulating Districts, 02/10/2022.

Figure 5.2 SEDA Proposed Land Use
Source: Southeast Development Area Specific Plan Notice of Preparation,
First Carbon Solutions, 02/2022

Increases in CA values result in increased peak runoff rates, which can increase friction losses in pipes and lead to a decline in a collection system's ability to convey stormwater runoff from inlets to basins. This can cause flooding at the inlets and manholes of the collection system. Basins will also receive increased volumes of stormwater runoff that may surpass their design volumes, resulting in a deficit between what the basin can store and the amount of runoff produced. This may cause flooding of surrounding streets at the basins. Basins are designed with relief systems to help drain stored runoff in between storm events to maximize capacity during storm events.

The FMFCD grading design criteria requires that, to the greatest extent, water due to flooding at basins and inlets cannot exceed the finished floor of adjacent buildings before it can flow out of the catchment area for the basin or inlet. This is to ensure buildings are not flooded due to drainage collection or disposal system failures. This will be an important factor in future developments within the Plan Area.

5.2 Analysis Methodology

This analysis compares the Equivalent Areas (CA value) of each existing and proposed drainage area within SEDA between the General Plan Land Uses and the SEDA Specific Plan Land Uses. Generally speaking, the CA value is a measure of the imperviousness of an area, and is a product of the area (A) of a specific land use and its runoff factor (C). The drainage area, CA, is calculated as the sum of all individual land use areas multiplied by their runoff factors. The equivalent General Plan land uses for the SEDA land uses are shown in Table 5.1.

The technical analysis of the impacts of land use changes in the Plan Area was focused on comparing the changes in equivalent area for each drainage area of the General Plan to the Specific Plan to determine potential impacts to future storm drain collection systems and to assist in the development of mitigation measures if necessary. The methodology used to calculate the CA values for each case utilized land use data obtained from the City and design data from FMFCD. General Plan land use classifications and Specific Plan land use classifications were provided by the City of Fresno Planning and Development Department in the form of GIS (Geographic Information System) and Shape files. GIS and Shape files were also obtained from FMFCD for the existing drainage areas encompassed by the Plan Area.

For the General Plan land use analysis, the FMFCD's "Recommended Design C-Factors for the City of Fresno" was used. Not all land uses described in the General Plan are listed in this table, so some C-factors were estimated based on their description, while others were taken from FMFCD's hydraulic and hydrology spreadsheets when possible. Table 5.2 shows the C-factors used for the General Plan analysis.

The FMFCD is currently developing updated C Factors for the SEDA Specific Plan land use classifications; a set of preliminary values have been developed, and these were used in completing the SEDA Specific Plan analysis; see Table 5.3 for these C-factors.

[13].

Table 5.1 General Plan–SEDA Equivalent Land Use Classifications

SEDA Specific Plan Land Use Classifications [A]	Equivalent General Plan Land Use Classification [B]
Residential – Mixed Residential	Residential – Urban Neighborhood
Residential – Neighborhood Residential	Residential – Medium Density
Residential – Rural Residential	Residential – Low Density
Residential – Rural Cluster Residential	Residential – Low Density
Employment – Office Center	Employment – Office
Employment – Flexible Research & Development	Employment – Business Park/ Regional Business Park
Employment – Institutional	Public Facilities – College/School with Park
Mixed Use – Regional Center	Mixed Use – Regional Mixed Use
Mixed Use – Community Center	Mixed Use – Corridor/Center Mixed Use
Mixed Use – Neighborhood Center	Public Facilities – Neighborhood Center
Open Space – Flood Control Basin	Open Space – Ponding Basin
Other	Streets/Railroad/Canals/Etc.

[A] City of Fresno, "Notice of Preparation of a Program Environmental Impact Report for the Southeast Development Area Specific Plan, Fresno, California," February 22, 2022.
[B] City of Fresno, "Fresno General Plan," December 18, 2014.

[13] Blair, Church & Flynn, "Storm Drainage Technical Report for the City of Fresno General Plan Update MEIR," June 17, 2013.

Table 5.2 FMFCD Recommended Design C-Factors

General Plan Land Use Classification	Equivalent FMFCD Land Use Classification	"C" Factor for 2 Year Return Period
Residential – Low Density	Low Density Residential (0-2 DU/ac)	0.29
Residential – Medium Low Density	Medium Low (2-5 DU/ac)	0.29
Residential – Medium Density	Medium Density (5-10 DU/ac)	0.32
Residential – Medium High Density	Medium-High Density (10-23 DU/ac)	0.42
Residential – Urban Neighborhood	High Density Residential (23-44 DU/ac)	0.55
Employment – Office	Office Commercial	0.65
Employment – Light Industrial	Light Industrial	0.65
Employment – Business Park	Heavy Industrial	0.75
Employment – Regional Business Park		
Corridor-Center Mixed Use	Regional Shopping Center	0.70
Regional Mixed Use	Community Commercial	0.70
Public Facility	MDR-50	0.50
Public Facility - Church		
Public Facility - College		
Public Facility – Elementary School		
Public Facility – Middle & High School		
Commercial – Community	Community Commercial	0.70
Open Space	Open Space	0.20
Open Space – Community Park		
Open Space – Golf Course		
Open Space – Neighborhood Park		
Open Space – Park		
Open Space – Ponding Basin		
Open Space (Trail)		
Canal	Open Space	0.20
Planned Road	Roads	0.90
Planned Trail	Open Space	0.20
Railroad	Railroad	0.50
SEGA Buffer	Rural Density Residential (0-0.7 DU/ac)	0.29
SEGA School with Park	MDR-50	0.50
Roads	Roads	0.90

Table 5.3 SEDA "C" Factors

SEDA Specific Plan Land Use Classifications	FMFCD Land Use Classification	Runoff C-Factor
Residential – Mixed Residential	Mixed Residential	0.46
Residential – Neighborhood Residential	Neighborhood Residential	0.52
Residential – Rural Residential	Low Density (0-2 DU/ac)	0.29
Residential – Rural Cluster Residential	Rural Cluster Residential	0.31
Employment – Office Center	Office Center	0.65
Employment – Flexible Research & Development	Flexible Research & Development	0.74
Employment – Institutional	Institutional	0.60
Mixed Use – Regional Center	Community Commercial	0.70
Mixed Use – Community Center	Community Center	0.67
Mixed Use – Neighborhood Center	Neighborhood Center	0.61
Open Space – Flood Control Basin	Open Space	0.20
Other	Roads	0.90

Since the drainage areas within the Plan Area are still under development, FMFCD provided design and analysis documents that included the basic drainage area information needed to complete the analysis, including drainage area size in acres and proposed basin volumes. GIS and Shape files were georeferenced to the California State Plane Coordinate System, Zone 4, Foot, NAD83 Datum for analysis. This allowed mapping of the land uses to pull information necessary to complete the analysis, including the area of each land use. The product of each land use area and its C factor was calculated and summed to determine the total Equivalent Area for the drainage area. This procedure was completed for the General Plan land uses and the Specific Plan land uses.

For both SEDA and General Plan areas, roads and some waterways were not included in the shape files provided, meaning the land use areas do not completely fill the basin boundary areas. Through visual inspection of aerial photography, we determined which areas were water. It was assumed that the remaining difference in areas were roads. Thus, road areas were calculated by finding the total land use areas (including water) and subtracting it from the basin boundary area.

The Equivalent Area data was used to evaluate the required storage capacity for each drainage area, and how this compared to the existing/proposed drainage basins in the plan Area. The analysis was separated into two categories – existing and proposed. This is because, as has been established in this study, some of the Plan Area is encompassed within existing drainage areas already established by FMFCD, and thus only a portion of that drainage area's total runoff is affected by the change in land use from General to Specific Plan. Additionally, the FMFCD has already completed runoff and volume calculations for these basins, which are already constructed and in use.

Analysis for the existing drainage areas consisted of calculating the increase in runoff volume for the portion of the existing drainage area locating within the Plan Area from the General Plan to the Specific Plan, and adding this increase to the FMFCD's calculated runoff volume for the whole existing drainage area. This combined runoff volume was then deducted from the design volume of the existing basin in said drainage area to determine the remaining basin volume available.

Analysis for the proposed drainage areas differed slightly from the existing analysis. Because the drainage areas and basins proposed for the Plan Area are preliminary, FMFCD calculations for

the drainage area runoffs were not used; instead, the GIS and shape files of the City's land uses and FMFCD's drainage areas and basins were used to develop independent calculations for the runoff volumes of each proposed drainage area based on the General Plan land uses. Thus, the area and volume values may differ slightly from those obtained from FMFCD. The proposed analysis consisted of calculating the runoff volume for each proposed drainage area based on the General Plan land uses and the Specific Plan land uses, then finding the difference between them to determine an increase in runoff volume due to the Specific Plan. This increase was used in conjunction with proposed basin volumes provided by FMFCD to determine how much the runoff collected by the basin changed, and what the remaining available capacity was for each basin.

Runoff volume for each drainage area was determined using similar methods as the FMFCD:

- Q = C x A x d x F
    - Q = Runoff Volume, ac-ft
    - A = Total area impacted by SEDA within a basin's boundary, ac
    - D = Rainfall depth (0.5 feet for all basins)
    - F = Safety Factor (FMFCD uses 1.2 for a 20% buffer)

5.3 Results

The total runoff volume was determined for each drainage area under the General Plan and Specific Plan. In general, all drainage areas experienced some amount of increase in runoff volume. See Table 5.4and Table 5.5 for the results of the analysis completed for the existing and proposed drainage areas, and Appendix A for a more detailed version of the analysis.

As shown, none of the existing basins exceed a 20% change in runoff volume, and all existing basins have sufficient capacity available to accommodate the increase in runoff volume as a result of the Specific Plan development.

With regards to the proposed basins, there are two (2) basins of concern – Basin DW and Basin DX. Basin DW experiences a 16.2% increase in runoff volume, and while this does not exceed the 20% threshold, it does exceed the available volume of the proposed basin by 12.8 acre-feet, meaning that FMFCD will need to reevaluate Basin DW's capacity. Basin DX has the opposite problem – while there is still 34 acre-feet of capacity available in the basin, the total runoff volume increased by 25.4%, which exceeds the 20% threshold. FMFCD will need to reevaluate either the basin's size or location to accommodate this increase in runoff.

There may be a number of reasons as to why some of the basins experienced higher increases in runoff volumes from the General Plan to the Specific Plan.

One reason could be that the SEDA boundary has increased from that shown in the General Plan, indicated by the increased area of total land uses. The total area of the General Plan land uses is 8,253.76 acres, while the total area of the Specific Plan land uses was found to be 8,325.57 acres – an increase of approximately 72 acres. This increase will lend itself to an increase in developed area which may have increase C values, as well as increases in land use areas that will contribute to an increase in runoff volume.

Another contributor to increased runoff volume is changes in land use classifications. For the most part, the land use classifications remained fairly similar in nature and category when transitioning from the General Plan to the Specific Plan. However, a few areas of land uses in drainage areas DW and DX changed to different land uses that have larger runoff factors; these include "Public Facilities – School with Park," and "Buffer." Per the SEDA Specific Plan land use map, all but one area defined as "School with Park" in the General Plan land use map changed to the SEDA

"Neighborhood Center" land use. Similarly, the areas denoted as "Buffer" land use in the General Plan changed to "Rural Custer Residential" in the SEDA Specific Plan.

Finally, many SEDA land uses increased in area from their General Plan counterparts seemingly due to the elimination of the "Open Space" land uses included in the General Plan for the Plan Area, which totaled approximately 617 acres. As shown in Figure 5.2, approximately 249 acres of "Open Space," and "Community Park" areas were removed from the Plan Area within Drainage Areas DW and DX, and those areas were absorbed by adjacent land uses, including various residential and mixed use land uses. Open Space land uses have a significantly smaller runoff factor than other land uses; consequently, this means that these Open Space areas were added to other land uses with larger runoff factors, thereby increasing the total runoff volume of Drainage Areas DW and DX within the SEDA Plan Area when compared to the General Plan buildout condition.

Table 5.4 General Plan (GP) and Specific Plan (SP) Anticipated Runoff Volume for Existing Basins Encompassed within SEDA

Drainage Area	GP FMFCD Design Runoff Volume (ac-ft)	SP Runoff Volume Increase (ac-ft)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (ac-ft)	Remaining Basin Volume (ac-ft)
BG	213.2	8.50	4.0%	232.1	10.4
BL	274.0	4.00	1.5%	301.1	23.1
BM	379.3	0.46	0.1%	390.4	10.7
BS	332.2	5.34	1.6%	396.7	59.2
CS	310.4	4.75	1.5%	346.5	31.3

Table 5.5 General Plan (GP) and Specific Plan (SP) Anticipated Runoff Volume for

Drainage Area	GP Runoff Volume (ac-ft)	SP Runoff Volume Increase (ac-ft)	SP Runoff Volume Increase (%)	GP FMFCD Basin Design Volume (ac-ft)	Remaining Basin Volume (ac-ft)
DS	433.8	85.2	19.6%	1,383.3	864.3
DT	207.3	18.7	9.0%	232.4	6.4
DU	305.0	3.8	1.3%	323.8	15.0
DV	171.7	6.6	3.8%	230.0	51.7
DW	212.3	34.4	16.2%	233.9	-12.8
DX	215.7	54.8	25.4%	304.5	34.0
DY	279.9	10.4	3.7%	295.2	4.9
DZ	237.4	11.1	4.7%	263.6	15.1

CHAPTER 6
IMPACTS AND MITIGATION

6.1 SEDA Planning

Improvements within the Plan Area will require modifications to master planned storm drain facilities and infrastructure. These facilities are being designed and developed by FMFCD in close coordination with the City.

A draft policy document has been completed for the SEDA Specific Plan (March 2022), which includes updated policies for the Plan Area, and proposed improvements to meet the chosen alternative for development of the area. Included among these are policies directly related to storm drainage in the Plan Area.[14] These include:

Table 6.1 SEDA Specific Plan Draft Policies Related to Recycled Water

Objective/Policy Number	Objective/Policy Text
Policy UF-7.3	Parking Design – Support vibrant, walkable, and accessible communities by successfully integrating and managing parking facilities within the urban fabric. Minimize Heat Island Effect & Stormwater Runoff: Use planting, shading and paving techniques to minimize environmental impacts of parking facilities… • Soil and planting materials on surface lots shall serve to: o Arrest sediment movement o Trap sediment-attached substances o Encourage infiltration o Encourage nutrient-fixing and absorption of flushed surface contaminants during detention and infiltration o Enhance water-cooling effect by shading runoff during detention and infiltration • Paving in high-density and commercial areas should consist of pervious pavement systems or equivalent technology, achieving a reduction of not less than 50% net impervious cover, for at least 50% of total pavement area as compared to a typical concrete or asphalt concrete system.
Policy OS-1.1	Joint Use of Open Spaces – Establish agreements to share facilities between the City of Fresno and Fresno Metropolitan Flood Control District, Fresno Irrigation District, and other local and regional agencies and organizations. At a minimum, and as early as possible with respect to development plans, the City of Fresno shall: • Establish joint-use agreements with the Fresno Metropolitan Flood Control District to provide access to storm drainage/recharge basins for recreational use, where appropriate. • Establish joint-use agreements with the Fresno Irrigation District to provide public access to areas adjacent to canals and creeks. These agreements should address issues associated with the provision of canal side trails, where appropriate.

[14] City of Fresno, "Southeast Development Area Specific Plan Policy Draft," March 2022.

Objective/Policy Number	Objective/Policy Text
Policy OS-2.3	Stormwater Management Features – Maximize the use of green stormwater management infrastructure – such as ponds, basins, swales, and other low-impact systems – within the open space system. *Coordinate with Fresno Metropolitan Flood Control District (FMFCD) to incorporate green infrastructure within city parks and trails.*
Policy PF-8.1	Provision of Water, Stormwater, & Wastewater Infrastructure – Provide water, stormwater, and wastewater infrastructure in accordance with the policies of the Water Resources Element. Refer to the Water Resources Element for detailed information.
Policy RC-4.3	Maximizing Groundwater Recharge – Establish integrated systems within the SEDA open space network to maximize recharge using stormwater, treated wastewater, and excess surface water supplies. Facilitate increased porosity and en-route stormwater recharge through the use of porous conveyance methods such as bioswales, naturalized channels, and layered basins. Recharge and related systems shall be addressed in the SEDA Infrastructure Assessment.
Policy RC-4.4	Utilization of Recreation & Open Spaces as Groundwater Recharge Areas – Support recreation opportunities with a range of parks and multi-use trails by establishing joint-use agreements with Fresno Metropolitan Flood Control District to allow access to storm drainage/recharge basins for recreational use, when appropriate (see Open Space and Recreation Policy OS-1.2).
Policy RC-5.1	Stormwater Runoff – Implement stormwater management practices that minimize stormwater runoff impacts on the Tulare Lake Watershed. • *Compact Development*: Limit impervious cover by clustering new, higher density development within the SEDA, directing growth away from undeveloped portions of the watershed. o *Compact Development* – Reduce the building footprint and overall impervious surface to minimize lot coverage on a per unit basis. o *Parking demand management* – Reduce the demand for parking stalls to lower the amount of impervious surface (and environmental impacts). • *Low Impact Development Practices*: Implement practices such as natural conveyance, bioswales, and raingardens that minimize, slow and filter street runoff and remove pollutants, lowering peak volume and reducing the size and cost of stormwater infrastructure. o Natural conveyance o Bioswales o Raingardens
Policy RC-5.2	Hazardous Materials – Prevent contamination of the groundwater table and surface water resources. • *Signage*: Install appropriate signage to deter the discharge of hazardous materials into storm drains. • *Pollution Prevention*: Provide information to SEDA residents on appropriate ways to dispose of hazardous materials and chemicals. • *Pesticide Reduction*: Discourage all pesticide use for agricultural and landscaping uses within the SEDA.

Objective/Policy Number	Objective/Policy Text
	• *Remediation:* Encourage rapid clean-up of contaminated groundwater consistent with applicable laws and regulations.
Policy RC-5.3	Construction Erosion – Prevent erosion on construction sites during storm events. • *Erosion & Sedimentation Control Plan*: Require all construction projects to create and implement a plan using state and local best management practices for erosion and sedimentation control. • *Runoff Control*: Prevent loss of soil by stormwater runoff and sedimentation of storm sewers or receiving streams.
Policy RC-6.3	Flood Control & Stormwater Management – Evaluate and provide infrastructure to minimize community flood risk, enhance water quality, and provide locations for active recreation. Schematic designs will be included in the pending EIR-related water infrastructure planning tasks, as well as the SEDA Infrastructure Assessment. Sub-Area or Development Proposal Delivery: Proposed stormwater systems shall be identified at the time of development project approval to the satisfaction of the City of Fresno. Systems must work within the requirements established in the pending EIR-related water infrastructure planning tasks, and the SEDA Infrastructure Assessment. • Stormwater Runoff Reductions – The City of Fresno and the developer will identify specific reduction measures required for the development proposal to move forward. • Detailed Engineering: Infrastructure planning and engineering will be conducted with the proposed demand reduction factors included.
Policy RC-6.4	Shared Resources & Infrastructure – Develop methods and systems to share resources, infrastructure, and to capture the highest possible value for all public agencies. Resource-sharing strategies and plans shall be included in the SEDA Infrastructure Assessment. • Water infrastructure Systems, Stormwater Systems, & Assessment: The Water Section of the Resource Conservation Element will include a full Infrastructure Assessment (Water Supply Assessment, or WAS), as well as trunk infrastructure diagrams for water, wastewater, and stormwater systems. This work is being completed by the Fresno Metropolitan Flood Control District, and the City's consultants as part of the preparation of the Environmental Impact Report (EIR) for the SEDA Plan. All this work and analysis will eventually be integrated into this, and other sections as required. • Infrastructure Assessment: The WSA, currently underway as part of the SEDA EIR process, will include: o Surface water analysis and allocation for the SEDA o Groundwater analysis and allocation for the SEDA o Recycled water systems analysis and planning for the SEDA • Water Infrastructure Planning: Informed by the results of the WSA, infrastructure plans will describe the following components of the water, wastewater, and stormwater systems for the SEDA: o Stormwater

Objective/Policy Number	Objective/Policy Text
	▪ Stormwater plan map (including basins and conveyances) ▪ Size and design standards for infrastructure basins and features.

6.2 5.2 Impacts of Significance

The proposed Specific Plan would result in a significant impact if it would:

1. Violate any water quality standards or waste discharge requirements (e.g. NPDES or RWQCB requirements) or otherwise substantially degrade surface or groundwater quality.

   The Plan Area will undergo development as the Specific Plan is enacted, which will result in various construction activities for new projects that could impact water quality through soil erosion and increased silt and debris discharged into runoff, or present risks to surface water quality through the use of construction materials such as fuel or solvents. These risks may result in contamination of stormwater. New projects 1 acre or larger in size will be required to comply with the General Construction Permit, Order No. 2012-0006-DWQ, issued by the SWRCB, and will need to develop and implement a Storm Water Pollution Prevention Plan (SWPPP) to estimate sediment risk from construction activities to receiving waters, and specify Best Management Practices (BMPs) that would be used by the project to minimize pollution of stormwater.

   The Plan Area will eventually be under the jurisdiction of the FMFCD for storm water and flood control management (portions of the Plan Area are currently within FMFCD boundaries, with the rest actively being developed and annexed). Operation of projects developed under the Specific Plan could produce the same contaminants that construction does. Water quality treatment for post-construction discharges to stormwater in the FMFCD urban flood control system area is provided by retention basins. Development in the FMFCD Master Plan area is exempt from further water quality requirements as long as the FMFCD's Storm Water Quality Management Plan is implemented. Storm drainage improvements are funded by local drainage fees paid by developments and constructed by either FMFCD, developers, or both. Basins are effective at reducing average concentrations of a broad range of contaminants via filtration through soil, and are bult to design criteria exceeding Statewide Standard Urban Stormwater Mitigation Plan standards. Construction and operational impacts would be less than significant.

2. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that the project may impede sustainable groundwater management of the basin.

   The FMFCD is developing designs for proposed drainage areas and basins for the Plan Area, and some portions of the area are already served by existing drainage areas and basins. As developed by FMFCD, the Plan Area's storm drain system will include facilities to capture the runoff from proposed land uses and convey it to retention basins where it will infiltrate into the soil. As designed, basins have the capacity for a two-year storm and for at least 60 percent of average annual rainfall. The existing and proposed basins will encourage groundwater recharge through stormwater collection; the impact would be less than significant.

3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river or through addition of impervious surfaces, in a manner which would:
    a. Result in a substantial erosion or siltation on- or off-site;

        The drainage pattern in the Plan Area would remain similar to the conditions established for drainage systems in the City's General Plan and FMFCD planning documents; runoff from developed properties would be conveyed to public streets and via curbs and gutters to storm drain inlets, and then through piping systems to FMFCD basins where the runoff would be stored and infiltrated into the soil. Retention basin capacities for the Plan Area are shown in Table 4.1. Proposed basins are being designed and sized for SEDA Specific Plan buildout, and per the analysis in this study may require additional storage in the form of new or expanded basins. Additionally, the FMFCD master plan includes many proposed storm drain facilities to be installed within the Plan Area and proposed drainage areas. Impacts would be less than significant.

        The main natural sources of erosion in the area are wind and flowing water. Erosion can be exacerbated by construction activities if effective erosion control measures are not in place. Siltation, the settling of sediment to the bed of a stream or lake, can result from soil erosion, and can negatively impact natural watercourses. Portions of the Plan Area are currently used for agriculture and the General Plan includes areas for open space. At buildout of the proposed Specific Plan, many of the areas will be developed with land uses consisting of buildings, paved areas, and landscaping. Bare soil on farmland is more susceptible to erosion than developed land. Though areas of the Specific Plan will maintain mixed use facilities for agriculture and open land uses, implementation of the Specific Plan is expected to not result in a significant increase of onsite erosion, and impacts would be less than significant as long as proper erosion control and SWPPP measures are carried out during and post-construction/development.

    b. Substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site;

        Development as part of the Specific Plan will increase the amount of impervious surfaces onsite and thus increase runoff from the Plan Area. As discussed in Chapter 5, the buildout of the Specific Plan when compared to the General Plan would result in a net change of 248 ac-ft in expected runoff; FMFCD allows a 20 percent change in required basin volumes before the basin must be modified; as shown, the buildout of the Specific Plan results in a change in required volume of more than 20 percent in one basin (Basin DX), and the exceedance of one basin's proposed capacity (Basin DW). The basins in questions will need to be revised or resized in conjunction with those other basins proposed for the SEDA Plan Area and the master plan storm drain facilities.

        Minimum finish floor elevations in all developments under the Specific Plan would be required to be above flood pool elevations at affected sites, and such project would be designed and graded to not impede the flow of flood waters around or through the sites (per Fresno General Plan Policy NS-3-h). Proposed basins will be constructed to complete the proposed storm drain system. Development of the Specific Plan would not alter drainage patterns to cause flooding on or offsite, and the impacts would be less than significant.

c. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial or additional sources of polluted runoff;

As stated above under 3.b, the buildout of the Specific Plan when compared to the General Plan would result in a net change of 248 ac-ft in expected runoff; FMFCD allows a 20 percent change in required basin volumes before the basin must be modified; as shown, the buildout of the Specific Plan results in a change in required volume of more than 20 percent in one basin (Basin DX), and the exceedance of one basin's proposed capacity (Basin DW). These two basins will need to be revised by resizing or relocating; impacts would be less than significant if these basins are revised.

As stated above under 1, construction and operational impacts would be less than significant with regards to runoff pollution as long as proper erosion control and SWPPP measures are carried out during and post-construction/development.

d. Impede or redirect flood waters.

As stated above in 3.a, the drainage pattern in the Plan Area would remain similar to the conditions established for drainage systems in the City's General Plan and FMFCD planning documents. Impacts would be less than significant

4. Risk release of pollutants due to project inundation in flood hazard, tsunami, or seiche zones.

Development within floodplains puts structures in danger of repeat flooding from sources of flooding; in Fresno, these sources include the San Joaquin River and a number of foothill creeks, including Big Dry Creek, Dry Creek Canal, Redbank Creek, Fancher Creek, and several other smaller tributaries. Additionally, there are regulatory facilities that help control said bodies of water, including the Big Dry Creek Dam and Reservoir, the Fancher creek Dam and Fancher Creek Detention Basin, and the Redbank Dam and Redbank Creek Detention Basin.

FEMA (Federal Emergency Management Agency) classifies areas into various zones according to the risks associated with flooding of said areas. The Plan Area includes the following zones:

- Zone X (Unshaded) – areas outside of the 500-year (0.2% annual chance) floodplain with minimal risk of flooding.
- Zone X (Shaded) – areas between the 100-year and 500-year floodplain with moderate risk of flooding; areas within the 500-year (0.2% annual chance) floodplain, areas within the 100-year (1% annual chance) floodplain with average depths of less than 1 foot or with drainage areas less than 1 square mile, and areas protected by levees from the 100-year (1% annual chance) flood.
- Zone A – A Special Flood Hazard Area (SFHA) within the 100-year (1% annual chance) floodplain with high risk of flooding; Base Flood Elevations (BFE) have not been determined.
- Zone AE – A Special Flood Hazard Area (SFHA) within the 100-year (1% annual chance) floodplain with high risk of flooding; Base Flood Elevations (BFE) have been determined.
- Zone A/AE, Regulatory Floodway – A Special Flood Hazard Area (SFHA) within the 100-year (1% annual chance) floodplain with high risk of flooding; the channel of a river or other watercourse and the adjacent land areas that must be reserved

in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height.

FEMA prepares Flood Insurance Rate Maps (FIRMS) to map flood zones in order to assist communities with floodplain management regulations and flood insurance requirements. FEMA has prepared multiple FIRMS for the City that show floodplain zones throughout Fresno and surrounding areas. According to the FIRMs that include SEDA, a majority of the Plan Area is outside the 100-year flood zones; most areas are located within Zone X (Unshaded). However, several areas in the northern portion of SEDA (north of California State Route 180) are within zones of higher flood chances, including Zones X (Shaded), A, AE, and A/AE Regulatory Floodplains; these areas are mainly adjacent to existing rivers, creeks, canals, or detention basins.

As shown on FIRM Number 06019C1595H, areas surrounding and along the Fancher Creek are within Zone X (Shaded), the area containing the Redbank Detention Basin is within Zone A, areas surrounding and along the Mill Ditch and Redbank Creek are within Zone AE, and a portion of the Redbank Creek along the northern SEDA border is defined as a Regulatory Floodplain.

FEMA developed the Flood Insurance Program (FIP), of which the City is a participant of, to communities to adopt FIRMS, appoint a trained Floodplain Administrator, adopt a floodplain ordinance modeled after the FIP model ordinance, and enforce the ordinance and the requirements of Title 40 of the Code of Federal Regulations (40 CFR – Protection of Environment), Subchapter D (Water Programs, parts 100 – 149). The City enforces these requirements through Chapter 11, Article 6 of the Fresno Municipal Code (Fresno Flood Plain Ordinance), which outlines specific requirements for floodproofing of structures. The Specific Plan include developments that will be located within these SFHAs; development within these areas will require significant floodproofing, and any required review and approval of the developments by the City, FMFCD, FEMA, and any other governing body. If developments follow the floodplain ordinance, and General Plan objectives and policies are implemented, impacts associated with flooding of developments within the 100-year floodplain would be less than significant.

The plan area is located approximately 6 miles south of Big Dry Creek Dam. An expanded drain was installed at the base of the downstream side of the dam in 2014 to prevent potential damage to the dam from seepage under the dam. The dam is also inspected annually by the California Department of Water Resources Division of Safety of Dams. Considering recent improvements and regular maintenance of the dam, the potential for dam failure is considered slight, and buildout of the Specific Plan would not exacerbate flood hazards due to dam inundation, and impacts would be less than significant. No areas in the Plan Area are mapped as protected from 100-year floods by levees, and thus buildout of the Specific Plan would not place people or structures in the Plan Area at risk of flooding due to levee failure; impacts would be less than significant.

A tsunami is an ocean wave caused by a sudden displacement of the ocean floor, most often due to an earthquake. The Plan Area is approximately 115 miles inland from the Pacific Ocean and is at elevation ranging from about 308 feet amsl (above mean sea level) at the southwest corner to 372 feet amsl at the northeast corner of the area. The Plan Area is not at risk of flooding due to a tsunami, and impacts would be less than significant.

A seiche is a surface wave created when an inland water body is shaken, usually by an earthquake. The nearest body of water capable of generating a seiche is Big Dry Creek Reservoir about 6 miles north of the Plan Area. The Plan Area is not at risk of flooding due to a seiche, and impacts would be less than significant.

5. Conflict with or obstruct implementation of a water quality control plan or sustainable groundwater management plan.

   As stated above under 1, construction and operational impacts would be less than significant with regards to runoff pollution as long as proper erosion control and SWPPP measures are carried out during and post-construction/development.

   As stated above under 2, no additional or expanded basins will be required beyond those proposed, and the existing and proposed basins will encourage groundwater recharge through stormwater collection; the impact would be less than significant.

6. Require or result in the relocation or construction of new or expanded storm water drainage facilities , the construction of which could cause significant environmental effects.

   As development of the Plan Area occurs under the Specific Plan, new and expanded storm drain facilities will be necessary to adequately accommodate the increase in stormwater flows due to an increase in impervious surfaces. Implementation of the Specific Plan would result in significant impact on existing drainage facilities. The transition from General Plan to Specific Plan, though, proposes a modest transfer of density and land uses throughout the Plan Area, which will modify the distribution of stormwater generation. Under both the General Plan and Specific Plan, stormwater generation will continue to increase as growth continues.

   The Plan Area does have master planned FMFCD utilities, including inlets, pipelines, basins, and drainage areas, which have been designed to accommodate the General Plan developments, and are being modified for the SEDA Specific Plan developments. As established in Chapter 5, the majority of the planned facilities will be sufficient to provide drainage for the Specific Plan improvements without significant environmental impacts, except for Basin DW and DX which will require reassessment and possibly resizing or relocation. FMFCD plans for drainage facilities but does not construct facilities until such time as development. Therefore, impacts related to the construction of new storm drain treatment facilities or expansion of baseline facilities would be less than significant.

   Mitigation measures related to storm drain systems are established and required in the FMFCD Master Plan and the City General Plan MEIR. Stormwater collection and handling must adhere to these mitigation measures.

6.3 Conclusions

City planning documents, including but not limited to the General Plan, and FMFCD Master Plan documents, will need to be updated to account for the development of the SEDA, and account for the policies and revisions present in the Specific Plan.

Mitigations for SEDA from the 2025 General Plan to the SEDA Specific Plan include:

a) Develop an update to the FMFCD Storm Drainage and Flood Control Master Plan.
b) Reassess and update SEDA drainage areas and associated basins.
c) Install master-planned storm drain facilities (inlets, pipes, manholes, etc.)
d) Construct proposed storm drain basins in Plan Area.

Appendix A

Supporting Calculations

Basin BG

Catchment Area Impacted by
SEDA (Acres): 248.52

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	17.63	Regional Shopping Center	12.34	7.40
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	90.43	Medium Density (5-10 DU/acre)	28.94	17.36
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	76.79	High Density (23-44 DU/acre)	42.23	25.34
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	37.08	*MDR-50	18.54	11.13
Open Space	0.00	Open Space (OS)	0.00	0.00
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	14.23	*MDR-50	7.12	4.27
Roads = 248.52 - Sum(Row5-22)	12.36		11.12	6.67

Totals (Row5-25): 236.16
Totals check(Row 35-41): 236.16

Grand Total: 248.52 120.29 72.17

City of Fresno GIS Data

Planned Land Use Designation	AREA Square Feet	AREA Acres
Corridor - Center Mixed Use	318351.032	7.3
Corridor - Center Mixed Use	449554.1694	10.3
Public Facility - College	1615363.932	37.1
Residential - Medium Density	3939151.455	90.4
Residential - Urban Neighborhood	1976162.571	45.4
Residential - Urban Neighborhood	1368654.263	31.4
SEGA School with Park	620014.4444	14.2

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	21.92	Community Center	14.69	8.81
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	90.39	Neighborhood Residential	47.00	28.20
Mixed Residential	78.56	Mixed Residential	36.14	21.68
Flexible Reseach & Dev	0.00	Flexible Reseach & Dev	0.00	0.00
Office Center	0.00	Office Center	0.00	0.00
Institutional	37.08	Institutional	22.25	13.35
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	14.23	Neighborhood Center	8.68	5.21
Roads = 248.52 - Sum(Row5-15)	6.33		5.70	3.42

Totals (Row5-25): 242.19
Totals check(Row 35-51): 242.19

Grand Total: 248.52 134.46 80.68

South East Development Area GIS Data

SEDA Land Use Designation	AREA Square Feet	AREA Acres
Neighborhood Center	620014.1528	14.2
Community Center	441325.9625	10.1
Community Center	449554.7152	10.3
Community Center	64146.81362	1.5
Institutional	205954.8112	4.7
Institutional	1409410.031	32.4
Mixed Residential	226488.3359	5.2
Mixed Residential	33004.7502	0.8
Mixed Residential	167139.3305	3.8
Mixed Residential	1853185.982	42.5
Mixed Residential	1142160.354	26.2
Neighborhood Residential	474014.9778	10.9
Neighborhood Residential	534268.1394	12.3
Neighborhood Residential	307533.5408	7.1
Neighborhood Residential	1824150.244	41.9
Neighborhood Residential	600741.8441	13.8
Neighborhood Residential	196656.4626	4.5

CA Difference	Volume Difference	Percent Difference
14.17	**8.50**	**12%**

Basin BL

Catchment Area Impacted by
SEDA (Acres): 322.00

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	0.00	Regional Shopping Center	0.00	0.00
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	0.00	Medium Density (5-10 DU/acre)	0.00	0.00
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	0.00	High Density (23-44 DU/acre)	0.00	0.00
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	289.78	*Heavy Industrial (M-3)	217.33	130.40
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	17.45	Open Space (OS)	3.49	2.09
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.78	Railroad	0.39	0.23
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	0.00	*MDR-50	0.00	0.00
Water	0.00			
Roads = 322.00 - Sum(Row5-22)	14.00		12.60	7.56

Totals (Row 5-25): 308.00
Totals check (Row 36-42): 308.00

Grand Total: 322.00 233.81 140.29

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Railroad	34096.29946	0.78274333
Employment - Regional Business Park	377036.1641	8.655559322
Employment - Regional Business Park	1320690.482	30.31888159
Open Space	527343.3901	12.10613843
Employment - Regional Business Park	2271777.545	52.15283621
Employment - Regional Business Park	8653125.424	198.6484257
Open Space	232616.3489	5.340136568

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	0.12	Neighborhood Residential	0.06	0.04
Mixed Residential	0.53	Mixed Residential	0.24	0.15
Flexible Reseach & Dev	306.33	Flexible Reseach & Dev	226.69	136.01
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	0.09	Neighborhood Center	0.06	0.03
Water	0.00			
Roads =322.00 - Sum(Row5-15)	14.93		13.44	8.06

Totals (Row 5-25): 307.07
Totals check (Row 36-82): 308.02

Grand Total: 322.00 240.48 144.29

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Mixed Residential	215.1461909	0.004939077
Mixed Residential	1130.235735	0.025946642
Mixed Residential	1384.500257	0.031783752
Mixed Residential	322.7493189	0.007409305
Flexible Reseach & Dev	362973.4273	8.332723307
Mixed Residential	487.0722759	0.011181641
Mixed Residential	1048.401183	0.024067979
Mixed Residential	512.7368059	0.011770817
Flexible Reseach & Dev	8522.850824	0.195657732
Mixed Residential	595.7038072	0.013675478
Mixed Residential	72.72043017	0.001669431
Flexible Reseach & Dev	134915.512	3.097233977
Flexible Reseach & Dev	216186.7314	4.962964448
Flexible Reseach & Dev	213546.8294	4.902360639
Flexible Reseach & Dev	243332.2297	5.58613934
Flexible Reseach & Dev	300.0198701	0.006887508
Flexible Reseach & Dev	255197.8796	5.858537182
Flexible Reseach & Dev	100367.4186	2.304118885
Flexible Reseach & Dev	106258.8376	2.439367254
Flexible Reseach & Dev	106837.0671	2.452641578
Flexible Reseach & Dev	55.66158321	0.001277814
Flexible Reseach & Dev	173685.2173	3.987263941
Flexible Reseach & Dev	270601.3684	6.212152627
Flexible Reseach & Dev	36734.86293	0.843316412
Flexible Reseach & Dev	416567.1922	9.563066856
Flexible Reseach & Dev	133778.6584	3.071135408
Neighborhood Residential	37.62668571	0.00086379
Flexible Reseach & Dev	364169.7004	8.36018596
Neighborhood Residential	5088.487416	0.116815597
Flexible Reseach & Dev	118154.2107	2.712447444
Flexible Reseach & Dev	1291508.412	29.64895345
Flexible Reseach & Dev	2048776.226	47.03343035
Flexible Reseach & Dev	409301.2818	9.396264505
Flexible Reseach & Dev	611252.9732	14.0324374
Flexible Reseach & Dev	92619.18669	2.126243955
Flexible Reseach & Dev	418565.3447	9.608938124

CA Difference	Volume Difference	Percent Difference
6.67	**4.00**	**3%**

No Value	41377.29077	0.949891891
Flexible Reseach & Dev	215985.0342	4.958334118
Neighborhood Center	3970.954896	0.091160581
Flexible Reseach & Dev	175317.5284	4.024736649
Flexible Reseach & Dev	810210.1828	18.59986645
Flexible Reseach & Dev	834440.3303	19.1561141
Neighborhood Residential	25.35820066	0.000582144
Flexible Reseach & Dev	823193.062	18.89791235
Mixed Residential	17426.80011	0.400064282
Flexible Reseach & Dev	1040972.349	23.89743684
Flexible Reseach & Dev	1309457.897	30.06101691

Basin BM

Catchment Area Impacted by SEDA (Acres): 188.32

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	0.00	Regional Shopping Center	0.00	0.00
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	0.00	Medium Density (5-10 DU/acre)	0.00	0.00
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	0.00	High Density (23-44 DU/acre)	0.00	0.00
Employment - Business Park	12.78	*Heavy Industrial (M-3)	9.58	5.75
Employment - Regional Business Park	160.45	*Heavy Industrial (M-3)	120.34	72.20
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	5.07	Open Space (OS)	1.01	0.61
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	3.59	Railroad	1.79	1.08
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	0.00	*MDR-50	0.00	0.00
Water	0.00			
Roads =188.32 - Sum(Row5-15)	6.43		5.79	3.47
Totals (Row 5-25):	181.88			
Totals check (Row36-45):	246.57			
Grand Total:	188.32		138.52	83.11

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Open Space	31288.28941	0.7
Open Space	373.5063682	0.0
Employment - Regional Business Park	4443134.181	102.0
Railroad	156211.2625	3.6
Employment - Regional Business Park	2546139.217	58.5
Open Space	31731.317	0.7
Employment - Business Park	556545.878	12.8
Open Space	157340.1257	3.6
~~Employment - Light Industrial~~	~~2817871.803~~	

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	0.00	Neighborhood Residential	0.00	0.00
Mixed Residential	0.83	Mixed Residential	0.38	0.23
Flexible Reseach & Dev	177.39	Flexible Reseach & Dev	131.27	78.76
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	0.00	Neighborhood Center	0.00	0.00
No Value	3.64	Railraod	1.82	1.09
Water	0.00			
Roads =188.32 - Sum(Row5-15)	6.45		5.81	3.48
Totals (Row 5-25):	181.86			
Totals check (Row36-65):	181.86			
Grand Total:	188.32		139.28	83.57

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Mixed Residential	434.4155206	0.01
Mixed Residential	31288.50015	0.72
Mixed Residential	14.88610306	0.00
Mixed Residential	477.3342314	0.01
Flexible Reseach & Dev	112364.6504	2.58
Flexible Reseach & Dev	201364.5703	4.62
Flexible Reseach & Dev	199014.0181	4.57
Mixed Residential	667.9870436	0.02
Flexible Reseach & Dev	102899.9885	2.36
Mixed Residential	3089.59024	0.07
Mixed Residential	372.5425372	0.01
Mixed Residential	1.015040097	0.00
Flexible Reseach & Dev	359571.6911	8.25
Flexible Reseach & Dev	36628.23522	0.84
Flexible Reseach & Dev	314539.8141	7.22
Flexible Reseach & Dev	77406.36687	1.78
Flexible Reseach & Dev	8958.590626	0.21
Flexible Reseach & Dev	18.2845006	0.00
Flexible Reseach & Dev	813475.0382	18.67
Flexible Reseach & Dev	1472813.914	33.81
Flexible Reseach & Dev	263.0631197	0.01
Flexible Reseach & Dev	871313.7327	20.00
Flexible Reseach & Dev	76341.87283	1.75
Flexible Reseach & Dev	771375.0745	17.71
No Value	158394.644	3.64
Flexible Reseach & Dev	1295225.728	29.73
Flexible Reseach & Dev	654987.1312	15.04
Flexible Reseach & Dev	1457307.325	33.46
Flexible Reseach & Dev	-1098694.819	-25.22

CA Difference	Volume Difference	Percent Difference
0.76	**0.46**	**1%**

Basin BS

Catchment Area Impacted by SEDA (Acres): 260.29

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	0.00	Regional Shopping Center	0.00	0.00
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	17.26	Low Density (0-2 DU/acre)	5.01	3.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	84.95	Medium Density (5-10 DU/acre)	27.18	16.31
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	0.00	High Density (23-44 DU/acre)	0.00	0.00
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	3.22	Open Space (OS)	0.64	0.39
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	149.33	Open Space (OS)	29.87	17.92
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	0.00	*MDR-50	0.00	0.00
Water	0.00			
Roads =260.29 - Sum(Row5-15)	5.53		4.98	2.99
Totals (Row 5-25):	254.76			
Totals check (Row36-46):	254.76			
Grand Total:	260.29		67.68	40.61

City of Fresno GIS Data		
Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Residential - Low Density	1183.927465	0.03
Residential - Low Density	300838.8573	6.91
Residential - Medium Density	1945544.61	44.66
Residential - Low Density	142414.5145	3.27
Residential - Low Density	116789.2063	2.68
Open Space	140144.7304	3.22
Residential - Low Density	190682.013	4.38
Open Space - Ponding Basin	7735420.549	177.58
Residential - Medium Density	1754977.236	40.29
Open Space - Ponding Basin	-1230667.512	-28.25
~~Residential - Medium Low Density~~	~~1068372.058~~	
~~Residential - Medium Low Density~~	~~79386.35718~~	
~~Residential - Medium Low Density~~	~~271154.0297~~	

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	52.53	Low Density (0-2 DU/acre)	15.23	9.14
Neighborhood Residential	49.37	Neighborhood Residential	25.67	15.40
Mixed Residential	0.00	Mixed Residential	0.00	0.00
Flexible Reseach & Dev	0.00	Flexible Reseach & Dev	0.00	0.00
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	152.68	Open Space (OS)	30.54	18.32
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	0.00	Neighborhood Center	0.00	0.00
Water	0.00			
Roads =260.29 - Sum(Row5-15)	5.71		5.14	3.08
Totals (Row 5-25):	254.58			
Totals check (Row36-72):	254.58			
Grand Total:	260.29		76.58	45.95

South East Development Area GIS Data		
SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Rural Residential	275.556951	0.01
Rural Residential	887.4387904	0.02
Neighborhood Residential	1.413990371	0.00
Neighborhood Residential	404.28945	0.01
Park_OS_FloodControl	831290.5503	19.08
Park_OS_FloodControl	177603.7938	4.08
Mixed Residential	4.215678275	0.00
Neighborhood Residential	109662.7723	2.52
Rural Residential	212663.1192	4.88
Rural Residential	356.0999362	0.01
Rural Residential	1333.900221	0.03
Neighborhood Residential	744334.0298	17.09
Rural Residential	125329.4753	2.88
Rural Residential	15119.46326	0.35
Rural Residential	83051.1117	1.91
Rural Residential	25748.74874	0.59
Rural Residential	296.491578	0.01
Rural Residential	82477.01139	1.89
Rural Residential	90850.18603	2.09
Rural Residential	176418.3332	4.05
Rural Residential	63.59468293	0.00
Park_OS_FloodControl	10146.621	0.23
Park_OS_FloodControl	4053.492783	0.09
Rural Residential	1003973.26	23.05
Park_OS_FloodControl	123436.5213	2.83
Park_OS_FloodControl	904145.7385	20.76
Rural Residential	116789.0385	2.68
Park_OS_FloodControl	1116512.635	25.63
Neighborhood Residential	217590.4349	5.00
Rural Residential	211277.1655	4.85
Rural Residential	39693.42244	0.91
Rural Residential	17977.76703	0.41
Rural Residential	83785.21764	1.92
Neighborhood Residential	216000.0892	4.96
Neighborhood Residential	862466.8282	19.80
Park_OS_FloodControl	865655.9748	19.87

CA Difference	Volume Difference	Percent Difference
8.90	**5.34**	**13%**

Park_OS_FloodControl	2618015.943	60.10

Basin CS

Catchment Area Impacted by
SEDA (Acres): 80.08

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	0.00	Regional Shopping Center	0.00	0.00
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	0.00	Medium Density (5-10 DU/acre)	0.00	0.00
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	0.00	High Density (23-44 DU/acre)	0.00	0.00
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	79.17	*MDR-50	39.59	23.75
Open Space	0.00	Open Space (OS)	0.00	0.00
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	0.00	*MDR-50	0.00	0.00
Water	0.00			
Roads = 80.08 - Sum(Row5-22)	0.91		0.82	0.49

Totals (Row5-25):	79.17		
Totals check(Row 36):	79.17		
Grand Total:	80.08	40.40	24.24

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Public Facility - College	3448709.476	79.17

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	0.00	Neighborhood Residential	0.00	0.00
Mixed Residential	0.00	Mixed Residential	0.00	0.00
Flexible Reseach & Dev	0.00	Flexible Reseach & Dev	0.00	0.00
Office Center	0.00	Office Center	0.00	0.00
Institutional	79.17	Institutional	47.50	28.50
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	0.00	Neighborhood Center	0.00	0.00
Water	0.00			
Roads = 80.08 - Sum(Row5-22)	0.91		0.82	0.49

Totals (Row5-25):	79.17		
Totals check(Row 36-38):	79.17		
Grand Total:	80.08	48.32	28.99

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Mixed Residential	5.267727096	0.00012
Institutional	3018487.701	69.3
Institutional	430220.7426	9.9

CA Difference	Volume Difference	Percent Difference
7.92	**4.75**	**20%**

Basin DS

Catchment Area Impacted by SEDA (Acres): 1934.94

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	95.15	Regional Shopping Center	66.61	39.96
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	313.03	Low Density (0-2 DU/acre)	90.78	54.47
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	628.03	Medium Density (5-10 DU/acre)	200.97	120.58
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	169.22	High Density (23-44 DU/acre)	93.07	55.84
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	185.45	Open Space (OS)	37.09	22.25
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	113.68	Open Space (OS)	22.74	13.64
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	134.30	Rural Density (0-0.7 DU/acre)	38.95	23.37
SEGA School with Park	203.06	*MDR-50	101.53	60.92
Water	15.71			
Roads = 1934.94 - Sum(Row5-22)	77.30		69.57	41.74
Totals (Row5-25):	1841.93			
Totals check(Row 36-91):	1841.93			
Grand Total:	1934.94		721.30	432.78

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	96.94	Community Center	64.95	38.97
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	550.58	Low Density (0-2 DU/acre)	159.67	95.80
Neighborhood Residential	526.15	Neighborhood Residential	273.60	164.16
Mixed Residential	175.61	Mixed Residential	80.78	48.47
Flexible Reseach & Dev	0.00	Flexible Reseach & Dev	0.00	0.00
Office Center	0.00	Office Center	0.00	0.00
Institutional	149.77	Institutional	89.86	53.92
Park_OS_FloodControl	113.10	Open Space (OS)	22.62	13.57
Rural Cluster Residential	147.19	Rural Cluster Residential	45.63	27.38
Neighborhood Center	84.38	Neighborhood Center	51.47	30.88
Water	15.71			
Roads = 1934.94 - Sum(Row5-22)	75.51		67.96	40.78
Totals (Row5-25):	1843.72			
Totals check(Row 36-91):	1843.72			
Grand Total:	1934.94		856.54	513.92

CA Difference	Volume Difference	Percent Difference
135.24	**81.14**	**19%**

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Corridor - Center Mixed Use	1181852.752	27.13
Corridor - Center Mixed Use	1127933.365	25.89
Corridor - Center Mixed Use	1041644.956	23.91
Corridor - Center Mixed Use	793312.549	18.21
Open Space	7403.589931	0.17
Open Space	126.923315	0.00
Open Space	1257730.606	28.87
Open Space	152297.0733	3.50
Open Space	342176.423	7.86
Open Space	717859.1756	16.48
Open Space	381259.7611	8.75
Open Space	37825.119	0.87
Open Space	3161566.994	72.58
Open Space	1085513.121	24.92
Open Space	862790.0302	19.81
Open Space	63146.05935	1.45
Open Space	8479.981247	0.19
Open Space - Ponding Basin	1634323.699	37.52
Open Space - Ponding Basin	3317690.782	76.16
Residential - Low Density	13020.86476	0.30
Residential - Low Density	192037.2247	4.41
Residential - Low Density	1741135.322	39.97
Residential - Low Density	210285.9861	4.83
Residential - Low Density	130607.8794	3.00
Residential - Low Density	3013618.816	69.18
Residential - Low Density	524298.8045	12.04
Residential - Low Density	1520362.482	34.90
Residential - Low Density	1781577.261	40.90
Residential - Low Density	564304.8462	12.95
Residential - Low Density	762139.9148	17.50
Residential - Low Density	2103763.63	48.30
Residential - Low Density	331062.8293	7.60
Residential - Low Density	747374.1104	17.16
Residential - Medium Density	5641736.349	129.52
Residential - Medium Density	158.2397194	0.00
Residential - Medium Density	1488384.615	34.17

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Rural Cluster Residential	7403.817498	0.17
Rural Residential	15100.32896	0.35
Rural Residential	24996.96041	0.57
Rural Residential	126.9982087	0.00
Rural Residential	31.38611577	0.00
Rural Residential	87118.99812	2.00
Rural Residential	87910.10412	2.02
Rural Residential	87604.94337	2.01
Rural Residential	87114.35491	2.00
Rural Residential	88282.52105	2.03
Rural Residential	98822.02028	2.27
Park_OS_FloodControl	893.962097	0.02
Neighborhood Residential	430729.9572	9.89
Institutional	199968.8988	4.59
Institutional	223718.7107	5.14
Institutional	209975.3343	4.82
Institutional	209928.8091	4.82
Institutional	219680.0516	5.04
Institutional	186948.0828	4.29
Institutional	193767.0305	4.45
Institutional	191954.7505	4.41
Rural Residential	1621.922576	0.04
Rural Residential	1882.299222	0.04
Rural Residential	1914.108734	0.04
Rural Residential	3443.87913	0.08
Rural Residential	405.4100871	0.01
Rural Residential	72492.16677	1.66
Rural Residential	87298.53588	2.00
Rural Residential	195028.0376	4.48
Rural Residential	195703.0843	4.49
Rural Residential	211989.8439	4.87
Institutional	842911.721	19.35
Rural Residential	435679.3061	10.00
Rural Residential	181039.9038	4.16
Rural Residential	202791.0066	4.66
Rural Residential	805214.2904	18.49

Residential - Medium Density	1401621.21	32.18
Residential - Medium Density	1930932.991	44.33
Residential - Medium Density	295612.9858	6.79
Residential - Medium Density	1689150.657	38.78
Residential - Medium Density	4417719.759	101.42
Residential - Medium Density	3382627.854	77.65
Residential - Medium Density	1613478.965	37.04
Residential - Medium Density	2158065.288	49.54
Residential - Medium Density	3337698.565	76.62
Residential - Urban Neighborhood	3522025.825	80.85
Residential - Urban Neighborhood	2107173.817	48.37
Residential - Urban Neighborhood	1086057.498	24.93
Residential - Urban Neighborhood	656012.337	15.06
SEGA Buffer	1133180.945	26.01
SEGA Buffer	3051118.745	70.04
SEGA Buffer	1665648.612	38.24
SEGA School with Park	948718.1857	21.78
SEGA School with Park	1372765.575	31.51
SEGA School with Park	3235148.802	74.27
SEGA School with Park	3288738.252	75.50

~~Residential - Medium Low Density~~	~~90735.3134~~
~~Residential - Medium Low Density~~	~~82528.89732~~
~~Residential - Medium Low Density~~	~~73553.82899~~
~~Residential - Medium Low Density~~	~~166080.9516~~

Rural Residential	205769.1946	4.72
Rural Residential	297377.7359	6.83
Rural Residential	849971.4997	19.51
Rural Residential	209756.7897	4.82
Rural Residential	423735.1208	9.73
Rural Residential	199206.4031	4.57
Neighborhood Center	127318.1079	2.92
Neighborhood Residential	119733.3817	2.75
Neighborhood Residential	1076188.976	24.71
Rural Residential	1599807.604	36.73
Neighborhood Residential	2056978.268	47.22
Rural Residential	90887.15379	2.09
Rural Residential	103507.7617	2.38
Neighborhood Residential	501949.9517	11.52
Rural Residential	366070.9157	8.40
Neighborhood Residential	67.51966792	0.00
Community Center	117762.7094	2.70
Community Center	99965.04375	2.29
Neighborhood Residential	109773.1354	2.52
Rural Residential	70.03535309	0.00
Mixed Residential	432189.0374	9.92
Community Center	405024.1139	9.30
Community Center	418892.2336	9.62
Mixed Residential	415955.4874	9.55
Rural Residential	94004.57093	2.16
Rural Residential	100092.1616	2.30
Mixed Residential	670102.0858	15.38
Community Center	405596.775	9.31
Rural Residential	213359.6098	4.90
Community Center	103874.7127	2.38
Neighborhood Residential	146983.0897	3.37
Rural Residential	105791.3856	2.43
Rural Residential	36765.9258	0.84
Rural Residential	41354.13301	0.95
Rural Residential	36294.90393	0.83
Rural Residential	109899.1932	2.52
Rural Residential	58755.08511	1.35
Rural Residential	110868.5774	2.55
Rural Residential	54407.87502	1.25
Rural Residential	68188.86569	1.57
Rural Residential	100298.7349	2.30
Rural Residential	76869.60876	1.76
Rural Residential	6574.9956	0.15
Rural Residential	6264.331446	0.14
Rural Residential	108387.1646	2.49
Rural Residential	43471.66823	1.00
Rural Residential	42413.40881	0.97
Rural Residential	45177.83659	1.04
Rural Residential	326219.2639	7.49
Rural Residential	189473.6268	4.35
Rural Residential	215169.0924	4.94
Neighborhood Residential	1281965.527	29.43
Rural Residential	42568.22445	0.98
Rural Residential	43424.55723	1.00
Rural Residential	45089.65001	1.04
Rural Residential	101739.4956	2.34
Rural Residential	39447.65011	0.91
Rural Residential	142466.0227	3.27
Rural Residential	28221.07518	0.65
Rural Residential	104342.4037	2.40
Rural Residential	673445.7872	15.46
Rural Residential	745168.5973	17.11
Rural Residential	773047.4362	17.75
Neighborhood Residential	595449.1561	13.67
Neighborhood Residential	639384.5793	14.68
Neighborhood Residential	799184.008	18.35
Rural Cluster Residential	890.4987555	0.02
Neighborhood Residential	40753.12557	0.94
Neighborhood Residential	911553.3109	20.93
Rural Cluster Residential	1975.863716	0.05
Neighborhood Residential	1280885.484	29.41
Rural Cluster Residential	441128.9076	10.13
Community Center	388442.2444	8.92
Mixed Residential	217311.8625	4.99
Mixed Residential	208218.7486	4.78
Neighborhood Residential	965080.038	22.16
Neighborhood Residential	523827.0048	12.03
Mixed Residential	415104.6885	9.53
Neighborhood Residential	470532.0263	10.80

Mixed Residential	763160.7524	17.52
Neighborhood Residential	42645.36831	0.98
Mixed Residential	1088562.543	24.99
Mixed Residential	445196.3942	10.22
Mixed Residential	384470.8387	8.83
Community Center	793410.4813	18.21
Neighborhood Residential	62814.30372	1.44
Neighborhood Center	341.254905	0.01
Neighborhood Residential	2319190.236	53.24
Rural Cluster Residential	690010.5181	15.84
Rural Cluster Residential	214747.8888	4.93
Neighborhood Residential	111231.701	2.55
Mixed Residential	203367.1777	4.67
Mixed Residential	212919.3155	4.89
Rural Cluster Residential	2134225.336	49.00
Neighborhood Residential	755647.5199	17.35
Neighborhood Residential	57374.69939	1.32
Neighborhood Center	144617.2744	3.32
Neighborhood Center	888342.1938	20.39
Rural Residential	87119.57837	2.00
Rural Residential	87910.62741	2.02
Rural Residential	87119.38494	2.00
Rural Residential	87119.9298	2.00
Rural Residential	87602.60603	2.01
Rural Residential	87122.9595	2.00
Rural Residential	88314.57463	2.03
Rural Residential	88357.94566	2.03
Rural Residential	87042.33953	2.00
Rural Residential	87045.03506	2.00
Rural Residential	99848.19717	2.29
Rural Residential	97777.48837	2.24
Rural Residential	96628.3104	2.22
Rural Residential	388700.6085	8.92
Neighborhood Residential	103799.8271	2.38
Neighborhood Residential	103605.9274	2.38
Neighborhood Residential	103408.4225	2.37
Neighborhood Residential	106948.5129	2.46
Neighborhood Residential	404043.1101	9.28
Neighborhood Residential	849226.7069	19.50
Neighborhood Residential	807963.7571	18.55
Neighborhood Residential	427971.7136	9.82
Rural Residential	43283.54766	0.99
Rural Residential	497010.4744	11.41
Rural Residential	3447.320902	0.08
Rural Residential	375813.6632	8.63
Rural Residential	879237.7949	20.18
Rural Residential	256365.6651	5.89
Rural Residential	194491.1208	4.46
Rural Residential	211491.5008	4.86
Rural Residential	184177.0579	4.23
Institutional	2392238.125	54.92
Rural Residential	203991.6061	4.68
Rural Residential	117608.0541	2.70
Rural Residential	787324.9985	18.07
Rural Residential	2629004.49	60.35
Rural Residential	311520.2883	7.15
Neighborhood Residential	444709.7878	10.21
Neighborhood Center	421589.8808	9.68
Community Center	69269.0362	1.59
Neighborhood Residential	275.903669	0.01
Rural Residential	1504.547585	0.03
Neighborhood Residential	2740.202912	0.06
Mixed Residential	432174.8914	9.92
Mixed Residential	1379239.218	31.66
Rural Residential	98032.3808	2.25
Rural Residential	99940.96752	2.29
Community Center	205326.7454	4.71
Community Center	205394.2411	4.72
Rural Residential	213429.9047	4.90
Rural Residential	213424.2808	4.90
Rural Residential	213431.0528	4.90
Rural Residential	103368.0109	2.37
Rural Residential	99745.47922	2.29
Rural Residential	100049.9499	2.30
Community Center	103869.2219	2.38
Community Center	103872.0042	2.38
Neighborhood Residential	107245.5323	2.46
Neighborhood Residential	706949.9095	16.23
Rural Residential	53161.20225	1.22

Rural Residential	68387.43999	1.57
Rural Residential	283556.5233	6.51
Rural Residential	346999.0862	7.97
Rural Residential	178242.2919	4.09
Rural Residential	184181.4423	4.23
Rural Residential	182681.9174	4.19
Rural Residential	57253.3998	1.31
Rural Residential	280600.3847	6.44
Rural Residential	219333.8402	5.04
Rural Residential	173453.439	3.98
Rural Residential	87017.99484	2.00
Rural Residential	9171.457086	0.21
Rural Cluster Residential	32500.12708	0.75
Rural Cluster Residential	1601541.317	36.77
Park_OS_FloodControl	4925665.018	113.08
Institutional	1652830.595	37.94
Rural Residential	115507.4776	2.65
Rural Residential	42487.47424	0.98
Rural Residential	46901.50421	1.08
Rural Cluster Residential	40271.97733	0.92
Rural Residential	9950.314598	0.23
Neighborhood Residential	237326.3994	5.45
Neighborhood Residential	63762.17134	1.46
Neighborhood Residential	112607.7	2.59
Rural Cluster Residential	434125.5857	9.97
Neighborhood Residential	70013.53255	1.61
Neighborhood Residential	42006.03532	0.96
Rural Cluster Residential	204166.4469	4.69
Rural Cluster Residential	96673.97195	2.22
Neighborhood Residential	478394.67	10.98
Neighborhood Center	476277.6708	10.93
Neighborhood Residential	1148264.607	26.36
Neighborhood Center	68219.55934	1.57
Rural Cluster Residential	117660.3987	2.70
Neighborhood Center	1548986.648	35.56
Rural Cluster Residential	215856.0053	4.96
Rural Cluster Residential	178514.299	4.10
Community Center	802114.1643	18.41
Mixed Residential	174138.4466	4.00
Neighborhood Residential	216695.0697	4.97
Neighborhood Residential	216062.4371	4.96
Neighborhood Residential	212569.9967	4.88
Neighborhood Residential	89023.69678	2.04
Neighborhood Residential	20987.87269	0.48
Mixed Residential	207384.7894	4.76
Neighborhood Residential	542461.0775	12.45

Basin DT

Catchment Area Impacted by SEDA (Acres): 982.29

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	41.29	Regional Shopping Center	28.90	17.34
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	624.26	Low Density (0-2 DU/acre)	181.04	108.62
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	99.74	Medium Density (5-10 DU/acre)	31.92	19.15
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	15.20	High Density (23-44 DU/acre)	8.36	5.02
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	70.97	Open Space (OS)	14.19	8.52
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	43.15	Rural Density (0-0.7 DU/acre)	12.51	7.51
SEGA School with Park	25.64	*MDR-50	12.82	7.69
Water	0.00			
Roads = 982.29 - Sum(Row5-22)	62.03		55.83	33.50
Totals (Row5-25):	920.26			
Totals check(Row 36-62):	920.26			
Grand Total:	982.29		345.57	207.34

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Residential - Low Density	107701.0163	2.47
Residential - Low Density	22304.58071	0.51
Residential - Low Density	777778.0567	17.86
Residential - Medium Density	123.6608068	0.00
Residential - Low Density	3561526.635	81.76
Residential - Medium Density	3451815.687	79.24
Residential - Low Density	441427.934	10.13
Residential - Low Density	2683484.289	61.60
Residential - Low Density	2116565.696	48.59
Open Space	484913.9463	11.13
Open Space	1872710.693	42.99
SEGA School with Park	1117008.759	25.64
Corridor - Center Mixed Use	1798548.559	41.29
Residential - Low Density	3095669.45	71.07
Residential - Urban Neighborhood	662088.7259	15.20
Residential - Medium Density	892947.6185	20.50
Residential - Low Density	727891.5302	16.71
Residential - Low Density	326065.6394	7.49
Residential - Low Density	5190175.693	119.15
Residential - Low Density	1562390.87	35.87
Residential - Low Density	3125840.905	71.76
Residential - Low Density	852421.7297	19.57
Residential - Low Density	2145688.677	49.26
Residential - Low Density	455896.831	10.47
SEGA Buffer	1229159.41	28.22
Open Space	733928.0443	16.85
SEGA Buffer	650360.8087	14.93

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	41.29	Community Center	27.66	16.60
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	672.21	Low Density (0-2 DU/acre)	194.94	116.96
Neighborhood Residential	79.25	Neighborhood Residential	41.21	24.72
Mixed Residential	18.30	Mixed Residential	8.42	5.05
Flexible Reseach & Dev	0.00	Flexible Reseach & Dev	0.00	0.00
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	60.00	Rural Cluster Residential	18.60	11.16
Neighborhood Center	49.23	Neighborhood Center	30.03	18.02
Water	0.00			
Roads = 982.29 - Sum(Row5-22)	62.02		55.82	33.49
Totals (Row5-25):	920.26			
Totals check(Row 36-352):	920.26			
Grand Total:	982.29		376.68	226.01

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Rural Residential	3196.210271	0.07
Rural Residential	3890.579187	0.09
Rural Cluster Residential	6251.833456	0.14
Rural Residential	87.77426423	0.00
Rural Residential	1586.092555	0.04
Rural Cluster Residential	1602.017268	0.04
Mixed Residential	797092.1256	18.30
Rural Residential	7264.592711	0.17
Rural Residential	4103.871787	0.09
Rural Residential	50375.57406	1.16
Rural Residential	2077.408377	0.05
Rural Residential	95664.13947	2.20
Rural Residential	67462.83732	1.55
Rural Residential	40200.14101	0.92
Rural Residential	50290.93046	1.15
Rural Residential	10746.87615	0.25
Rural Residential	45.60951075	0.00
Rural Residential	167.291003	0.00
Rural Residential	527171.2415	12.10
Rural Residential	183604.6911	4.21
Rural Cluster Residential	9939.523733	0.23
Rural Cluster Residential	154776.5004	3.55
Rural Residential	101785.1554	2.34
Rural Residential	114059.9057	2.62
Rural Residential	100164.4237	2.30
Rural Residential	49435.00106	1.13
Rural Residential	101121.2432	2.32
Rural Residential	81530.72791	1.87
Rural Residential	470871.1363	10.81
Rural Residential	60241.90403	1.38
Rural Residential	154941.9148	3.56
Rural Residential	149610.6359	3.43
Rural Residential	106025.542	2.43
Rural Residential	86276.91151	1.98
Rural Residential	86139.95947	1.98
Rural Residential	86436.91924	1.98

CA Difference	Volume Difference	Percent Difference
31.11	**18.66**	**9%**

Rural Residential	87745.54293	2.01
Rural Residential	95051.00501	2.18
Rural Residential	83335.01504	1.91
Rural Residential	125415.4384	2.88
Rural Residential	250953.5451	5.76
Rural Residential	49709.23536	1.14
Rural Residential	49850.87338	1.14
Rural Residential	10053.24166	0.23
Rural Residential	589715.7473	13.54
Rural Residential	59368.89619	1.36
Rural Residential	83642.1042	1.92
Rural Residential	26769.16052	0.61
Rural Residential	28931.68326	0.66
Community Center	1784169.941	40.96
Community Center	14378.73072	0.33
Rural Residential	83330.08024	1.91
Rural Residential	81456.97705	1.87
Rural Residential	482286.2619	11.07
Rural Residential	79089.77405	1.82
Rural Residential	91023.67211	2.09
Rural Residential	71461.64408	1.64
Rural Residential	68324.31257	1.57
Rural Residential	69914.31223	1.61
Rural Residential	67853.48833	1.56
Rural Residential	73852.89621	1.70
Rural Residential	76189.21078	1.75
Rural Residential	88027.66298	2.02
Rural Residential	79198.32443	1.82
Rural Residential	92604.03379	2.13
Rural Residential	89983.19089	2.07
Rural Residential	89262.00522	2.05
Rural Residential	90508.60545	2.08
Rural Residential	88612.34667	2.03
Rural Residential	90295.71623	2.07
Rural Residential	90187.87976	2.07
Rural Residential	90079.40732	2.07
Rural Residential	92700.81298	2.13
Rural Residential	88470.36932	2.03
Rural Residential	90184.74794	2.07
Rural Residential	96331.68906	2.21
Rural Residential	90002.92676	2.07
Rural Residential	86199.69417	1.98
Rural Residential	88005.78695	2.02
Rural Residential	92292.23593	2.12
Rural Residential	90235.29912	2.07
Rural Residential	105392.0957	2.42
Rural Residential	76087.60482	1.75
Rural Residential	88506.80853	2.03
Rural Residential	92851.1347	2.13
Rural Residential	94885.23121	2.18
Rural Residential	87843.10157	2.02
Rural Residential	89931.83593	2.06
Rural Residential	87207.37488	2.00
Rural Residential	110305.187	2.53
Rural Residential	100758.1282	2.31
Rural Residential	80442.80084	1.85
Rural Residential	93599.02843	2.15
Rural Residential	61546.0956	1.41
Rural Residential	43939.2124	1.01
Rural Residential	18780.26636	0.43
Rural Residential	74139.77288	1.70
Rural Residential	96371.87209	2.21
Rural Residential	98571.17004	2.26
Rural Residential	20288.47496	0.47
Rural Residential	94964.42599	2.18
Rural Residential	20444.07703	0.47
Rural Residential	24346.24696	0.56
Rural Residential	21252.09299	0.49
Rural Residential	39175.98998	0.90
Rural Residential	24808.62293	0.57
Rural Residential	17919.95999	0.41
Rural Residential	38551.96409	0.89
Rural Residential	129055.7076	2.96
Rural Residential	33150.66909	0.76
Rural Residential	32990.76111	0.76
Rural Residential	107122.5066	2.46
Rural Residential	95761.88211	2.20
Rural Residential	21479.6454	0.49
Rural Residential	97543.56134	2.24

Rural Residential	37929.96232	0.87
Rural Residential	38486.97617	0.88
Rural Residential	38434.95849	0.88
Rural Residential	152470.9543	3.50
Rural Residential	332533.5968	7.63
Rural Residential	15142.37818	0.35
Rural Residential	132089.9673	3.03
Rural Residential	88999.22301	2.04
Rural Residential	408981.4106	9.39
Rural Residential	98620.59979	2.26
Rural Residential	88401.52266	2.03
Rural Residential	117578.2948	2.70
Rural Residential	108851.6467	2.50
Rural Residential	94972.9356	2.18
Rural Residential	51935.09624	1.19
Rural Residential	84290.39888	1.94
Rural Residential	84924.28033	1.95
Rural Residential	192434.8484	4.42
Rural Cluster Residential	38223.94752	0.88
Rural Cluster Residential	83235.76243	1.91
Rural Cluster Residential	101645.2036	2.33
Rural Residential	86063.32713	1.98
Rural Residential	85102.99585	1.95
Rural Cluster Residential	310929.07	7.14
Rural Residential	108366.9851	2.49
Rural Residential	108054.7353	2.48
Rural Residential	111938.3429	2.57
Rural Residential	87095.93754	2.00
Rural Residential	87171.98813	2.00
Rural Residential	87112.3155	2.00
Rural Residential	87209.45224	2.00
Rural Residential	109243.9107	2.51
Rural Residential	87176.71748	2.00
Rural Residential	217835.9645	5.00
Rural Residential	87122.62285	2.00
Rural Residential	99074.09772	2.27
Rural Residential	241789.4296	5.55
Rural Residential	88817.79194	2.04
Neighborhood Residential	51150.02583	1.17
Neighborhood Residential	51149.97489	1.17
Neighborhood Residential	97650.04077	2.24
Neighborhood Residential	2459094.835	56.45
Rural Residential	80578.4541	1.85
Rural Residential	77561.62865	1.78
Rural Residential	87567.2114	2.01
Rural Residential	87362.54752	2.01
Rural Residential	87120.78311	2.00
Rural Residential	87133.03733	2.00
Rural Residential	87145.09601	2.00
Rural Residential	86962.02458	2.00
Neighborhood Residential	787887.3295	18.09
Rural Residential	87115.29553	2.00
Rural Residential	87120.51896	2.00
Rural Residential	157957.7967	3.63
Rural Residential	87409.65462	2.01
Rural Residential	86593.93313	1.99
Rural Residential	82363.7779	1.89
Rural Residential	104320.2546	2.39
Rural Residential	104276.9491	2.39
Rural Residential	104233.7622	2.39
Rural Residential	104190.2807	2.39
Rural Residential	115018.2296	2.64
Rural Residential	218460.147	5.02
Rural Residential	319571.695	7.34
Rural Residential	117676.6104	2.70
Rural Residential	94293.61016	2.16
Rural Residential	197035.5989	4.52
Rural Residential	87563.05841	2.01
Rural Residential	87830.24033	2.02
Rural Residential	88943.29802	2.04
Rural Residential	87307.32232	2.00
Rural Residential	87999.31473	2.02
Rural Residential	87154.50427	2.00
Neighborhood Residential	4883.075021	0.11
Rural Residential	87367.02493	2.01
Neighborhood Residential	123.6106461	0.00
Rural Residential	1265.91467	0.03
Rural Residential	46084.81642	1.06
Rural Residential	61616.05623	1.41

Rural Residential	60549.1156	1.39
Neighborhood Center	1180393.161	27.10
Rural Residential	7739.490803	0.18
Rural Residential	48345.92256	1.11
Rural Residential	10569.25757	0.24
Rural Residential	91531.70705	2.10
Rural Residential	83358.27153	1.91
Rural Residential	90207.1247	2.07
Rural Residential	94087.31789	2.16
Rural Residential	215276.6734	4.94
Rural Cluster Residential	43414.22401	1.00
Rural Cluster Residential	41536.62342	0.95
Rural Cluster Residential	40231.54251	0.92
Rural Cluster Residential	555642.3347	12.76
Rural Cluster Residential	27582.8598	0.63
Rural Cluster Residential	902.6539311	0.02
Rural Residential	76180.3725	1.75
Rural Residential	49812.09934	1.14
Rural Residential	46043.81733	1.06
Rural Residential	118176.063	2.71
Rural Residential	106133.3121	2.44
Neighborhood Center	963874.396	22.13
Rural Residential	78515.49702	1.80
Rural Residential	8212.712292	0.19
Rural Residential	81214.14792	1.86
Rural Residential	29253.45781	0.67
Rural Residential	24717.29157	0.57
Rural Residential	18073.9497	0.41
Rural Residential	144322.4464	3.31
Rural Residential	74655.76475	1.71
Rural Residential	100372.7405	2.30
Rural Residential	107231.5539	2.46
Rural Residential	94267.34921	2.16
Rural Residential	66352.89966	1.52
Rural Residential	39881.01275	0.92
Rural Residential	21792.64497	0.50
Rural Residential	16459.86659	0.38
Rural Residential	35263.79729	0.81
Rural Residential	36424.37467	0.84
Rural Residential	86953.02643	2.00
Rural Residential	105259.4557	2.42
Rural Residential	1547243.932	35.52
Rural Residential	85823.45008	1.97
Rural Residential	86280.95973	1.98
Rural Residential	98345.79514	2.26
Rural Residential	87143.86882	2.00
Rural Residential	87396.58246	2.01
Rural Residential	88860.85778	2.04
Rural Residential	87910.22911	2.02
Rural Residential	86977.77751	2.00
Rural Residential	90282.65107	2.07
Rural Residential	85559.00749	1.96
Rural Residential	76190.23934	1.75
Rural Residential	114344.2869	2.62
Rural Residential	95445.49688	2.19
Rural Residential	89822.4184	2.06
Rural Residential	161667.6322	3.71
Rural Residential	86517.20495	1.99
Rural Residential	91198.72968	2.09
Rural Residential	121326.1725	2.79
Rural Residential	86275.76545	1.98
Rural Residential	88119.63333	2.02
Rural Residential	85813.68371	1.97
Rural Residential	91040.91958	2.09
Rural Residential	83162.84178	1.91
Rural Residential	98747.99037	2.27
Rural Residential	91232.94402	2.09
Rural Residential	80505.91904	1.85
Rural Residential	85752.65782	1.97
Rural Residential	83789.99532	1.92
Rural Residential	84491.04558	1.94
Rural Residential	87763.1044	2.01
Rural Residential	87201.38835	2.00
Rural Residential	87035.78763	2.00
Rural Residential	24583.74797	0.56
Rural Residential	55113.36636	1.27
Rural Residential	107708.6463	2.47
Rural Residential	48028.52167	1.10
Rural Residential	153490.8679	3.52

Rural Residential	40581.08295	0.93
Rural Residential	841184.9698	19.31
Rural Residential	86278.26567	1.98
Rural Residential	86966.86308	2.00
Rural Residential	91255.37789	2.09
Rural Residential	88417.37201	2.03
Rural Residential	2315.71598	0.05
Rural Residential	108248.1829	2.49
Rural Residential	39053.33287	0.90
Rural Residential	44780.57852	1.03
Rural Residential	187655.7343	4.31
Rural Residential	256581.1662	5.89
Rural Cluster Residential	68704.58252	1.58
Rural Cluster Residential	223349.0415	5.13
Rural Residential	157320.756	3.61
Rural Residential	236601.3176	5.43
Rural Residential	206759.2542	4.75
Rural Residential	177545.8919	4.08
Rural Cluster Residential	905480.8574	20.79
Rural Residential	108388.7339	2.49
Rural Residential	112855.275	2.59
Rural Residential	109888.4183	2.52
Rural Residential	108367.6087	2.49
Rural Residential	108387.3157	2.49
Rural Residential	87238.20984	2.00
Rural Residential	87100.99929	2.00
Rural Residential	86901.07296	1.99
Rural Residential	217833.5694	5.00
Rural Residential	87117.608	2.00
Rural Residential	87125.12825	2.00
Rural Residential	86925.06989	2.00
Rural Residential	87122.62332	2.00
Rural Residential	87131.24296	2.00
Rural Residential	23689.30591	0.54
Rural Residential	118933.4217	2.73
Rural Residential	118585.6811	2.72
Rural Residential	87240.74977	2.00
Rural Residential	87392.58765	2.01
Rural Residential	87815.17539	2.02
Rural Residential	92040.57848	2.11
Rural Residential	87145.92492	2.00
Rural Residential	87145.8953	2.00
Rural Residential	108181.0092	2.48
Rural Residential	100324.0821	2.30

Basin DU

Catchment Area Impacted by SEDA (Acres): 1306.62

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	50.36	Regional Shopping Center	35.25	21.15
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	694.85	Low Density (0-2 DU/acre)	201.51	120.90
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	36.01	Medium Density (5-10 DU/acre)	11.52	6.91
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	121.59	High Density (23-44 DU/acre)	66.87	40.12
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	28.44	Open Space (OS)	5.69	3.41
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	199.94	Rural Density (0-0.7 DU/acre)	57.98	34.79
SEGA School with Park	71.16	*MDR-50	35.58	21.35
Water	0.00			
Roads = 1306.62 - Sum(Row5-22)	104.28		93.85	56.31

Totals (Row5-25):	1202.34		
Totals check(Row 36-57):	1202.34		
Grand Total:	1306.62	508.26	304.95

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
SEGA Buffer	2456373.11	56.39
Residential - Low Density	297.7900811	0.01
Residential - Low Density	4581820.698	105.18
Residential - Low Density	1153839.107	26.49
Residential - Low Density	902111.9657	20.71
Residential - Low Density	1400531.707	32.15
Residential - Urban Neighborhood	2207552.586	50.68
Open Space	435768.9154	10.00
Open Space	803060.8594	18.44
Residential - Low Density	3858512.903	88.58
SEGA School with Park	970773.2815	22.29
SEGA School with Park	1331323.72	30.56
Residential - Low Density	8438841.837	193.73
Residential - Urban Neighborhood	3088862.724	70.91
Residential - Medium Density	1568470.94	36.01
Residential - Low Density	252693.8715	5.80
Residential - Low Density	3146275.091	72.23
Residential - Low Density	817131.35	18.76
Residential - Low Density	5715690.197	131.21
SEGA School with Park	797498.2972	18.31
Corridor - Center Mixed Use	2193551.052	50.36
SEGA Buffer	6252926.135	143.55

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	48.38	Community Center	32.41	19.45
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	723.79	Low Density (0-2 DU/acre)	209.90	125.94
Neighborhood Residential	36.01	Neighborhood Residential	18.72	11.23
Mixed Residential	129.37	Mixed Residential	59.51	35.71
Flexible Reseach & Dev	0.00	Flexible Reseach & Dev	0.00	0.00
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	199.94	Rural Cluster Residential	61.98	37.19
Neighborhood Center	69.35	Neighborhood Center	42.30	25.38
Water	0.00			
Roads = 1306.62 - Sum(Row5-22)	99.78		89.80	53.88

Totals (Row5-25):	1206.84		
Totals check(Row 36-386):	1206.84		
Grand Total:	1306.62	514.64	308.78

CA Difference	Volume Difference	Percent Difference
6.38	3.83	1%

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Rural Residential	31723.85146	0.73
Rural Residential	886.156783	0.02
Rural Residential	297.7989703	0.01
Rural Cluster Residential	26309.24815	0.60
Neighborhood Center	507301.2872	11.65
Rural Residential	45380.89897	1.04
Rural Residential	42896.27628	0.98
Rural Residential	181602.5114	4.17
Rural Residential	88498.81292	2.03
Rural Residential	87254.3451	2.00
Rural Residential	85635.42767	1.97
Rural Residential	473707.6376	10.87
Rural Residential	2002.111579	0.05
Rural Residential	2578.130602	0.06
Rural Residential	17884.41502	0.41
Rural Residential	15191.2793	0.35
Rural Residential	15286.79779	0.35
Rural Residential	15477.80605	0.36
Rural Residential	9767.479144	0.22
Rural Residential	37500.95583	0.86
Rural Residential	13022.1597	0.30
Rural Residential	16818.85514	0.39
Rural Residential	12596.13465	0.29
Rural Residential	12675.67503	0.29
Rural Residential	12644.6617	0.29
Rural Residential	12798.15174	0.29
Rural Residential	17661.89295	0.41
Rural Residential	20609.06122	0.47
Rural Residential	12810.1256	0.29
Rural Residential	12802.65779	0.29
Rural Residential	13703.18371	0.31
Rural Residential	13779.71447	0.32
Rural Residential	3626.668074	0.08
Rural Residential	14311.26544	0.33
Rural Residential	16370.34874	0.38
Rural Residential	12946.19921	0.30

Rural Residential	18439.95676	0.42
Rural Residential	12664.12504	0.29
Rural Residential	16286.84103	0.37
Rural Residential	13992.71832	0.32
Rural Residential	16650.85122	0.38
Rural Residential	13415.2016	0.31
Rural Residential	11990.11855	0.28
Rural Residential	15705.2182	0.36
Rural Residential	26492.83237	0.61
Rural Residential	69365.07889	1.59
Rural Residential	41112.04007	0.94
Rural Residential	41830.0985	0.96
Rural Residential	16828.37003	0.39
Rural Residential	16179.30406	0.37
Rural Residential	15949.79825	0.37
Rural Residential	16144.32224	0.37
Rural Residential	14238.25392	0.33
Rural Residential	14417.75041	0.33
Rural Residential	14332.22401	0.33
Rural Residential	13842.20973	0.32
Mixed Residential	31244.25252	0.72
Rural Residential	34425.37511	0.79
Mixed Residential	56110.35516	1.29
Mixed Residential	727135.321	16.69
Rural Residential	71523.26945	1.64
Rural Residential	102562.1226	2.35
Mixed Residential	680834.3741	15.63
Rural Residential	98769.39908	2.27
Rural Residential	97162.58576	2.23
Rural Residential	98209.4733	2.25
Rural Residential	86751.56715	1.99
Rural Residential	88545.59893	2.03
Rural Residential	105102.2634	2.41
Mixed Residential	219105.3765	5.03
Rural Residential	89500.97642	2.05
Rural Residential	113665.8643	2.61
Rural Residential	96855.85624	2.22
Rural Residential	100608.2879	2.31
Rural Residential	206335.0939	4.74
Rural Residential	94080.38785	2.16
Rural Residential	93829.81963	2.15
Rural Residential	89108.51947	2.05
Rural Residential	96601.04394	2.22
Rural Residential	12530.42764	0.29
Rural Residential	12039.2663	0.28
Rural Residential	1067.485486	0.02
Rural Residential	52118.15795	1.20
Rural Residential	12279.26839	0.28
Rural Residential	3807.770217	0.09
Rural Residential	13590.29907	0.31
Rural Residential	2166.072956	0.05
Rural Residential	92223.15512	2.12
Rural Residential	88190.57565	2.02
Rural Residential	87217.99612	2.00
Rural Residential	11204.59997	0.26
Rural Residential	10619.38839	0.24
Rural Residential	10894.85761	0.25
Rural Residential	215622.4019	4.95
Rural Residential	216927.8482	4.98
Rural Residential	52858.25718	1.21
Rural Residential	198949.7167	4.57
Rural Residential	43714.27613	1.00
Rural Residential	53863.76359	1.24
Rural Residential	42282.18228	0.97
Rural Residential	99691.12033	2.29
Rural Residential	828154.2346	19.01
Rural Residential	129639.7698	2.98
Rural Residential	143422.5774	3.29
Rural Residential	87140.50837	2.00
Rural Residential	95207.16965	2.19
Rural Residential	96934.51011	2.23
Rural Residential	87131.86345	2.00
Rural Residential	97501.49348	2.24
Rural Residential	97697.87239	2.24
Rural Residential	87134.04398	2.00
Rural Residential	104000.4154	2.39
Rural Residential	88617.25632	2.03
Rural Residential	93751.84848	2.15
Rural Residential	90878.181	2.09

Rural Residential	109296.476	2.51
Rural Residential	98694.07166	2.27
Rural Residential	114816.9434	2.64
Rural Residential	114365.8787	2.63
Rural Residential	254207.0299	5.84
Rural Residential	91187.15877	2.09
Rural Residential	93780.30802	2.15
Rural Residential	91191.75111	2.09
Rural Residential	86925.97782	2.00
Rural Residential	55516.85409	1.27
Rural Residential	54919.44359	1.26
Rural Residential	26548.83657	0.61
Rural Residential	86256.35153	1.98
Rural Residential	97569.90613	2.24
Rural Residential	95374.35882	2.19
Rural Residential	102070.9581	2.34
Rural Residential	109004.3322	2.50
Rural Residential	97339.35592	2.23
Rural Residential	118972.6959	2.73
Rural Residential	62153.3122	1.43
Rural Residential	126494.3059	2.90
Rural Residential	111224.3407	2.55
Rural Residential	208952.6328	4.80
Rural Residential	277772.1545	6.38
Rural Residential	124378.8793	2.86
Rural Residential	449262.7564	10.31
Rural Residential	219180.2445	5.03
Rural Residential	175935.8595	4.04
Rural Residential	95203.53707	2.19
Rural Residential	97359.96085	2.24
Rural Residential	41492.10587	0.95
Rural Residential	101107.2836	2.32
Rural Residential	285709.7235	6.56
Rural Residential	84124.12106	1.93
Rural Residential	26451.37092	0.61
Rural Residential	106710.6186	2.45
Rural Residential	13422.77143	0.31
Rural Residential	46022.1845	1.06
Mixed Residential	2487640.274	57.11
Neighborhood Center	384844.8292	8.83
Rural Residential	84478.41794	1.94
Rural Residential	415320.4235	9.53
Community Center	53867.73158	1.24
Community Center	51173.64819	1.17
Rural Cluster Residential	813512.1733	18.68
Neighborhood Residential	690933.4736	15.86
Neighborhood Residential	877537.3279	20.15
Neighborhood Center	1331324.032	30.56
Rural Residential	43935.71828	1.01
Rural Cluster Residential	39560.29061	0.91
Rural Cluster Residential	582368.8566	13.37
Rural Cluster Residential	40818.60513	0.94
Rural Cluster Residential	123705.0384	2.84
Rural Cluster Residential	36265.85255	0.83
Rural Residential	15809.45798	0.36
Rural Residential	101030.1173	2.32
Rural Residential	54983.52663	1.26
Rural Residential	89083.19831	2.05
Rural Residential	83265.7934	1.91
Rural Residential	87516.72036	2.01
Rural Residential	87238.01036	2.00
Rural Residential	188146.5842	4.32
Rural Cluster Residential	6363.765093	0.15
Rural Cluster Residential	150523.807	3.46
Rural Cluster Residential	107879.6496	2.48
Rural Cluster Residential	101381.1951	2.33
Rural Residential	4237.777975	0.10
Rural Residential	150333.0742	3.45
Rural Residential	132476.6772	3.04
Rural Residential	140474.2081	3.22
Rural Residential	83918.33021	1.93
Rural Residential	131742.2798	3.02
Rural Residential	239553.3399	5.50
Rural Residential	146746.1775	3.37
Rural Residential	185329.0437	4.25
Rural Residential	424023.7758	9.73
Rural Residential	42654.88896	0.98
Rural Residential	25663.19183	0.59
Rural Residential	38866.16156	0.89

Rural Residential	12775.58085	0.29
Rural Residential	12747.27359	0.29
Rural Residential	2326.43564	0.05
Rural Residential	5286.115064	0.12
Rural Residential	5971.575957	0.14
Rural Residential	3911.195845	0.09
Rural Residential	3395.314275	0.08
Rural Residential	7565.936976	0.17
Mixed Residential	204530.0981	4.70
Community Center	2002275.587	45.97
Mixed Residential	197807.104	4.54
Rural Residential	45124.18933	1.04
Rural Residential	114836.9038	2.64
Rural Residential	93997.12275	2.16
Rural Residential	87584.59027	2.01
Rural Residential	91296.83957	2.10
Rural Residential	209495.4135	4.81
Rural Residential	86976.32256	2.00
Rural Residential	89607.15825	2.06
Rural Residential	7044.369302	0.16
Rural Residential	14787.77764	0.34
Rural Residential	12881.66551	0.30
Rural Residential	14974.25983	0.34
Rural Residential	12726.65612	0.29
Rural Residential	12169.1367	0.28
Rural Residential	12922.65657	0.30
Rural Residential	12536.64697	0.29
Rural Residential	12493.15	0.29
Rural Residential	3481.67013	0.08
Rural Residential	12710.11961	0.29
Rural Residential	16037.84449	0.37
Rural Residential	16157.3345	0.37
Rural Residential	21043.60285	0.48
Rural Residential	12941.6738	0.30
Rural Residential	12932.6576	0.30
Rural Residential	13468.67612	0.31
Rural Residential	18524.42362	0.43
Rural Residential	17357.36152	0.40
Rural Residential	17736.40561	0.41
Rural Residential	14406.74849	0.33
Rural Residential	16685.36847	0.38
Rural Residential	16188.82584	0.37
Rural Residential	17292.41345	0.40
Rural Residential	16590.87623	0.38
Rural Residential	17132.39884	0.39
Rural Residential	17348.91815	0.40
Rural Residential	18328.43162	0.42
Rural Residential	17779.92643	0.41
Rural Residential	16940.37484	0.39
Rural Residential	16793.87214	0.39
Rural Residential	22029.10678	0.51
Rural Residential	11520.60895	0.26
Rural Residential	14775.7918	0.34
Rural Residential	13541.17731	0.31
Rural Residential	15928.80933	0.37
Rural Residential	15242.31831	0.35
Rural Residential	13087.20734	0.30
Rural Residential	14789.75696	0.34
Rural Residential	14348.73395	0.33
Rural Residential	17867.39377	0.41
Mixed Residential	567095.3732	13.02
Mixed Residential	15056.94005	0.35
Mixed Residential	85249.69529	1.96
Rural Residential	92209.75454	2.12
Rural Residential	96578.97154	2.22
Rural Residential	85407.81693	1.96
Neighborhood Center	688267.0983	15.80
Rural Residential	93508.23436	2.15
Rural Residential	87334.07102	2.00
Rural Residential	95285.063	2.19
Rural Residential	92273.04502	2.12
Rural Residential	94911.86809	2.18
Rural Residential	95087.81702	2.18
Neighborhood Center	109231.6507	2.51
Rural Residential	88954.00874	2.04
Rural Residential	91673.17928	2.10
Rural Residential	90481.65775	2.08
Rural Residential	93034.7136	2.14
Rural Residential	93410.82334	2.14

Rural Residential	92506.74241	2.12
Rural Residential	88143.46526	2.02
Rural Residential	372297.243	8.55
Rural Residential	102078.2042	2.34
Rural Residential	5890.524751	0.14
Rural Residential	5710.100981	0.13
Rural Residential	87724.73103	2.01
Rural Residential	204700.5652	4.70
Rural Residential	203649.8485	4.68
Rural Residential	41342.64218	0.95
Rural Residential	25894.66602	0.59
Rural Residential	94929.60949	2.18
Rural Residential	93650.44329	2.15
Rural Residential	107289.1189	2.46
Rural Residential	93110.44151	2.14
Rural Residential	82081.77164	1.88
Rural Residential	69055.56848	1.59
Rural Residential	168857.807	3.88
Rural Residential	63432.23992	1.46
Rural Residential	26585.31887	0.61
Rural Residential	103012.1954	2.36
Rural Residential	103836.3999	2.38
Rural Residential	2035770.402	46.73
Rural Residential	426160.7248	9.78
Rural Residential	2811.66051	0.06
Rural Residential	97475.91544	2.24
Rural Residential	102254.749	2.35
Rural Residential	112756.2236	2.59
Rural Residential	114380.8347	2.63
Rural Residential	124659.5398	2.86
Rural Residential	222944.0344	5.12
Rural Residential	133477.3655	3.06
Rural Residential	113736.3859	2.61
Rural Residential	35920.8004	0.82
Rural Residential	83950.85956	1.93
Rural Residential	115835.479	2.66
Rural Residential	86197.06826	1.98
Rural Residential	88666.27511	2.04
Rural Residential	86711.61272	1.99
Rural Residential	85032.69363	1.95
Rural Residential	81755.20946	1.88
Rural Residential	92407.66178	2.12
Rural Residential	91735.1243	2.11
Rural Residential	89252.76825	2.05
Rural Residential	177733.0379	4.08
Rural Residential	107666.7766	2.47
Rural Residential	82449.0975	1.89
Rural Residential	129559.6432	2.97
Rural Residential	67307.47032	1.55
Rural Residential	73716.76752	1.69
Rural Residential	74268.80091	1.70
Rural Residential	250918.3241	5.76
Rural Residential	98513.12997	2.26
Rural Residential	224370.6335	5.15
Rural Residential	101185.1964	2.32
Rural Residential	22290.59194	0.51
Rural Cluster Residential	3164269.752	72.64
Rural Cluster Residential	59780.69645	1.37
Rural Cluster Residential	59780.7509	1.37
Rural Cluster Residential	458413.0977	10.52
Mixed Residential	363746.8997	8.35
Rural Residential	4763010.21	109.34
Rural Cluster Residential	1697169.152	38.96
Rural Cluster Residential	810360.2739	18.60
Rural Residential	45210.46925	1.04
Rural Residential	57483.10311	1.32
Rural Residential	44409.35465	1.02
Rural Residential	54780.33036	1.26
Rural Residential	18413.91571	0.42
Rural Residential	86992.97427	2.00
Rural Residential	90178.00128	2.07
Rural Residential	17573.87771	0.40
Rural Cluster Residential	210943.4452	4.84
Rural Cluster Residential	219893.1073	5.05
Rural Residential	91347.17556	2.10
Rural Residential	77773.96207	1.79
Rural Residential	95252.86995	2.19
Rural Residential	674433.636	15.48

Basin DV

Catchment Area Impacted by SEDA (Acres): 398.87

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	0.00	Regional Shopping Center	0.00	0.00
Regional Mixed-Use	208.64	Community Commercial	146.05	87.63
Residential - Low Density	0.16	Low Density (0-2 DU/acre)	0.05	0.03
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	0.00	Medium Density (5-10 DU/acre)	0.00	0.00
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	48.55	High Density (23-44 DU/acre)	26.70	16.02
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	79.80	Office Commercial (OC)	51.87	31.12
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	43.18	Open Space (OS)	8.64	5.18
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	0.00	*MDR-50	0.00	0.00
Water	0.00			
Roads =398.87 - Sum(Row5-22)	18.55		16.70	10.02
Totals (Row5-25):	380.31			
Totals check(Row 36-49):	380.31			
Grand Total:	398.87		249.99	150.00

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Residential - Urban Neighborhood	50144.92094	1.15
Open Space	420564.4053	9.65
Residential - Urban Neighborhood	2064571.502	47.40
Open Space	800524.6718	18.38
Employment - Office	1677784.893	38.52
Employment - Office	1125002.039	25.83
Regional Mixed-Use	1441467.614	33.09
Regional Mixed-Use	1520050.345	34.90
Residential - Low Density	6760.298127	0.16
Employment - Office	297926.9151	6.84
Employment - Office	375299.326	8.62
Regional Mixed-Use	6126786.971	140.65
Open Space	659637.2426	15.14

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	223.45	Community Commercial	156.42	93.85
Rural Residential	1.81	Low Density (0-2 DU/acre)	0.53	0.32
Neighborhood Residential	0.00	Neighborhood Residential	0.00	0.00
Mixed Residential	68.54	Mixed Residential	31.53	18.92
Flexible Reseach & Dev	0.19	Flexible Reseach & Dev	0.14	0.08
Office Center	88.04	Office Center	57.23	34.34
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	0.00	Neighborhood Center	0.00	0.00
Water	0.00			
Roads =398.87 - Sum(Row5-22)	16.84		15.15	9.09
Totals (Row5-25):	382.03			
Totals check(Row 36-84):	382.03			
Grand Total:	398.87		260.99	156.59

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Flexible Reseach & Dev	4468.025071	0.10
Flexible Reseach & Dev	582.1269892	0.01
Flexible Reseach & Dev	29.52919758	0.00
Flexible Reseach & Dev	26.22616893	0.00
Flexible Reseach & Dev	354.9173678	0.01
Flexible Reseach & Dev	2655.877158	0.06
Mixed Residential	76239.01801	1.75
Mixed Residential	424881.7975	9.75
Mixed Residential	343624.1975	7.89
Mixed Residential	84336.46845	1.94
Mixed Residential	555503.8437	12.75
Mixed Residential	50957.54829	1.17
Mixed Residential	98529.51653	2.26
Mixed Residential	254635.4158	5.85
Mixed Residential	1096794.671	25.18
Office Center	233664.4656	5.36
Office Center	401661.5638	9.22
Office Center	448894.3853	10.31
Office Center	669640.243	15.37
Office Center	407884.8643	9.36
Office Center	516645.9484	11.86
Office Center	858954.3248	19.72
Office Center	297842.7068	6.84
Regional Center	41023.12399	0.94
Regional Center	1720173.544	39.49
Regional Center	42649.15588	0.98
Regional Center	141820.0295	3.26
Regional Center	1635243.978	37.54
Regional Center	611641.023	14.04
Regional Center	327518.9852	7.52
Regional Center	53666.22779	1.23
Regional Center	756493.0073	17.37
Regional Center	855548.4575	19.64
Regional Center	1283173.427	29.46
Regional Center	258066.8526	5.92
Regional Center	1712609.074	39.32

CA Difference	Volume Difference	Percent Difference
10.99	**6.60**	**4%**

Regional Center	293867.3579	6.75
Rural Residential	124.8070353	0.00
Rural Residential	1.612217946	0.00
Rural Residential	11460.73198	0.26
Rural Residential	1172.505174	0.03
Rural Residential	928.0891124	0.02
Rural Residential	604.3594203	0.01
Rural Residential	85.22064049	0.00
Rural Residential	5832.142702	0.13
Rural Residential	58791.40203	1.35
Mixed Residential	1098694.819	
Flexible Reseach & Dev	-200541.1116	
~~Office Center~~	~~10927.54979~~	
~~Office Center~~	~~6103.422205~~	
~~Rural Residential~~	~~11460.61612~~	
~~Rural Residential~~	~~45938.72168~~	
~~Rural Residential~~	~~1737.37273~~	
~~Rural Residential~~	~~11512.90902~~	
~~Rural Residential~~	~~11564.9562~~	

Basin DW

Catchment Area Impacted by SEDA (Acres): 756.17

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	0.00	Regional Shopping Center	0.00	0.00
Regional Mixed-Use	1.13	Community Commercial	0.79	0.47
Residential - Low Density	39.51	Low Density (0-2 DU/acre)	11.46	6.87
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	135.21	Medium Density (5-10 DU/acre)	43.27	25.96
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	220.86	High Density (23-44 DU/acre)	121.48	72.89
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.32	Light Industrial	0.21	0.12
Employment - Office	0.67	Office Commercial (OC)	0.44	0.26
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	103.57	Open Space (OS)	20.71	12.43
Open Space - Community Park	12.59	Open Space (OS)	2.52	1.51
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	6.39	Railroad	3.20	1.92
SEGA Buffer	147.94	Rural Density (0-0.7 DU/acre)	42.90	25.74
SEGA School with Park	70.60	*MDR-50	35.30	21.18
Water	0.00			
Roads =756.17 - Sum(Row5-22)	17.38		15.64	9.38
Totals (Row5-25):	738.79			
Totals check(Row 36-69):	738.79			
Grand Total:	756.17		297.91	178.74

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Employment - Light Industrial	13470.95401	0.31
Regional Mixed-Use	12997.26643	0.30
Residential - Urban Neighborhood	48796.62584	1.12
Residential - Medium Density	37805.57846	0.87
Railroad	130827.7137	3.00
SEGA School with Park	835794.4945	19.19
Residential - Urban Neighborhood	657990.0404	15.11
Residential - Urban Neighborhood	3468853.436	79.63
Open Space - Community Park	548383.7364	12.59
Employment - Light Industrial	439.462936	0.01
Open Space	483901.9106	11.11
Employment - Office	29214.75318	0.67
Regional Mixed-Use	36261.15522	0.83
SEGA Buffer	203.8136373	0.00
Residential - Medium Density	2538511.672	58.28
Residential - Low Density	1721002.458	39.51
Residential - Medium Density	1128543.22	25.91
SEGA School with Park	977778.9372	22.45
Residential - Medium Density	118884.5171	2.73
Open Space	1088436.447	24.99
Residential - Urban Neighborhood	1592846.921	36.57
Residential - Urban Neighborhood	399851.8703	9.18
Residential - Urban Neighborhood	969349.3728	22.25
Residential - Urban Neighborhood	1232316.722	28.29
Residential - Medium Density	378594.988	8.69
Residential - Medium Density	1641948.162	37.69
Residential - Urban Neighborhood	1250842.507	28.72
Residential - Medium Density	45489.77458	1.04
SEGA School with Park	1261746.545	28.97
Railroad	80418.05344	1.85
Railroad	67235.19096	1.54
Open Space	2065319.769	47.41
SEGA Buffer	6443922.51	147.93
Open Space	873876.4433	20.06

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	3.06	Community Commercial	2.14	1.28
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	207.76	Neighborhood Residential	108.04	64.82
Mixed Residential	284.10	Mixed Residential	130.69	78.41
Flexible Reseach & Dev	0.10	Flexible Reseach & Dev	0.07	0.04
Office Center	0.71	Office Center	0.46	0.28
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	154.97	Rural Cluster Residential	48.04	28.82
Neighborhood Center	81.44	Neighborhood Center	49.68	29.81
no value	7.85	Open Space (OS)	1.57	0.94
Water	0.00			
Roads =756.17 - Sum(Row5-22)	16.18		14.56	8.74
Totals (Row5-25):	739.99			
Totals check(Row 36-99):	739.99			
Grand Total:	756.17		355.25	213.15

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Flexible Reseach & Dev	43.66764205	0.001
Flexible Reseach & Dev	34.97282372	0.001
Flexible Reseach & Dev	560.8587542	0.01
Mixed Residential	176268.2389	4.05
Flexible Reseach & Dev	3621.561532	0.08
Regional Center	14837.46829	0.34
Neighborhood Residential	17745.89172	0.41
Regional Center	113.5855245	0.003
Regional Center	12883.59951	0.30
Neighborhood Residential	86123.87452	1.98
Neighborhood Center	192753.0142	4.43
Rural Cluster Residential	1609389.997	36.95
Neighborhood Residential	40586.62054	0.93
Neighborhood Center	874931.142	20.09
Mixed Residential	756200.2041	17.36
Neighborhood Residential	116670.1153	2.68
Neighborhood Residential	318923.7345	7.32
Mixed Residential	867945.2717	19.93
Office Center	31093.03517	0.71
Neighborhood Residential	85831.86508	1.97
Neighborhood Residential	1635171.116	37.54
Neighborhood Residential	1293258.127	29.69
Neighborhood Residential	1686282.295	38.71
Mixed Residential	443457.937	10.18
Mixed Residential	608343.6087	13.97
Mixed Residential	1747201.217	40.11
Mixed Residential	1690808.119	38.82
Mixed Residential	86801.40441	1.99
Mixed Residential	857688.751	19.69
Mixed Residential	443108.7488	10.17
Mixed Residential	420854.8216	9.66
Mixed Residential	54019.09131	1.24
Rural Cluster Residential	13269.28351	0.30
Regional Center	29811.47362	0.68
Regional Center	28792.8341	0.66
No Value	22075.7274	0.51

CA Difference	Volume Difference	Percent Difference
57.35	**34.41**	**19%**

No Value	23031.50148	0.53
Mixed Residential	369859.6302	8.49
Neighborhood Center	305970.3165	7.02
Mixed Residential	373160.7187	8.57
Neighborhood Residential	623737.6225	14.32
Neighborhood Center	912325.8181	20.94
Mixed Residential	547530.3496	12.57
Neighborhood Residential	169536.6401	3.89
Rural Cluster Residential	2153783.697	49.44
Rural Cluster Residential	40263.10123	0.92
Neighborhood Residential	5316.240574	0.12
Neighborhood Residential	587889.8035	13.50
Neighborhood Residential	1668418.805	38.30
Neighborhood Residential	669512.84	15.37
Mixed Residential	1599962.913	36.73
Rural Cluster Residential	1541740.852	35.39
Rural Cluster Residential	102871.0691	2.36
Mixed Residential	55763.45615	1.28
Rural Cluster Residential	1254293.317	28.79
Neighborhood Center	1261745.74	28.97
Regional Center	46833.74402	1.08
Mixed Residential	1276422.9	29.30
No Value	154330.9315	3.54
No Value	55743.32787	1.28
Rural Cluster Residential	13355.16286	0.31
Neighborhood Residential	45222.49069	1.04
Rural Cluster Residential	21336.2245	0.49
No Value	86631.46088	1.99

Basin DX

Catchment Area Impacted by SEDA (Acres): 879.02

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	55.06	Regional Shopping Center	38.54	23.13
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	274.43	Medium Density (5-10 DU/acre)	87.82	52.69
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	142.94	High Density (23-44 DU/acre)	78.62	47.17
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	76.10	Open Space (OS)	15.22	9.13
Open Space - Community Park	34.85	Open Space (OS)	6.97	4.18
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.44	Railroad	0.22	0.13
SEGA Buffer	140.59	Rural Density (0-0.7 DU/acre)	40.77	24.46
SEGA School with Park	119.39	*MDR-50	59.69	35.82
Water	0.00			
Roads =879.02 - Sum(Row5-22)	35.21		31.69	19.01
Totals (Row5-25):	843.81			
Totals check(Row 36-67):	843.81			
Grand Total:	879.02		359.54	215.73

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Open Space	590.1602888	0.01
SEGA School with Park	980538.4318	22.51
Railroad	19288.85529	0.44
Residential - Medium Density	2089180.98	47.96
Residential - Urban Neighborhood	227741.7547	5.23
Open Space	651684.4879	14.96
Residential - Urban Neighborhood	215760.4101	4.95
Open Space	32281.78959	0.74
Open Space - Community Park	1518214.301	34.85
Corridor - Center Mixed Use	1355442.527	31.12
Corridor - Center Mixed Use	1043030.342	23.94
Residential - Medium Density	1722605.678	39.55
SEGA Buffer	4474989.751	102.73
Residential - Urban Neighborhood	1648104.45	37.84
Residential - Urban Neighborhood	794549.8544	18.24
Open Space	1091530.686	25.06
Residential - Medium Density	1702083.493	39.07
Residential - Medium Density	2196271.242	50.42
Residential - Medium Density	577955.4385	13.27
Residential - Medium Density	1158507.961	26.60
Residential - Urban Neighborhood	1602844.155	36.80
Residential - Medium Density	814978.2031	18.71
SEGA School with Park	726989.5376	16.69
Residential - Urban Neighborhood	1737564.93	39.89
SEGA School with Park	819665.2071	18.82
SEGA School with Park	676883.645	15.54
SEGA School with Park	1226236.35	28.15
Open Space	561147.5549	12.88
SEGA School with Park	770312.5193	17.68
Open Space	977883.9109	22.45
SEGA Buffer	1648958.168	37.85
Residential - Medium Density	1692628.049	38.86

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	0.00	Community Center	0.00	0.00
Regional Center	65.20	Community Commercial	45.64	27.38
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	321.36	Neighborhood Residential	167.11	100.26
Mixed Residential	181.08	Mixed Residential	83.29	49.98
Flexible Reseach & Dev	1.88	Flexible Reseach & Dev	1.39	0.83
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	152.45	Rural Cluster Residential	47.26	28.36
Neighborhood Center	121.36	Neighborhood Center	74.03	44.42
Water	0.00			
Roads =879.02 - Sum(Row5-22)	35.70		32.13	19.28
Totals (Row5-25):	843.32			
Totals check(Row 36-135):	843.83			
Grand Total:	879.02		450.85	270.51

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Flexible Reseach & Dev	1025.976569	0.02
Flexible Reseach & Dev	1.59667206	0.00004
Flexible Reseach & Dev	15.10405347	0.0003
Mixed Residential	3415.270802	0.08
Flexible Reseach & Dev	144.8605603	0.003
Neighborhood Residential	22239.07842	0.51
Mixed Residential	168991.7814	3.88
Mixed Residential	427032.6694	9.80
Regional Center	51457.96587	1.18
Rural Cluster Residential	3253.183429	0.07
Neighborhood Residential	224717.5025	5.16
Flexible Reseach & Dev	9153.120377	0.21
Flexible Reseach & Dev	2513.365357	0.06
Flexible Reseach & Dev	1.932517865	0.00004
Flexible Reseach & Dev	2668.881749	0.06
Mixed Residential	4279.59023	0.10
Mixed Residential	193658.8139	4.45
Mixed Residential	247766.4579	5.69
Neighborhood Center	260688.6104	5.98
Neighborhood Center	439560.5698	10.09
Regional Center	60454.61495	1.39
Mixed Residential	21599.02041	0.50
Regional Center	811074.1901	18.62
Mixed Residential	63.84747571	0.00
Flexible Reseach & Dev	8984.815181	0.21
Neighborhood Center	464146.4978	10.66
Flexible Reseach & Dev	7399.548333	0.17
Flexible Reseach & Dev	6013.694174	0.14
Regional Center	83272.81112	1.91
Regional Center	7145.068762	0.16
Mixed Residential	782485.829	17.96
Mixed Residential	805914.8807	18.50
Mixed Residential	100463.5518	2.31
Mixed Residential	33086.7133	0.76
Mixed Residential	32671.58817	0.75
Neighborhood Residential	16570.8002	0.38

CA Difference	Volume Difference	Percent Difference
91.30	**54.78**	**25%**

Neighborhood Residential	835702.9911	19.19
Neighborhood Center	883376.7006	20.28
Rural Cluster Residential	733841.1092	16.85
Neighborhood Residential	876546.134	20.12
Rural Cluster Residential	37461.84148	0.86
Rural Cluster Residential	842987.6356	19.35
Neighborhood Residential	3415233.127	78.40
Mixed Residential	1680386.659	38.58
Neighborhood Residential	37658.88056	0.86
Neighborhood Residential	841243.7609	19.31
Flexible Reseach & Dev	505.9704946	0.01
Neighborhood Residential	1382039.24	31.73
No Value	22007.6433	0.51
Regional Center	840.4635111	0.02
Neighborhood Center	347871.156	7.99
Neighborhood Center	44990.1962	1.03
Neighborhood Center	197991.3859	4.55
Regional Center	152732.5473	3.51
Regional Center	294569.9377	6.76
Neighborhood Center	571278.3175	13.11
Regional Center	111.6336036	0.00
Neighborhood Residential	776314.0179	17.82
Mixed Residential	1108955.099	25.46
Mixed Residential	261643.995	6.01
Neighborhood Residential	219824.7616	5.05
Neighborhood Residential	258963.6946	5.94
Flexible Reseach & Dev	22806.23968	0.52
Mixed Residential	803987.4268	18.46
Regional Center	153294.8974	3.52
Regional Center	52124.13877	1.20
Neighborhood Center	173568.2225	3.98
Regional Center	45559.78846	1.05
Mixed Residential	45686.83696	1.05
Mixed Residential	47952.83086	1.10
Mixed Residential	45284.70258	1.04
Regional Center	73166.7915	1.68
Regional Center	83557.26887	1.92
Flexible Reseach & Dev	6662.134612	0.15
Flexible Reseach & Dev	13919.763	0.32
Regional Center	898814.0338	20.63
Mixed Residential	69068.67645	1.59
Rural Cluster Residential	769442.6469	17.66
Rural Cluster Residential	81699.06879	1.88
Rural Cluster Residential	857695.1982	19.69
Rural Cluster Residential	838416.1562	19.25
Neighborhood Center	589163.4775	13.53
Neighborhood Center	39995.03917	0.92
Neighborhood Center	391770.5263	8.99
Neighborhood Residential	577954.2497	13.27
Neighborhood Center	245118.1408	5.63
Mixed Residential	240892.0415	5.53
Neighborhood Residential	785012.7076	18.02
Neighborhood Residential	15226.7662	0.35
Mixed Residential	762348.5144	17.50
Regional Center	71840.14449	1.65
Neighborhood Residential	1219285.818	27.99
Neighborhood Residential	652860.9832	14.99
Neighborhood Residential	105472.1133	2.42
Rural Cluster Residential	864405.8608	19.84
Rural Cluster Residential	786645.5536	18.06
Rural Cluster Residential	824850.6239	18.94
Neighborhood Residential	22949.62016	0.53
Neighborhood Residential	1712588.919	39.32
Neighborhood Center	637065.9974	14.63

Basin DY

Catchment Area Impacted by SEDA (Acres): 648.83

General Plan Area Calculations

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	27.20	Regional Shopping Center	19.04	11.42
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	0.00	Medium Density (5-10 DU/acre)	0.00	0.00
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	0.00	High Density (23-44 DU/acre)	0.00	0.00
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	540.98	*Heavy Industrial (M-3)	405.74	243.44
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	0.00	Office Commercial (OC)	0.00	0.00
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	44.02	Open Space (OS)	8.80	5.28
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	0.00	*MDR-50	0.00	0.00
Water	0.00			
Roads =648.83 - Sum(Row5-22)	36.63		32.97	19.78
Totals (Row5-25):	612.20			
Totals check(Row 36-40):	612.20			
Grand Total:	648.83		466.55	279.93

City of Fresno GIS Data

Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
Employment - Regional Business Park	8097137.463	185.88
Employment - Regional Business Park	12175534.32	279.51
Employment - Regional Business Park	3292601.401	75.59
Open Space	1917367.619	44.02
Corridor - Center Mixed Use	1184879.009	27.20

SEDA Area Calculations

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	30.80	Community Center	20.64	12.38
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	0.00	Neighborhood Residential	0.00	0.00
Mixed Residential	0.00	Mixed Residential	0.00	0.00
Flexible Reseach & Dev	581.39	Flexible Reseach & Dev	430.23	258.14
Office Center	0.00	Office Center	0.00	0.00
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	0.00	Neighborhood Center	0.00	0.00
Water	0.00			
Roads =648.83 - Sum(Row5-22)	36.64		32.97	19.78
Totals (Row5-25):	612.19			
Totals check(Row 36-78):	612.19			
Grand Total:	648.83		483.84	290.30

CA Difference	Volume Difference	Percent Difference
17.29	10.38	4%

South East Development Area GIS Data

SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Community Center	89487.27483	2.05
Community Center	134740.2111	3.09
Community Center	48557.39241	1.11
Community Center	39620.00034	0.91
Community Center	225108.2932	5.17
Community Center	64611.83442	1.48
Community Center	662048.8822	15.20
Community Center	36848.29636	0.85
Community Center	40691.96701	0.93
Flexible Reseach & Dev	1383535.3	31.76
Flexible Reseach & Dev	49648.13803	1.14
Flexible Reseach & Dev	4006.923742	0.09
Flexible Reseach & Dev	753118.2987	17.29
Flexible Reseach & Dev	1745905.768	40.08
Flexible Reseach & Dev	672548.1334	15.44
Flexible Reseach & Dev	930265.6496	21.36
Flexible Reseach & Dev	102040.0754	2.34
Flexible Reseach & Dev	818551.6973	18.79
Flexible Reseach & Dev	811614.553	18.63
Flexible Reseach & Dev	163058.2982	3.74
Flexible Reseach & Dev	842072.7333	19.33
Flexible Reseach & Dev	803760.2082	18.45
Flexible Reseach & Dev	1693046.614	38.87
Flexible Reseach & Dev	824968.6918	18.94
Flexible Reseach & Dev	816890.082	18.75
Flexible Reseach & Dev	38984.94497	0.89
Flexible Reseach & Dev	923032.3969	21.19
Flexible Reseach & Dev	868908.6238	19.95
Flexible Reseach & Dev	275894.7473	6.33
Flexible Reseach & Dev	69171.01337	1.59
Flexible Reseach & Dev	730735.5681	16.78
Flexible Reseach & Dev	624759.9064	14.34
Flexible Reseach & Dev	888498.0522	20.40
Flexible Reseach & Dev	727426.7223	16.70
Flexible Reseach & Dev	723571.3533	16.61
Flexible Reseach & Dev	788268.4933	18.10

Flexible Reseach & Dev	822036.505	18.87
Flexible Reseach & Dev	818504.2693	18.79
Flexible Reseach & Dev	812659.0822	18.66
Flexible Reseach & Dev	813173.7603	18.67
Flexible Reseach & Dev	1479702.356	33.97
Flexible Reseach & Dev	801838.3261	18.41
Flexible Reseach & Dev	703181.933	16.14

Basin DZ

Catchment Area Impacted by SEDA
(Acres): 645.56

Land Use Classification	General Plan Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	General Plan Required Basin CA	General Plan Required Basin Volume [CA*0.5*1.2] (acre-ft)
Corridor - Center Mixed Use	28.72	Regional Shopping Center	20.10	12.06
Regional Mixed-Use	0.00	Community Commercial	0.00	0.00
Residential - Low Density	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Residential - Medium High Density	0.00	Medium High Density (10-23 DU/acre)	0.00	0.00
Residential - Medium Density	124.51	Medium Density (5-10 DU/acre)	39.84	23.91
Residential - Medium Low Density	0.00	Medium Low (2-5 DU/Acre)	0.00	0.00
Residential - Urban Neighborhood	95.71	High Density (23-44 DU/acre)	52.64	31.58
Employment - Business Park	0.00	*Heavy Industrial (M-3)	0.00	0.00
Employment - Regional Business Park	228.50	*Heavy Industrial (M-3)	171.38	102.83
Employment - Light Industrial	0.00	Light Industrial	0.00	0.00
Employment - Office	63.89	Office Commercial (OC)	41.53	24.92
Public Facility - College	0.00	*MDR-50	0.00	0.00
Open Space	0.00	Open Space (OS)	0.00	0.00
Open Space - Community Park	0.00	Open Space (OS)	0.00	0.00
Open Space - Ponding Basin	0.00	Open Space (OS)	0.00	0.00
Railroad	0.00	Railroad	0.00	0.00
SEGA Buffer	0.00	Rural Density (0-0.7 DU/acre)	0.00	0.00
SEGA School with Park	59.13	*MDR-50	29.56	17.74
Water	0.00			
Roads =645.56 - Sum(Row5-22)	45.11		40.60	24.36
Totals (Row5-25):	600.45			
Totals check(Row 36-51):	600.45			
Grand Total:	645.56		395.65	237.39

SEDA Equivalent Land Use	SEDA Catchment Areas [from GIS table below] (Acres)	FMFCD Land Use	SEDA Required Basin CA	SEDA Required Basin Volume [CA*0.5*1.2] (acre-ft)
Community Center	34.54	Community Center	23.14	13.89
Regional Center	0.00	Community Commercial	0.00	0.00
Rural Residential	0.00	Low Density (0-2 DU/acre)	0.00	0.00
Neighborhood Residential	120.83	Neighborhood Residential	62.83	37.70
Mixed Residential	86.71	Mixed Residential	39.89	23.93
Flexible Reseach & Dev	236.72	Flexible Reseach & Dev	175.17	105.10
Office Center	65.30	Office Center	42.45	25.47
Institutional	0.00	Institutional	0.00	0.00
Park_OS_FloodControl	0.00	Open Space (OS)	0.00	0.00
Rural Cluster Residential	0.00	Rural Cluster Residential	0.00	0.00
Neighborhood Center	71.10	Neighborhood Center	43.37	26.02
Water	0.00			
Roads =645.56 - Sum(Row5-22)	30.36		27.32	16.39
Totals (Row5-25):	615.20			
Totals check(Row 36-81):	615.20			
Grand Total:	645.56		414.17	248.50

CA Difference	Volume Difference	Percent Difference
18.52	11.11	5%

City of Fresno GIS Data		
Planned Land Use Designation	AREA	AREA
	Square Feet	Acres
SEGA School with Park	438518.3973	10.07
Residential - Medium Density	5423515.354	124.51
SEGA School with Park	756003.5535	17.36
SEGA School with Park	796875.4912	18.29
SEGA School with Park	584116.5818	13.41
Corridor - Center Mixed Use	394101.7458	9.05
Corridor - Center Mixed Use	75052.67239	1.72
Employment - Regional Business Park	919277.3683	21.10
Residential - Urban Neighborhood	3104281.755	71.26
Corridor - Center Mixed Use	465122.3869	10.68
Residential - Urban Neighborhood	226426.6211	5.20
Employment - Regional Business Park	5733176.48	131.62
Employment - Office	2782964.559	63.89
Employment - Regional Business Park	3301043.316	75.78
Corridor - Center Mixed Use	316711.9269	7.27
Residential - Urban Neighborhood	838367.3556	19.25

South East Development Area GIS Data		
SEDA Land Use Designation	AREA	AREA
	Square Feet	Acres
Neighborhood Center	629357.3993	14.45
Mixed Residential	678598.8045	15.58
Community Center	24943.06139	0.57
Flexible Reseach & Dev	1679064.88	38.55
Community Center	58842.33589	1.35
Mixed Residential	27232.56708	0.63
Flexible Reseach & Dev	96693.78536	2.22
Office Center	1605604.134	36.86
Flexible Reseach & Dev	64895.31535	1.49
Community Center	400643.0462	9.20
Neighborhood Center	540915.44	12.42
Flexible Reseach & Dev	87444.17656	2.01
Flexible Reseach & Dev	818535.8245	18.79
Neighborhood Residential	1211516.801	27.81
Flexible Reseach & Dev	71027.31018	1.63
Mixed Residential	679916.9716	15.61
Neighborhood Residential	1662299.669	38.16
Neighborhood Residential	766048.478	17.59
Neighborhood Residential	756003.2291	17.36
Office Center	1170819.527	26.88
Mixed Residential	30259.51772	0.69
Flexible Reseach & Dev	60197.2641	1.38
Mixed Residential	890518.1146	20.44
Mixed Residential	24017.25283	0.55
Mixed Residential	412818.1988	9.48
Community Center	31778.86213	0.73
Community Center	31889.91095	0.73
Community Center	323308.7792	7.42
Flexible Reseach & Dev	869110.7513	19.95
Flexible Reseach & Dev	3258767.387	74.81
Mixed Residential	168870.2854	3.88
Neighborhood Center	584116.8439	13.41
Flexible Reseach & Dev	3305636.062	75.89
Community Center	40900.0405	0.94
Community Center	43264.14604	0.99
Community Center	30090.49367	0.69

Mixed Residential	864982.929	19.86
Neighborhood Center	452826.0388	10.40
Community Center	451077.3855	10.36
Neighborhood Center	889845.0087	20.43
Neighborhood Residential	28089.31741	0.64
Neighborhood Residential	47238.77204	1.08
Neighborhood Residential	791562.5801	18.17
Neighborhood Residential	560.0292567	0.01
Office Center	68215.14987	1.57
Community Center	67836.1618	1.56

Appendix B

FMFCD Storm Drain and Flood Control Master Plan

Exhibit A

- F.M.F.C.D. BOUNDARY
- DRAINAGE AREA BOUNDARY
- BQ DRAINAGE AREA DESIGNATION
- EXISTING PIPELINES
- DESIGN PIPELINES
- PROPOSED PIPELINES
- ACQUIRED BASIN FACILITY
- PROPOSED BASIN FACILITY
- NON-PLANNED AREAS
- AG USE FEE EXEMPTION
- CHANNELS AND CANALS
- RURAL STREAMS
- CITY SPHERE

0 0.35 0.75 1.5 2.25 3 Miles
0 0.5 1 2 3 4 Kilometers

FRESNO
CLOVIS
FRESNO - YOSEMITE INTERNATIONAL
Sierra Sky Park Airport
Fresno Chandler Airport
Landfill
CALIFORNIA STATE UNIVERSITY FRESNO
WOODWARD PARK
Woodward Lake
ROEDING PARK
LEAKY ACRES
Sunnyside Country Club

BIG DRY CREEK RESERVOIR
ALLUVIAL DRAIN BASIN
PUP CREEK ENTERPRISE DETENTION BASIN
PUP CREEK BASIN
FANCHER CREEK RESERVOIR
REDBANK RESERVOIR
REDBANK BASIN
FANCHER GOULD BASIN
FANCHER CREEK BASIN
DRY CREEK EXTENSION BASIN

SAN JOAQUIN RIVER
KINGS RIVER

Fresno Metropolitan Flood Control District
STORM DRAINAGE AND FLOOD CONTROL MASTER PLAN
FRESNO COUNTY, CALIFORNIA

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Appendix C

FMFCD Recommended Design “C” Factors for the City of Fresno

FRESNO METROPOLITAN FLOOD CONTROL DISTRICT

RECOMMENDED DESIGN "C" FACTORS
FOR
THE CITY OF FRESNO

NOTE: 1) The recommended "C" Factors & R/G times are for typical developments and should be verified by the Engineer for applicability.

FMFCD Land Use Designation	FMFCD Land Use Color Code	City of Fresno Allowable Density and Land Use Zoning	"C" Factor - Return Period (Years)								Recommended Roof to Gutter Time (min.)	Comments
			2			*5	*10	*25	*50	*100		
			1.10	1.00	1.20	Supplement "C" Factor is 1.00						
Rural Density Residential (RD-R)	Na	0 to 0.7 units/ac AE-20 AE-5 R-A	0.319	0.29	0.348	0.33	0.38	0.46	0.52	0.58	25	
Low Density Residential (LD-R)		0 to 2.0 units/ac R-A R-1-E R-1-A R-1-B	0.319	0.29	0.348	0.33	0.38	0.46	0.52	0.58	25	
Medium-Low Density Residential (MLD-R)		2.0 to 5.0 units/ac R-1-A R-1-B R-1-C	0.319	0.29	0.348	0.33	0.38	0.46	0.52	0.58	25*	*Use 20 min. if drainage is piped to front yard.
Medium Density Residential (MD-R) @ 45% C-Factor @ 50% C-Factor		5.0 to 10.0 units/ac R-1-C R-1 R-2-A R-1 45 R-1 50	0.352 Na Na	0.32 0.45 0.50	0.384 Na Na	0.36	0.42	0.51	0.57	0.64	20* 20 20	*Use 20 min. for new development after 6/19/2008 - for prior development use 25 min.
Medium-High Density Residential (MHD-R)		10.0 to 23.0 units/ac R-2-A R-2 R-3-A	0.462	0.42	0.504	0.47	0.52	0.60	0.65	0.71	20	May have private on-site system. If present adjust R/G time as necessary.
High Density Residential (HD-R)		23.0 to 44.0 units/ac R-3-A R-3 R-4	0.605	0.55	0.66	0.62	0.68	0.79	0.85	0.90	20	May have private on-site system. If present adjust R/G time as necessary.
Neighborhood Commercial (NC)		C-1 C-L	0.77	0.70	0.84	0.74	0.77	0.82	0.84	0.90	10	May have private on-site system. If present adjust R/G time as necessary.
Community Commercial (CC)		C-2 C-L	0.77	0.70	0.84	0.74	0.77	0.82	0.84	0.90	10	May have private on-site system. If present adjust R/G time as necessary.
Regional Shopping Center (RC)		C-3 C-4	0.77	0.70	0.84	0.74	0.77	0.82	0.84	0.90	10	May have private on-site system. If present adjust R/G time as necessary.
General Heavy Strip (GC or GHS)		C-5 C-6 C-P	0.77	0.70	0.84	0.74	0.77	0.82	0.84	0.90	10	May have private on-site system. If present adjust R/G time as necessary.
Office Commercial (OC)		R-P C-P RP-L	0.715	0.65	0.78	0.69	0.72	0.76	0.78	0.85	10	May have private on-site system. If present adjust R/G time as necessary.
Light Industrial (LI)		M-1-P M-1 C-M	0.715	0.65	Na	0.69	0.72	0.76	0.78	0.85	15	May have private on-site system. If present adjust R/G time as necessary.
Heavy Industrial (HI)		M-1-P M-1 M-2 M-3	0.825	0.75	Na	0.80	0.83	0.88	0.90	0.90	15	May have private on-site system. If present adjust R/G time as necessary.
Road (Road)	Na	Na	Na	0.90	Na	0.90	0.90	0.90	0.90	0.90	5	For arterial & collector roads verify that landscape setback is typical. If not adjust "C" as necessary.
Open Space (OS)	Na	Na	0.22	0.20	0.24	0.23	0.26	0.32	0.36	0.40	Na	Use for open space areas that are mostly grass. Use surface flow time curve or other means to establish Tc.

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